TEXAS A&M UNIVERSITY

Graduate Council Meeting Agenda

310 Jack K. Williams Administration Building

December 3rd, 2015

1. **Discussion Items**
   a. Graduate Distance Course
   b. Course Leaf Updates
   c. Graduate Council Standard Operating Procedures

2. **New Course Requests:**
   a. AERO 651 Human Spaceflight Operations
   b. ANTH 680 Teaching Anthropology
   c. ARCH 637 Seminar in Japanese Architecture History and Theory
   d. ATMO 618 Numerical Methods for the Geosciences
   e. ATMO 634 Fundamentals of High Performance Computing for the Geosciences
   f. BAEN 642 Water-Energy-Food Nexus: Toward Sustainable Resource Management
   g. BMEN 637 Pathologic Basis of Implantable Devices
   h. BMEN 676 Professional Development for Biomedical Engineering
   i. CVEN 602 Remote Sensing in Hydrology
   j. CVEN 642 Water-Energy-Food Nexus: Toward Sustainable Resource
   k. CVEN 650 Stochastic Mechanics
   l. ECEN 765 Machine Learning with Networks
   m. GEOL 647 Radiogenic Isotope Geology
   n. GEOP 618 Numerical Methods for the Geosciences
   o. GEOP 634 Fundamentals of High Performance Computing for the Geosciences
   p. MEEN 604 Time Frequency Nonlinear Vibration Control
   q. MSEN 610 Principles of Composite Materials
   r. MSEN 618 Data-Driven Discovery of Materials
   s. MSEN 655 Materials Design Studio
   t. MSEN 657 Summer School in Computational Materials Science
   u. MSEN 659 Communicating Materials, Informatics & Design Learning Experiences in an ePortfolio
   v. OCNG 634 Fundamentals of High Performance Computing for the Geosciences
   w. OCNG 656 MATHLAB Programming for Ocean Sciences
   x. PETE 614 Master Graduate Student Paper Contest
   y. PETE 615 Doctoral Student Paper Contest
   z. SUBS 601 Fundamentals of Subsea Engineering

3. **Course Change Requests:**
   a. BMEN 604 FDA Good Laboratory and Clinical Practices
   b. BMEN 608 Optical Diagnostic and Monitoring Principles
   c. BMEN 631 Thermodynamics of Biomolecular Systems
   d. BMEN 641 Numerical Methods in Biomedical Engineering
   e. BMEN 650 Biomedical Optics Laboratory
   f. BMEN 652 Cell Mechanobiology
   g. BMEN 661 Cardiac Mechanics
   h. BMEN 663 Soft Tissue Mechanics and Finite Element Methods
   i. BMEN 682 Polymeric Biomaterials
   j. EDHP 504 Teaching Practicum
   k. EDHP 505 Thesis

l. EDHP 506 Project
m. FINC 705 Corporate Finance
n. GEOG 651 Remote Sensing for Geographical Analysis
o. GEOG 659 GeoDatabases
p. GEOG 660 Applications in GIS
q. GEOG 661 Digital Image Processing and Analysis
r. GEOG 662 GIS in Land and Property Management
s. GEOG 665 GIS-Based Spatial Analysis and Modeling
t. GEOG 676 GIS Programming
u. GEOG 678 WebGIS
v. MEMA 613 Principles of Composite Materials
w. MSEN 601 Fundamentals of Materials Science and Engineering
x. MSEN 602 Advanced Materials Science and Engineering
y. OCNG 615 Numerical Modeling of Ocean Circulation I
z. OCNG 616 Numerical Modeling for Ocean Circulation II

4. Change in Curriculum Requests

a. College of Nursing- Master of Science in Nursing Education

5. Special Consideration Requests

a. Computer Engineering – Master of Engineering – Distance Education
b. Electrical Engineering – Master of Engineering – Distance Education
c. Engineering Technology and Industrial Distribution – Master of Engineering in Technical Management
d. Maritime Administration – Maritime Administration and Logistics – Residency Waiver
e. Sociology - Latino/a and Mexican American Studies Minor
f. Technical Management – Master of Engineering – Distance Education

6. Informational Items

a. School of Law- First Professional Programs
   i. New Course Requests
      1. LAW 7304 Due Diligence for the Professional
      2. LAW 7402 Pre-Suit Patent Litigation
      3. LAW 7409 Special Problems in Corporate Law: Offshore
      4. LAW 7445 Environmental Oil and Gas Law
      5. LAW 7645 Sentencing Law & Policy Seminar
      6. LAW 7793 LARW III: Public Policy Drafting
      7. LAW 7851S Wills & Estate Clinic
   ii. Change in Course Requests
      1. LAW 7839 Residency Externship
      2. LAW 7865S Law Clinic
      3. LAW 7932 Journal of Property Law Board
      4. LAW 7933 Journal of Property Law

Discussion Items

Graduate Council (GC) Standard Operating Procedures (SOP)

Purpose: The Graduate Council shall review all curricular requests pertaining to the graduate and professional academic programs, shall be responsible for the quality and development of the graduate instruction and programs and shall advise the Associate Provost for Graduate and Professional Studies on all graduate program matters.
The Graduate Council shall communicate in writing, through its secretary, its recommendations to the Faculty Senate.

Meetings: The GC will meet on the first Thursday of each month.

(1) Membership shall consist of one representative from each college and off campus academic unit, who shall be selected by the Faculty Senate Committee on Committees after consultation with the college deans and caucuses (chairs of college graduate instruction committees and associate deans for graduate programs shall be considered for appointment); two representatives of the Graduate Faculty; two graduate students; and the Associate Provost for Graduate and Professional Studies as an Ex-Officio member. All faculty members shall be members of the Graduate Faculty.

All of the above members except the Associate Provost shall be voting members. In the absence of the appointed member, a substitute may vote on behalf of that unit.

The Associate Directors of Graduate and Professional Studies, one representative of the University Library Council, and one member of the Medical Sciences Library shall serve as non-voting members. In addition, a representative from Curricular Services shall serve and provide advice as a non-voting member.

All faculty members shall serve three-year terms. Those serving on a committee as a result of their Texas A&M University position shall continue to serve as long as they are in that position. Student members shall serve one-year terms.

A representative from the Office of Graduate and Professional Studies (OGAPS) shall serve as secretary but not have voting privileges.

(2) The election for the GC Chair and Vice-Chair should take place during the October meeting for an effective date of 1 January. The chair and vice chair will be limited to one three-year term; the elevation of the vice-chair to chair, though commonplace, shall not be automatic. It is recommended that the Chair and Vice-Chair represent different Colleges.

(3) The GC shall review all proposed courses, programs, and changes to existing curricula at the graduate level and shall recommend appropriate policies to improve and develop graduate academic programs. All items for review shall be routed by through the appropriate colleges for approval.

(4) Items requiring vote include New Courses, Course Withdrawal, Change in Courses, Change in Curricula, Administrative Changes and Special Considerations (including new programs, degrees and certificates). These items may be approved, not approved, approved with changes (friendly amendments), referred to an electronic vote (e-vote, see item 11) prior to the deadline to submit to Faculty Senate, or postponed to a certain time (tabled, see item 12). Each item must receive a majority vote to pass. That is, at least half (50 percent) of GC voting members in attendance must approve an agenda item.

(5) The College representative or designee must be present to answer any questions regarding an agenda item. If a question arises and no representative is present, then the item will not be considered.

(6) Letters of support from all academic programs affected by curricular changes shall be provided to the GC by the department bringing the item(s) forward.

(7) Proposed courses in which undergraduate and graduate students meet together at the same time with the same instructor ("stacked courses") must have an instructor of record that is a member of the Graduate Faculty and the syllabus must clearly indicate the additional work required for the graduate students.

(8) New cross-listed courses require individual sets of approval forms. Adding a cross-listed course to an existing course only needs to be considered by the GC if the course is a new course.

(9) Approval of research and problem-based credit hours (685 and 691) and exploratory new (special topics) courses (689) do not require the GC approval.

(10) The GC shall operate under these rules:

Two weeks prior to meeting all agenda items are due to OGAPS.

No later than one week prior to meeting all voting and non-voting members will receive the agenda as a digital file easily searched and including all materials necessary to complete an informed review.

No Consent Agenda is designated. Rather, all agenda items will be fully considered at the Thursday meeting.

Any agenda item may be challenged at the meeting by a motion from a Committee Member with a second from another Committee Member.

(11) The Chair and/or Vice-Chair may elect to hold an electronic vote (e-vote) meeting when agenda items are minimal and there are no pending deadlines. An e-vote for a specific agenda item with an extremely tight deadline may also be used as deemed appropriate by the Chair or Vice-Chair and voted by the committee. E-votes by the committee are sent to the Secretary for compilation. The Chair and Vice-Chair are notified and the agenda item either passes or fails based on the e-votes received.

(12) The GC may vote to postpone voting on an agenda item (table the item) for various reasons (i.e., no representative present, support letters missing, corrections to form/syllabus, etc.). It is the responsibility of the department to resubmit the postponed item for reconsideration with the updates as requested by the committee.

(13) Submissions for consideration by the GC that are not complete or correct by stated GC standards will be returned by the Secretary, in consultation with the Chair and/or Vice Chair.

(14) New course requests and course changes involving significant content modification or alteration in course credit hours must include syllabi that comply with current University minimum syllabus requirements (http://curricularservices.tamu.edu).

New Courses

RECEIVED
NOV 17 2015
GRADUATE STUDIES

OC

RECEIVED
NOV 09 2015
EASA

Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

•Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Aerospace Engineering
3. Course prefix, number and complete title of course: AERO 651 Human Spaceflight Operations
4. Catalog course description (not to exceed 50 words):
   Essential aspects of human spaceflight operations as performed by NASA; in-depth understanding of the state-of-the-art in spacecraft operations, including spacecraft systems, ground and launch operations, mission management and on-orbit activities such as science, robotics, spacewalking and human health maintenance; applications to future space systems.
5. Prerequisite(s): Graduate classification.
   Cross-listed with: Stacked with: AER0 451
   Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times.
   Will this course be repeated within the same semester? ☐ Yes ☐ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
       MEN, MS, PHD in Aerospace Engineering
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
AERO	651	Human Spaceflight Operations

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
3.00	0.00	0.00	3.00	1402010006	0100	16 - 17	0 0 3 6 3 2

Level: 6

Approval recommended by:

Rodney D. Bowersox [signature] 10-29-15
Department Head or Program Chair *(Type Name & Sign)* Date
AERO Vikram K. Kinra

Prasad Enjeti [signature] 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Prasad Enjeti [signature] 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Karen Butler-Purry
Chair, GC or UCC Date

Associate Director, Curricular Services

Date Effective Date

TEXAS A&M UNIVERSITY

AEROSPACE ENGINEERING
TEXAS A&M UNIVERSITY

SYLLABUS

Aerospace Engineering - AERO 651 Human Spaceflight Operations
Semester: Spring 2017
Day/Time/Room: TBA
Credit: 3 (3-0), Elective Course

Course Brief Description

Essential aspects of human spaceflight operations as performed by NASA; in-depth understanding of the state-of-the-art in spacecraft operations, including spacecraft systems, ground and launch operations, mission management and on-orbit activities such as science, robotics, spacewalking and human health maintenance; applications to future space systems.

Course Description

The intent of this course is to give graduate students a solid background and understanding of the essential aspects of human spaceflight operations as it has been done by the experts in their respective fields over the past few decades (primarily at NASA). A broad and complete range of subjects will be studied, including all the spacecraft systems, ground and launch operations, mission management and on-orbit activities such as science, robotics, spacewalking and human health maintenance. Within each subject area, the course will delve into the basic theory, practical aspects of day-to-day operations, problem solving and lessons learned. The overall intent of this course is to give the student an in-depth understanding of the state-of-the-art in spacecraft operations that can be applied to future space systems.

Prerequisites

Graduate Classification. This course is intended for Aerospace Engineering graduate students.

Learning Objectives

At the end of this course, students will have a broad background, an in-depth understanding, and some keen insights into how human spaceflight operations have been conducted, how the spacecraft systems work, what issues have arisen, and how challenges have been overcome. Regardless of their area of future specialization, this course will give students a solid foundation in spaceflight operations that will be a great asset for space related careers. In each section of the course, as outlined in the topics below, the student will learn the fundamental principles and the essence of how things operate in the actual space environment. This will be followed by real-life examples, issues, and stories that give special insight that can only come from the experts 'who were there'. Communicating important lessons learned for future space engineers and operators is also an important objective of the course.
At the end of this course, students will be able to

a) Plan human spaceflight mission operations of the launch, space, and ground segments.
b) Provide mission parameter specifications, design spacecraft subsystems, and conduct trade studies for human space missions.
c) Incorporate lessons learned from previous spaceflight experience into current and future mission operations and procedures.
d) Extrapolate the current operational concepts to future missions.

Instructor Information

Greg Chamitoff, HRBB-746B. chamitoff@tamu.edu

Rao Vadali, HRBB-727B. svadali@tamu.edu

Textbook and Resource Material

None. Study materials and lecture notes will be provided for each section of the course throughout the semester.

Method of Evaluation / Grading Policies

Most topics below will include study material and related homework assignments. Working together on homework is acceptable but copying homework is not. Do your own work! Some homework assignments will be in the form of group project that will be performed partially during workshops in class. Graduate students will receive additional, more advanced problems on the homework, workshops, quizzes or final project when this course is stacked with the undergraduate course. Attendance and participation is an essential part of the course. In lieu of a final exam there will be a final project worth 30% of the total grade. Grading percentages will be **Homework 70%, Final Project 30%.** Grading Policy: A 90 – 100%, B 80 – 89%, C 70 – 79%, D 60 – 69%, F below 60% (raw scores will be curved based on the performance of the class as a whole).

Attendance and Make-up Policies

This course is unique in that much of it will be taught by recognized experts in each field who will be coming as visiting lecturers from government and industry. Attendance is a vital component of the value of the course and full participation is expected. Late homework will not be accepted unless absence due to a University excused absence and the work is provided by a revised date specified by the instructor. If you have special circumstances, please contact one of the instructors prior to your absence or have a friend submit your homework on time. You are responsible for any material covered and any assignments given even if absent from class. (University Student rule 7: http://student-rules.tamu.edu/rule07).

Course Topics

		Week
1	**Introduction to Human Spaceflight Operations**	1
2	**Mission Integration and Execution**	2
3	**Mission Planning**	2
4	**Command, Control & Communication**	3
5	**Launch and Trajectory Design**	4
6	**Environmental Control and Life Support**	5
7	**Space-Based Power Systems**	6
8	**Attitude Determination, Control & Propulsion**	7
9	**Thermal Control Systems**	8
10	**Extra Vehicular Activity (EVA/Spacewalking)**	9
11	**Space Robotics**	9
12	**Science and Payload Operations**	10
13	**Flight Crew Operations**	11
14	**Mission Engineering Operations**	12
15	**Flight Medical Operations**	12
16	**Mission Safety**	13
17	**Launch Operations and Vehicle Processing**	14
18	**International Operations**	14
19	**FINAL PROJECT DUE (No Final Exam)**	15

Academic Integrity

Aggie Honor Code : *An Aggie does not lie, cheat or steal, or tolerate those who do.*

Refer to the Honor Council Rules and Procedures on the web http://aggiehonor.tamu.edu.

Americans with Disabilities Act (ADA)

Notice: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu .

Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

• Submit original form and attach a course syllabus.•

RECEIVED
NOV 10 2015
GRADUATE STUDIES

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Anthropology
3. Course prefix, number and complete title of course: ANTH 680: Teaching Anthropology

4. Catalog course description (not to exceed 50 words):
Course is an introduction to course planning for future instructors of anthropology courses. Topics include course design, syllabus design, student motivation and engagement, assessment design and implementation, and technology use in education.

5. Prerequisite(s): Graduate standing; admission to graduate program in Department of Anthropology
   Cross-listed with: ______ Stacked with: ______
   Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times.
   Will this course be repeated within the same semester? ☐ Yes ☑ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
    MA, MS, PhD in Anthropology
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
ANTH	680	Teaching Anthropology

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
1.00	0.00	0.00	1.00	4502010001	0280	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Ted Goebel [signature] 10/21/15
Department Head or Program Chair *(Type Name & Sign)* Date

[signature]
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Leroy G. Dorsey 11-9-15
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

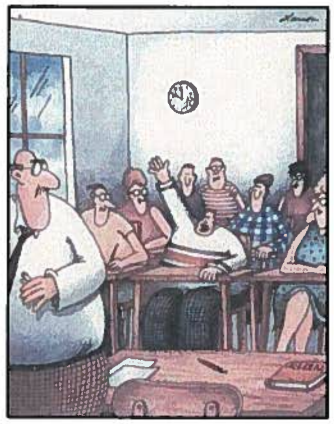
Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14

Teaching Anthropology:

Training for First-Time Graduate Instructors & Teaching Assistants

ANTH 680 – Fall 2016



Tuesday 9:35-10:25, ANTH 105

Office Hours Monday 10:30 – 11:30 – Anthropology Bld. 105A

Instructor: Dr. Filipe Castro (fvcastro@tamu.edu) Tel.: 979-853 8103

Course Description

The course is an introduction to course planning. It prepares graduate students to be effective teachers and deal with a number of subjects that will help them navigate through their first teaching experience, such as course design, syllabus design, student motivation and engagement, assessment design and implementation, and technology use in education.

Learning Objectives

The objective of this course is to get students familiar with the fundamental tasks required to teach a course at Texas A&M University. The key components of this objective are:

1. How to design a course;
2. Choose a bibliography;
3. Write a syllabus;
4. Plan each class;
5. Prepare didactic aids;
6. Incorporating available technology;
7. Define and implement the assessment plan;
8. Deal with conflict.

Prerequisites

Graduate standing; admission to graduate program in Department of Anthropology

Readings

Bain, K., *What the Best College Teachers Do*. Harvard University Press, Cambridge, MA, 2004.

All other reading materials will be posted on e-Campus.

Grading

The course grade will be based on five assignments each counting 20% to your final grade (100%). Letter Grades are based on the following scale: 100-90 = A; 80-89.9 = B; 70-79.9 = C; 60-69.9 = D; <60 = F. The final exam is not comprehensive.

Grades will only be posted on the course website and can be accessed there.

Attendance

I don't take attendance. If a student fails to turn in an assignment on time, a university approved excused absence will be required to make up the work. No late assignments will be accepted unless documentation is provided for a university approved excused absence on the due date. All late assignments must be completed before the next assignment due date. Students should notify the instructor in advance if they know they will need to take an excused absence. University approved excused absences are defined in the Texas A&M University Regulations: (http://studentrules.tamu.edu/rule07).

"Anthropologists! Anthropologists!"

Course Schedule

Week 1: Introduction

The purpose of education. Is education a topic outside politics? Aggies, money, jobs, competition, education, citizenship, democracy.

What are the most important outcomes of undergraduate education? What is the social relevance of Anthropology?! What is the use of an anthropologist?! ***Video***: https://www.youtube.com/watch?v=pzrUt9CHtpY

(Don McLeroy)

For next class watch video:

http://www.ted.com/talks/ken_robinson_says_schools_kill_creativity?language=en

(Ken Robinson)

Week 2: Planning a course

The basic rules of course planning. (CTE Learning Outcomes PowerPoint).

http://teachingcenter.wustl.edu/strategies/Pages/course-planning.aspx#.VFFAU_nF98E

Discussion: Bain, *What the Best College Teachers Do*, Introduction.

Week 3: Choosing a bibliography

Editors, politics, text books, articles and other resources. Evans Library. (CTE Teaching Strategies PowerPoint).

Discussion: Bain, *What the Best College Teachers Do*, Chapter 1

For next class watch video:

https://www.youtube.com/watch?v=u6XAPnuFjJc&list=PL4611E32F61B257F5

(Dan Pink)

Assignment 1: Write a bibliography (2 pages, TNR12, single-spaced, margins 1").

Week 4: Defining and adopting a teaching philosophy

Assessing, punishing, rewarding, motivating. Competition and citizenship. (CTE Classroom management PowerPoint).

Videos: https://www.youtube.com/watch?v=7sywMkf5QhI (Alfie Kohn)

https://www.youtube.com/watch?v=EQt-ZI58wpw (Alfie Kohn)

Discussion: Bain, *What the Best College Teachers Do*, Chapter 2

Assignment 2: Write a teaching philosophy (half page, same format)

Week 5: How to put a syllabus together

Course title, number and section, schedule and location, academic calendar, resources, prerequisites, policies, grades. (CTE Grading PowerPoint).

http://teachingcenter.wustl.edu/strategies/Pages/syllabus-checklist.aspx#.VFFuZBb4rwt

Discussion: Bain, *What the Best College Teachers Do*, Chapter 3

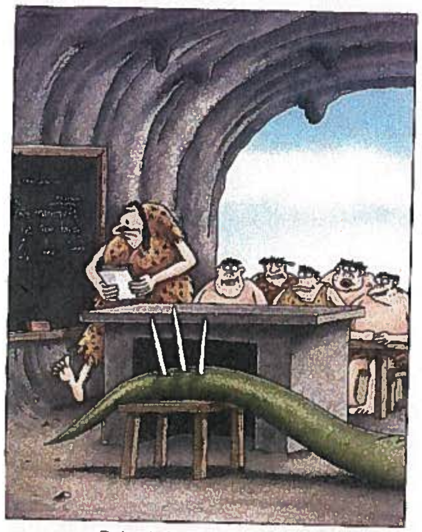
Assignment 3: Write the first draft of your syllabus (no longer than five pages).

Week 6: Defining learning objectives

Information, critical thinking, writing skills, curiosity. (CTE Advanced Technology PowerPoint).

Discussion: Bain, *What the Best College Teachers Do*, Chapter 4

Assignment 4: Write a one-page list with the five principal learning objectives for your class.



The hazards of teaching young Neanderthals

Week 7: How to manage a classroom

Student participation, lectures, exercises, grading, plagiarism, language, cultural sensitivity. (CTE Application of Teaching Strategy PowerPoint).

Discussion: Bain, *What the Best College Teachers Do*, Chapter 5

Week 8: How to construct a lecture

Rules to teach a perfect class. (CTE Self Refection for Instructors PowerPoint).

http://teachingcenter.wustl.edu/strategies/Pages/default.aspx

Discussion: Bain, *What the Best College Teachers Do*, Chapter 6

Week 9: Assessment

Exams, assignments, laboratories. Communicating about grades. (CTE International PowerPoint).

Discussion: Bain, *What the Best College Teachers Do*, Chapter 7

Assignment 5: Write the final version of your syllabus (no longer than six pages).

Week 10: Effective Teaching

What makes a good teacher?

Discussion: Bain, *What the Best College Teachers Do*, Epilogue

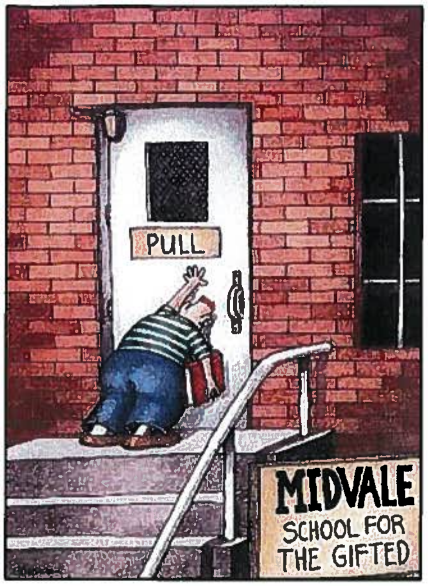
Week 11: Trends in academia

Universities as employment facilitators. Universities as places where knowledge is created and disseminated.

"*Knowledge-Based Education – We oppose the teaching of Higher Order Thinking Skills (HOTS) (values clarification), critical thinking skills and similar programs that are simply a relabeling of Outcome-Based Education (OBE) (mastery learning) which focus on behavior modification and have the purpose of challenging the student's fixed beliefs and undermining parental authority.*

Texas Republican Party 2012 Platform"

Video: http://www.ted.com/talks/richard_wilkinson?language=en



Week 12: Critical thinking

Is there an alternative to the federal/state requirement "memorize this, regurgitate it the day after and forget it forever?" Higher Order Thinking Skills (HOTS). Outcome-Based Education (OBE).

Video: https://www.youtube.com/watch?v=dUqRTWCdXt4 (Derek Cabrera)

Week 13: Social intelligence

What makes a great teacher?

Video: https://www.youtube.com/watch?v=9T9Kp4NE5I4 (Jamie Dimon)

Week 14: Discussion

How do I want to evolve as a teacher?

Websites

http://teaching.tamu.edu/Home.aspx

http://teaching.tamu.edu/Classroom-Management-and-Administration

http://teachingcenter.wustl.edu/strategies/Pages/syllabus-checklist.aspx#.VFFLpfnF98E

Title IX (of the Education Amendment of 1972)

Prohibits discrimination on the basis of sex in educational programs and activities at institutions that receive federal financial assistance: sexual discrimination, sexual harassment, sexual assault and violence.

Visit: (http://urc.tamu.edu/title-ix/).

Disabilities

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit: http://disability.tamu.edu.

Diversity Statement

Respect for cultural diversity is a core concept of Anthropology. In this course, each voice in the classroom has something of value to contribute to class discussion. Please respect the different experiences, beliefs and values expressed by your fellow students and refrain from anti-intellectual comments about other individuals, cultures, groups, or viewpoints. The Anthropology Department supports the Texas A&M University commitment to Diversity, and welcomes individuals of all ethnic groups, genders, sexual orientations, and family backgrounds.

Visit: http://diversity.tamu.edu/WhatsDiversity/CommitmentToDiversity.aspx.

Aggie Code of Honor

"An Aggie does not lie, cheat, or steal or tolerate those who do." Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System. For additional information on the Aggie Honor Code, please visit: www.tamu.edu/aggiehonor. All cases of plagiarism and cheating will be handled according to university policies. If you are caught plagiarizing, you will receive a zero for the assignment and you may receive an F for the class. Plagiarism is one of the worst academic sins, for the plagiarist destroys trust among colleagues without which research cannot be safely communicated.

Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

• Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☒ Graduate ☐ First Professional *(DDS MD JD PharmD DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Architecture
3. Course prefix, number and complete title of course: ARCH 637 - Seminar in Japanese Architecture History and Theory
4. Catalog course description (not to exceed 50 words):
Background and exploration of traditional, modern and contemporary Japanese architecture, including consideration of region, materials, structure and style, as well as the social and economic factors that influence architectural form and content; discussion of the works and writings and building models of case study of Japanese architects' design

5. Prerequisite(s): Graduate classification or approval of instructor

Cross-listed with: ______ Stacked with: ______

Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ______ to ______
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ______ times.

Will this course be repeated within the same semester? ☐ Yes ☑ No

8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
   a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

   b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*

11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
ARCH	637	Sem Japanese Arch Hist & Theor

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
3.00	0.00	0.00	3.00	040210006	0690	16 - 17	0 0 3 6 3 2

Level: 6

Approval recommended by:

Ward V. Wells [signature] 10/28/15
Department Head or Program Chair *(Type Name & Sign)* Date

Leslie Feigenbaum [signature] 10-28-15
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Leslie Feigenbaum [signature] 10-28-15
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date Effective Date

TEXAS A&M UNIVERSITY

DEPARTMENT OF ARCHITECTURE
SYLLABUS

Course title and number	ARCH 637 Seminar in Japanese Architecture History and Theory
Term (e.g., Fall 200X)	Spring 2017
Meeting times and location	TR 11:10-12:25 ARC A302

Course Description and Prerequisites

Japanese Architecture: Theory and History. Background and exploration of Traditional, Modern and Contemporary Japanese Architecture, including consideration of region, materials, structure and style, as well as the social and economic factors that influence architectural form and content; discussion of the works and writings and building models of case study of Japanese architects' design. Prerequisite: Graduate classification or approval of instructor.

3.000 Credit hours
3.000 Lecture hours

Learning Outcomes

1. Identify, define and describe the visual and textual languages of architecture in theory and in practice and critically assess various works of art and architecture through the analysis of formal elements and aesthetic principles.
2. Articulate the creative process of artistic and architectural design as expressions of human experience and cultural values.
3. Prepare the student for final study by investigating the creative role ideas play in the design process and how they are made manifest in architecture.
4. Develop the student's ability to understand how architecture theory and idea translated into the space and structure by the analysis and building case study models, and speak and write effectively on key subjects in their field of study.
5. Complement the design studio by surveying, analyzing and interpreting historical precedents, investigating their contemporary relevance and evaluating their usefulness as formal, structural and programmatic models.
6. Raise the student's awareness of architectural discourse in the context of global change and sustainability.

Instructor Information

Name	Koichiro Aitani
Telephone number	979.845.3218
Email address	kaitani@arch.tamu.edu
Office hours	By appointment
Office location	Langford Building A – Room431

Textbook and/or Resource Material
(Reading Assignment)

In Praise of Shadows by Junichiro Tanizaki, Leete's Island Books, 1977, pp. 5-64
What is Japanese Architecture? -A Survey of Traditional Japanese Architecture by Kazuo Nishi, Kodansha USA (May 1, 2012), pp. 7-52
The Metabolism/1960, Bijutsu Syuppan, 1960, pp. 4-69
Fumihiko Maki: Building and Projects, Princeton Architectural Press; 1st edition (July 1, 1997), pp. 206-217
Fumihiko Maki, An Aesthetic of Fragmentation, Rizzoli (August 15, 1988) pp. 7-16
Learning from the Japanese City: West Meets East in Urban Design (Planning, History and Environment Series) Taylor & Francis (1999/04), pp. 66-150
Light Construction by Terence Riley, The Museum of Modern Art, New York (1995), pp. 9-32

Assessment

Summary of Reading Assignments (Six assignments x 5% each = 30% of final grade)
There will be six writing assignments, each worth 5% of your final grade. You will be required to summarize the main points and reflect on key issues. Each paper should be 1 page in length or approximately 300 words.

- The due dates are indicated on the schedule of lectures.
- Format: Include your name and the author/title of the reading in the header.

Research Project Presentation and Review (50% of the final grade)
Each student will select a topic, theme, object, structure, medium, method, technique, practice, reign, or narrative that is of interest to them, and then prepare an analysis of the chosen topic to present in a format that is most relevant to you and/or useful to your own field of study.

Written proposal of research topic Due February 7 or 9: 5%
Proposal Mid-Term Presentation Due March 7 or 9: 5%
Final Presentation and Discussion (10 minutes) Due April 25, 27, or May 5: 20%
Analytical Research Paper Due May 5: 20%

Grading will be based on the following criteria, ranked on a scale of 0 (not attempted) to 5 (superior):

Clarity and specificity of written project topic proposal	0	1	2	3	4	5
Relevance of the topic to the course material	0	1	2	3	4	5
Relevance of the topic to the student's chosen field	0	1	2	3	4	5
Bibliography	0	1	2	3	4	5
Research documentation	0	1	2	3	4	5
Clarity, vigor, correctness and conciseness of expression	0	1	2	3	4	5
Degree of completion as compared to proposal	0	1	2	3	4	5

Guidelines for Written Proposal

Submit a one-paragraph description of your project that includes the following information:

- Specific topic, theme, image, object, structure, medium, period, practice, technique, reign or narrative
- Statement of relevance of the topic to the course material
- Statement of relevance of the topic to the student's chosen field of study or professional practice
- Form or medium of presentation
- Statement of objective(s) to be achieved by completion and submission of project
- List of references (scholarly works)

Guidelines for Analytical Research Paper (if you decided to present in this format)
• A machine-printed, double-spaced paper of 2,500 words minimum (approximately ten pages), Times New Roman font size 11, presented in this order: • Creative title; • Abstract at the beginning of the paper. In no more than 150 words, it should summarize the argument and define the methodological approach of the article. The abstract should be written in the third person. • Text and accompanying endnotes. • Bibliography • Chicago Style Citation: http://www.chicagomanualofstyle.org/tools_citationguide.html • Presentations: In addition to the written paper, you will explain your project in about 10 minutes. This exposition includes: • A brief explanation of the sources/references (annotated bibliography) that you have used. • Image and drawings of the main ideas of your essay.
Note: ANALYTICAL: uses evidence to analyze facets of an issue; ARGUMENTATIVE: uses evidence to attempt to convince the reader of your particular stance on a debatable topic. For more information see:
http://writingcenter.tamu.edu/how-to/academic/ and http://owl.english.purdue.edu/owl/resource/545/01/ Important: Be clear, concise and specific! Grade is based on quality and not quantity! A bibliography must be included; you must use at least three scholarly references; avoid ".com" references; include web site if used; include the title of the paper! Do not download text information directly on your report. Plagiarism is non-professional! Images, plans, photos are acceptable.

Participation (20% of the final grade)
Your grade will be based upon attendance and ***active participation*** in class exercises:
Presentations 2 x 5% = 10%,
Discussion questions (bi-weekly) = 5%
Class discussion (bi-weekly) = 5%

While attendance is the responsibility of the individual student, a point will be deducted for every two unexcused absences.

Grading Policies

Final letter grades will be determined consistent with University regulations and the College of Architecture grading guidelines:

A= 90-100	Excellent/outstanding (extremely good work)
B= 80-89	Above average (very good work)
C= 70-79	Average (fairly good work)
D= 69-60	Below average (poor work)
F= below 60	Failure (unacceptable work)

Late Assignment Policy: Late assignments will be accepted without question for excused absences as defined by University regulations. Any late assignments without an excused absence **will accepted for a period of three days** after the due date and will be assessed a 10% penalty.

Plagiarism

The most common type of misconduct reported to the Honor System Office, this is using someone else's intellectual content (ideas, words, pictures, etc.) with giving appropriate credit or attribution.
Examples:

- Intentionally, knowingly, or carelessly presenting the work of another as one's own (i.e., without crediting the author or creator).
- Failing to credit sources used in a work product in an attempt to pass off the work as one's own.
- Attempting to receive credit for work performed by another, including papers obtained in whole or in part from individuals or other sources. Students are permitted to use the services of a tutor (paid or unpaid), a professional editor, or the University Writing Center to assist them in completing assigned work, unless the instructor explicitly prohibits such assistance. If the student uses such services, the resulting product must be the original work of the student. Purchasing research reports, essays, lab reports, practice sets, or answers to assignments from any person or business are strictly prohibited. Sale of such materials is a violation of both these rules and State law.
- Failing to cite the World Wide Web, databases and other electronic resources if they are utilized in any way as resource material in an academic exercise.
- Other similar acts

Attendance Policies

The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located on-line at http://student-rules.tamu.edu/rule07

Project due dates will be provided in the project statements. Students should contact the instructor if work is turned in late due to an absence that is excused under the University's attendance policy. In such cases the instructor will either provide the student an opportunity to make up any quiz, exam or other graded activities or provide a satisfactory alternative to be completed within 30 calendar days from the last day of the absence. There will be no opportunity for students to make up work missed because of an unexcused absence.

Course Topics, Calendar of Activities, Major Assignment Dates

Week	Topic	Required Reading
#1 (Jan.17 & Jan. 19)	**Introduction**	
#2 (Jan.24 & Jan. 26)	**Traditional Architecture** *Religious Architecture: Buddhist Temple and Shinto Shrine*	In Praise of Shadows, pp. 5-64 Assignment 1(Due: Jan. 26)
#3 (Jan.31 & Feb. 2)	**Traditional Architecture** *Residential Houses: Palace, Town/Row House*	
#4 (Feb. 7 & Feb. 9)	**Traditional Architecture** *Development of Castle Town*	What is Japanese Architecture, pp. 7-52 Assignment 2(Due: Feb. 9)
#5 (Feb. 14 & Feb. 16)	**Modern Architecture** *British and American Influence*	
#6 (Feb. 21 & Feb. 23)	**Modern Architecture** *Le Corbusier's Influence*	The Metabolism/1960, pp. 4-69 Assignment 3(Due: Feb. 23)

#7 (Feb. 28 & March 2)	**Modern Architecture** *Works of Kenzo Tange*	
#8 (March 7 & March 9)	**Modern Architecture** *Metabolism Movement; Kiyonori Kikutake, Kisho Kurokawa*	Fumihiko Maki: Building and Projects, pp. 206-217 Fumihiko Maki, An Aesthetic of Fragmentation, pp. 7-16 Assignment 4 (Due: March 9)
#9 (March 21 & March 23)	**Contemporary Architecture** *Works of Fumihiko Maki and Arata Isozaki*	
#10 (March 28 & March 30)	**Contemporary Architecture** *Works of Tadao Ando and Yoshio Taniguchi*	Learning from the Japanese City by Barrie Shelton, pp. 66-150 Assignment 5 (Due: March 30)
#11 (April 4 & April 6)	**Contemporary Architecture** *Works of Toyo Ito and SANAA*	
#12 (April 11 & April 13)	**Contemporary Architecture** *Works of Emerging Architects 1*	Light Construction by Terence Riley, pp. 9-32 Assignment 6 (Due: April 13)
#13 (April 18 & April 20)	**Contemporary Architecture** *Works of Emerging Architects 2*	
#14 (April 25 & April 27)	**Final Review**	
#15 (May 2)	**Final Review**	Reserved, it might be completed by April 30

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

Academic Integrity

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System. *For additional information please visit: http://aggiehonor.tamu.edu*

Care of Facilities

The use of spray paint or other surface-altering materials is not permitted in the Langford Complex, except in designated zones. Students who violate this rule will be liable for the expenses associated with repairing damaged building finishes and surfaces. At the end of the semester, your area must be clean of all trash.

Studio Policy (required of all studios)

All students, faculty, administration and staff of the Department of Architecture at Texas A&M University are dedicated to the principle that the Design Studio is the central component of an effective education in architecture. They are equally dedicated to the belief that students and faculty must lead balanced lives and use time wisely, including time outside the design studio, to gain from all aspects of a university education and world experiences. They also believe that design is the integration of many parts, that process is as important as product, and that the act of design and of professional practice is inherently interdisciplinary, requiring active and respectful collaboration with others.

Students and faculty in every design studio will embody the fundamental values of optimism, respect, sharing, engagement, and innovation. Every design studio will therefore encourage the rigorous exploration of ideas, diverse viewpoints, and the integration of all aspects of architecture (practical, theoretical, scientific, spiritual, and artistic), by providing a safe and supportive environment for thoughtful innovation. Every design studio will increase skills in professional communication, through drawing, modeling, writing and speaking.

Every design studio will, as part of the syllabus introduced at the start of each class, include a clear statement on time management, and recognition of the critical importance of academic and personal growth, inside and outside the studio environment. As such it will be expected that faculty members and students devote quality time to studio activities, while respecting the need to attend to the broad spectrum of the academic life. Every design studio will establish opportunities for timely and effective review of both process and products. Studio reviews will include student and faculty peer review. Where external reviewers are introduced, the design studio instructor will ensure that the visitors are aware of the Studio Culture Statement and recognize that the design critique is an integral part of the learning experience. The design studio will be recognized as place for open communication and movement, while respecting the needs of others, and of the facilities.

Important Links Below

Department of Architecture Website	http://dept.arch.tamu.edu/
Department Financial Assistance	http://dept.arch.tamu.edu/financial-assistance/
Academic Calendar	http://admissions.tamu.edu/registrar/general/calendar.aspx
Final Exam Schedule Online	http://admissions.tamu.edu/registrar/general/finalschedule.aspx
On-Line Catalog	http://catalog.tamu.edu
Student Rules	http://student-rules.tamu.edu/
Aggie Honor System Office	http://aggiehonor.tamu.edu/
American Institute of Architecture website	http://www.aia.org/index.htm

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus. •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Atmospheric Sciences
3. Course prefix, number and complete title of course: ATMO 618 Numerical Methods for the Geosciences
4. Catalog course description (not to exceed 50 words):

Mathematical theory and numerical techniques for modeling physical systems and processes in the Geosciences; discretization of continuum equations for solids and fluids; finite difference methods, convergence, consistency, and stability; finite element and spectral methods in fluid dynamics and seismology; iterative solvers; implicit and explicit methods for diffusion and advection.

5. Prerequisite(s): Graduate classification or approval of instructor.

   Cross-listed with: OCNG 618 and GEOP 618 Stacked with: ______

   Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times.

   Will this course be repeated within the same semester? ☐ Yes ☑ No

8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:

    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
    M.S., Ph.D. in all Geosciences majors.

11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
ATMO	618	NUMERICAL METHODS GEOSCIENCES

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
03	00	00	03	4006070002	0351	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Ping Yang [signature] 11/9/2015
Department Head or Program Chair *(Type Name & Sign)* Date

[signature] 11/11/15
Chair, College Review Committee Date

Michael C Pope [signature] 11/09/15
Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

[signature] 11/11/15
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	**Numerical Methods for the Geosciences, ATMO 618**
Term (e.g., Fall 200X)	Fall 201X
Meeting times and location	TBD

Course Description and Prerequisites

Mathematical theory and numerical techniques for modeling physical systems and processes in the Geosciences; discretization of continuum equations for solids and fluids; finite difference methods, convergence, consistency, and stability; finite element and spectral methods in fluid dynamics and seismology; iterative solvers; implicit and explicit methods for diffusion and advection.

The goal of this course is to provide students with the mathematical and numerical foundations required to understand how to develop numerical models in the various disciplines of the Geosciences that employ the continuum approximation to study systems with a large number of degrees of freedom.

Students in this course are assumed to have a graduate-level working knowledge of and experience with continuum dynamics.

Learning Outcomes

By the end of this course, students will be able to:

1. Apply fundamental discretization techniques to the continuum partial differential equations (PDEs) used in the Geosciences to describe the physical behavior of solids and fluids;
2. Evaluate convergence, consistency, and stability of numerical solutions of initial value problems obtained by finite difference methods;
3. Identify problems of interest in the Geosciences whose solution may be approximated by using the finite element or spectral method and create a simplified numerical scheme based on the selected method;
4. Apply iterative methods to solve systems of linear equations resulting from discretized PDEs and address convergence issues;
5. Create one or more numerical models for specific physical processes in the Geosciences by identifying and applying the most suitable numerical techniques learned in the course;
6. Write a comprehensive technical report.

Instructor Information

Name	Ping Chang
Telephone number	979-845-8196
Email address	ping@tamu.edu
Office hours	Open
Office location	O&M 624

Textbook and/or Resource Material

Course material will be provided to the students in the form of lecture notes and handouts.

Students are encouraged, but not required, to read the following:

1. Roache, J.P., Fundamentals of Computational Fluid Dynamics, Hermosa Publishers, 1988
2. Ferziger, J.H., Peric, M., Computational Methods for Fluid Dynamics, 3rd rev. ed., Springer-Verlag

Berlin Heidelberg, 2002
3. Fletcher, C.A.J., Computational Techniques for Fluid Dynamics, Volume 1: Fundamental and General Techniques, Springer-Verlag, Berlin, 1988
4. Fletcher, C.A.J., Computational Techniques for Fluid Dynamics, Volume 2: Specific Techniques for Different Flow Categories, Springer-Verlag, Berlin, 1988
5. Canuto, C., et al., Spectral Methods in Fluid Dynamics, Springer-Verlag, Berlin Heidelberg, 1988
6. Gerya, T., Introduction to Numerical Geodynamic Modelling, Cambridge University Press, 2010
7. Haidvogel, D.B, Beckmann, A., Numerical Ocean Circulation Modeling, Imperial College Press, 1999
8. Griffies, S., Fundamentals of Ocean Climate Models, Princeton University Press, 2004
9. Mesinger, F., Arakawa, A., Numerical Methods Used in Atmospheric Models, Volume 1, GARP Publication Series No. 17, August 1976
10. Haltiner, G.J., Williams, R.T., Numerical Prediction and Dynamic Meteorology, Wiley, 1980
11. Washington, W.M., Parkinson, C.L., An Introduction to Three-Dimensional Climate Modeling, 2nd Ed., University Science Books, 2005
12. Bedford, A., Drumheller, D.S., Introduction to Elastic Wave Propagation, Wiley, 1994
13. Pujol, J., Elastic Wave Propagation and Generation in Seismology, Cambridge University Press, 2003
14. Yanfei Wang, Anatoly G. Yagola, Changchun Yang (Eds.), Computational Methods for Applied Inverse Problems. Higher Education Press, 2012

Grading Policies

Final grades will be based on the following weights:

1) Assignments (30% of course grade)
2) Midterm exam (20% of course grade)
3) Final project (50% of course grade)

Assignments will be due at the beginning of class on the scheduled week, unless stated otherwise by the instructor. Late homework will be assessed a penalty equal to 20% of its grade per day unless the students submits a university-excused absence (see Attendance and Make-up Policies section). An unexcused delay longer than 4 working days will automatically result in receiving zero points on the assignment.

Midterm. There will be a two-hour long in-class midterm exam.

Final Project. A final modeling project will be due by 5pm on the last day of the university's Final Examination Schedule for the semester, available at http://registrar.tamu.edu/Courses,-Registration,-Scheduling/Final-Exam-Schedule. This final project must include a 10-page written scientific report that comprehensively summarizes foundations, methods, and results of the modeling project in the style of the American Geophysical Union *Geophysical Research Letters* journal (http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)1944-8007/).

Final course grades will be posted on http://elearning.tamu.edu

Please consult University Student Rule 10 (Grading) at http://student-rules.tamu.edu/rule10 for additional details on grading policies.

Grading Scale

A final percentage grade will be calculated based on your total weighted scores as listed above. A final letter grade will be assigned as follows:

A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F = <60%

Attendance and Make-up Policies

The university views class attendance as an individual student responsibility. You are expected to attend class and to complete all assignments. Attendance is essential to complete the course successfully.

Please consult the University Student Rule 7 at http://student-rules.tamu.edu/rule07 for details on university-excused absences and make-up policies.

Course Topics, Calendar of Activities, Major Assignment Dates

Week	Topic	Assignment
Week 1	Introduction to fundamental physical systems and processes in Geosciences that can be represented using continuum partial differential equations (PDEs). Basic concepts in numerical modeling.	
Week 2	Mathematical description of continuum media and key physical properties: Fluids – Continuity equation; viscosity; classification of flow regimes; Eulerian and Lagrangian descriptions; advection. Solids – Deformation and stresses; stress and strain tensors; equations of motion; gravity and gravitational potential.	
Week 3	Fundamental equations in the Geosciences. Traditional working approximations. Primitive equations: continuity, momentum, thermal energy. Beta plane approximation in fluid dynamics.	
Week 4	Boundary value problems in the Geosciences. Dynamic and thermodynamic boundary conditions. Elliptic (Laplace's equation), parabolic (diffusion equation), and hyperbolic (wave equation) PDEs. Examples of common transition cases between PDE types in solids (e.g. homogenous to localized deformation) and fluids (e.g. steady, irrotational, isentropic, compressible flow below and above the speed of sound).	
Week 5-6	Discretization techniques for PDEs: Finite Difference Method (FDM), Finite Element Method (FEM), Spectral Method, Pseudospectral Method.	
Week 7	Consistency, convergence, and stability of numerical solutions of initial value problems by FDMs. Equivalence theorem.	
Week 8	Iterative solvers for discretized linear PDEs used in large three-dimensional problems: Jacobi method, Gauss-Seidel (GS) Iteration, Successive Over Relaxation (SOR) method, Conjugate Gradient Method (CGM), Steepest Descent method. Convergence and preconditioning.	
Week 8		**Midterm Exam**
Week 9	Modeling diffusive processes: explicit and implicit methods.	

Week 10	Modeling linear advective processes: explicit and implicit methods. Modeling transport.	**Assignment #1 due**
Week 11-12	Modeling nonlinear advective processes: Burger's equation. Positive-definite processes and flux-corrected methods. Nonlinear wave processes: Korteweg-de Vries equation.	**Assignment #2 due**
Week 13	Elliptic boundary-value problems in the Geosciences. Energy- and enstrophy-conserving space finite-difference schemes.	**Assignment #3 due**
Week 14	Basic models of physical systems in the Geosciences: spectral model for a homogeneous, non-divergent, incompressible flow on the surface of a sphere; quasi-geostrophic ocean model; spectral-element model for seismic wave propagation;	

Final project due by 5pm on the last day of the university's Final Examination Schedule for the semester.

Please note that the above schedule and topics are subject to change.

Other Pertinent Course Information

Copyright Policy. All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

Academic Integrity

For additional information please visit: http://aggiehonor.tamu.edu

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

Students are encouraged to study together and discuss the information presented in the course lectures and material with other students. However, all coursework submitted to the instructor must be the result of the original work of the student. Intentional or careless appropriation of someone else's work or ideas, even with their explicit consent, violates the Aggie Honor System Rules (Student Rule 20.1.2) and will result in all the students involved automatically receiving zero points for the assignment as well as mandatory reporting of the violation.

Each student is responsible for authenticating all submitted work and, if asked, to produce proof that the item submitted is indeed the work of that student. The inability to authenticate one's work upon the instructor's request is sufficient grounds to initiate an academic dishonesty case.

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus. •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Atmospheric Sciences
3. Course prefix, number and complete title of course: ATMO 634 - Fundamentals of High Performance Computing for the Geosciences

4. Catalog course description (not to exceed 50 words):

Architecture of High Performance Computing (HPC) systems; Unix operating system, shell environment; algorithms and programming languages for the Geosciences; concurrency, dependency, parallelism; parallel performance, scalability; structured programming; serial, parallel patterns; parallel programming models; parallel algorithms and software design for the Geosciences; techniques for empirical parallel performance analysis.

5. Prerequisite(s): Graduate classification or approval of instructor.

Cross-listed with: OCNG 634, GEOP 634 Stacked with:

Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ______ to ______
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ______ times.

Will this course be repeated within the same semester? ☐ Yes ☑ No

8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:

a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
M.S., Ph.D. in all Geosciences majors.

11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
ATMO	634	FUND HPC GEOSCIENCES

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
03	02	00	04	4006990202	0351	16 - 17	0 0 3 6 3 2

Level: 6

Approval recommended by:

Ping Yang [signature] 11/9/2015
Department Head or Program Chair *(Type Name & Sign)* Date

Michael C Pope Michael C. Pope 11/09/15
Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

[signature] 11/11/15
Chair, College Review Committee Date

[signature] 11/11/15
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	**Fundamentals of High Performance Computing for the Geosciences, ATMO 634**
Term (e.g., Fall 200X)	Spring 201X
Meeting times and location	Lectures: TBD (3 hours); Laboratory: TBD (2 hours).

Course Description and Prerequisites

This course will present the architectural concepts, theoretical basis, common tools, and practical knowledge required to use current, state-of-the-art High-Performance Computing (HPC) systems to accurately and efficiently solve large-scale problems in the Geosciences.

The basic architecture of HPC systems will be discussed, and you will become familiar with Unix-based operating systems and shell environments. The main part of the course will focus on how to design and implement serial and parallel algorithms specific to Geosciences' problems by using structured, pattern-based programming techniques along with computer languages and widely used models in the Geosciences' research community. Concepts such as concurrency, dependency, and parallelism will be used as basis for understanding parallel code performance and techniques for empirical performance analysis.

The course will specifically focus on programming languages such as Fortran and deal with design and implementation concepts present in current models for general circulation, regional climate and weather, seismic wave propagation, data inversion, and others, as used on HPC systems. Dominant performance bottlenecks deriving from the data-intensive nature of computations in the Geosciences will be discussed, including disk I/O.

The course includes a laboratory section designed to improve the understanding of the topics presented during lecture hours and to further develop your computational skills. Through lab exercises you will become familiar with available computing environments, software and tools, and gain realistic, hands-on experience on HPC systems that may be applied to your future research work.

The intent of this course is to provide Geosciences students with diverse backgrounds a common knowledge set that will help them advance more effectively in their discipline, and to emphasize shared aspects of computational modeling in the Geosciences that may be leveraged to foster interdisciplinary exchanges.

There are no course prerequisites, but basic knowledge of programming is required.

Prerequisites: Graduate classification or approval of instructor.

Learning Outcomes

By the end of this course, you will be able to:

1. Describe the basic architecture and design features of a modern HPC system;
2. Understand the structure of the Unix operating system and make use of its main capabilities;
3. Break down a given computational task into primary steps and design a basic algorithm to carry out the work;
4. Use a programming language (Fortran) and leverage its main features to implement serial and parallel Geosciences-oriented computer codes;
5. Understand structured, pattern-based serial and parallel programming;
6. Identify and apply parallel programming patterns to parallel code design for modeling in the Geosciences;

7. Understand the concepts of concurrency, dependency, and parallelism;
8. Evaluate the performance of a parallel code on a HPC system;
9. Develop a parallel computer code to simulate a basic physical process relevant to the Geosciences;
10. Give an oral presentation of your programming project;
11. Write a comprehensive technical report of your programming project.

Instructor Information

Name	Raffaele Montuoro
Telephone number	979-862-3182
Email address	rmontuoro@tamu.edu
Office hours	Open
Office location	O&M 1017B

Textbook and/or Resource Material

Course material will be provided in the form of lecture notes and handouts.

I encourage you to consult the following reference material:

1. Chivers, I., Sleightholme, J., Introduction to Programming with Fortran, 2nd Ed., Springer, 2012, ISBN 978-0-85729-232-2.
2. Akin, E., Object Oriented Programming via Fortran 90/95, 1st Ed., Cambridge University Press, 2003, ISBN 0-521-52408-3.
3. Chapman, S.J., Fortran 95/2003 for Scientists and Engineers, 3rd Ed., McGraw-Hill, 2007, ISBN 978-0-07-319157-7.
4. Press, W.H., Teukolsky, S.A., Vetterling, W.T., Flannery, B.P., Numerical Recipes: The Art of Scientific Computing, Third Edition, Cambridge University Press, 2007, ISBN 978-0-521-88068-8. See also, by the same authors: Fortran Numerical Recipes, 2nd Edition, Vol. 1 and 2, Cambridge University Press, 1992, 1997, available on line at: http://apps.nrbook.com/fortran/index.html.
5. McCool, M., Robinson, A., Reinders, J., Structured Parallel Programming: Patterns for Efficient Computation, Morgan Kaufmann, 2012, ISBN: 978-0-12-415993-8. See also: http://parallelbook.com
6. Foster, I., Designing and Building Parallel Programs: Concepts and Tools for Parallel Software Engineering, Addison-Wesley, 1995, ISBN: 978-0-20-157594-1.
7. Mattson, T.G., Sanders, B.A., Massingill, B.L., Patterns for Parallel Programming, Addison-Wesley Professional, 2013, ISBN 978-0-32-194078-0.
8. Hager, G., Wellein, G., Introduction to High Performance Computing for Scientists and Engineers, Chapman & Hall/CRC Press, 2011, ISBN: 978-1-4398-1192-4.
9. Levesque, J., Wagenbreth, G., High Performance Computing: Programming and Applications, Chapman & Hall/CRC Press, 2011, ISBN: 978-1-4200-7705-6.
10. Zhao, C., Hobbs, B.E., Ord, A., Fundamentals of Computational Geoscience, Numerical Methods and Algorithms, Lecture Notes in Earth Sciences, Vol. 122, Springer-Verlag Berlin Heidelberg, 2009, ISBN 978-3-540-89742-2.

Grading Policies

Your final grade will be determined based on the following categories and weights:

1) Programming assignments (20% of course grade)
2) Midterm exam (30% of course grade)
3) Final project (50% of course grade)

Assignments. Assignments will be due at the beginning of class on the scheduled week, unless stated otherwise by the instructor. Late homework without a university-excused absence (see Attendance and Make-up Policies section) will be assessed a penalty equal to 20% of its grade per day. An unexcused delay longer than 4 working days will automatically result in receiving zero points on the assignment.

Midterm Exam. There will be a two-hour, in-class midterm exam.

Final Project. A final programming project will be due by 5pm on the last day of the university's Final Examination Schedule for the semester, available at http://registrar.tamu.edu/Courses,-Registration,-Scheduling/Final-Exam-Schedule.

This final project must include:

1) a 10-page technical report written in the style of the Institute of Electrical and Electronics Engineers (IEEE) Transactions (https://www.ieee.org/publications_standards/publications/authors/author_templates.html). The report must comprehensively summarize and explain the objectives and technical approach, software design and implementation, and computational results of your project;
2) a presentation during last week of class.

Final course grades will be posted on http://elearning.tamu.edu

Please consult University Student Rule 10 (Grading) at http://student-rules.tamu.edu/rule10 for additional details on grading policies.

Grading Scale

You will be assigned a final letter grade based on your final percentage grade according to the following scale:

A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F = <60%

Your final percentage grade will be calculated by adding your weighted scores, divided by the maximum attainable score, for each of the categories listed in the Grading Policies section.

Attendance and Make-up Policies

The university views class attendance as an individual student responsibility. You are expected to attend class and to complete all assignments. Attendance is essential to complete the course successfully.

Please consult the University Student Rule 7 at http://student-rules.tamu.edu/rule07 for details on university-excused absences and make-up policies.

Course Topics, Calendar of Activities, Major Assignment Dates

Week	Topic	Assignment
Week 1	Introduction to the architecture and design of state-of-the-art High Performance Computing systems	
Week 2	Description of the UNIX operating system, including the shell environment.	
Week 3	Algorithm design and basic principles of computer programming.	
Week 4-5	Fundamentals of Fortran programming language.	
Week 6	Advanced Fortran features for computational Geosciences. Introduction to structured programming. Pattern-based serial programming.	**Assignment #1 due:** Serial codes for one-dimensional physical models

Week 7	Concepts of concurrency, dependency, and parallelism. Potential and actual parallelism, data locality, parallel efficiency, speedup, and scalability.	**Assignment #2 due:** Apply structured programming techniques and serial patterns to design and implement simple models
Week 8		**Midterm Exam**
Week 10	Pattern-based parallel programming in the Geosciences. Examples include: geometrical decomposition and communication patterns in climate models, sequences in coupled models and reservoir simulations, map/reduce operations for convergence testing or large matrix operations.	
Week 11	Description of the main parallel programming models used in computational Geosciences. Shared-memory parallelism with OpenMP.	**Assignment #3 due:** Design a pattern-based parallel code for a two dimensional problem
Week 12-13	Distributed-memory parallelism with the Message Passing Interface (MPI)	**Assignment #4 due:** Use OpenMP to create a shared-memory parallel code. Evaluate parallel efficiency.
Week 14	Concepts and tools for empirical performance analysis of parallel codes.	**Assignment #5 due:** Use MPI to create a distributed-memory parallel code. Evaluate parallel efficiency.

Final project due by 5pm on the last day of the university's Final Examination Schedule for the semester.

Please note that the schedule and topics of lectures and laboratory assignments are subject to change.

Other Pertinent Course Information

Email. All Texas A&M students are expected to use their official TAMU email account for all the communications regarding this course. It is the student's responsibility to check your TAMU email account regularly throughout the course.

Cell Phones/Mobile devices. You should set your mobile devices to silent and refrain from texting during class.

Access to HPC systems. You should have a working account on one of Texas A&M HPC systems to take full advantage of this course and successfully complete your assignments. You may apply for a basic supercomputing account by contacting High Performance Research Computing (http://sc.tamu.edu) before the beginning of the course. I am also available to help you obtaining a supercomputing account if you contact me during the first week of class.

Copyright Policy. All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

Academic Integrity

For additional information please visit: http://aggiehonor.tamu.edu

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

You are encouraged to study together and discuss the information presented in the course lectures and material with other students. However, all coursework submitted to the instructor must be the result of the your original work. Intentional or careless appropriation of someone else's work or ideas, even with their explicit consent, violates the Aggie Honor System Rules (Student Rule 20.1.2) and will result in all the students involved automatically receiving zero points for the assignment as well as mandatory reporting of the violation.

You are responsible for authenticating all submitted work and, if asked, to produce proof that the item submitted is indeed the work of that student. The inability to authenticate one's work upon the instructor's request is sufficient grounds to initiate an academic dishonesty case.

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EASA

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

•Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Biological and Agricultural Engineering
3. Course prefix, number and complete title of course: BAEN 642 Water-Engergy-Food Nexus: Toward Sustainable Resource Management
4. Catalog course description (not to exceed 50 words):
   Study the principles and application of the Water-Energy-Food nexus to state, national and international Water-Energy-Food securities and the interlinkages between them. Explore a quantitative framework to develop and assess sustainable tradeoffs of resources. Hands on experiences: following subject matter fundamentals, students will work on relevant real world projects or case studies.
5. Prerequisite(s): Strong analytical background; with consent of instructor
   Cross-listed with: CVEN 642 Stacked with: ______
   Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ______ to ______
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ______ times.
   Will this course be repeated within the same semester? ☐ Yes ☐ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
       MS AGSM, MS BAEN, MEn BAEN, PhD BAEN
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
BAEN	642	WEF Nexus Sust Res Mgmt

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	0.00	0.00	3.00	1403010006	0433	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Stephen W. Searcy Stephen W Searcy 10/30/15
Department Head or Program Chair *(Type Name & Sign)* Date

V E Taylor 11/17/2015
Chair, College Review Committee Date

Robin Autenrieth R Autenrieth 11-5-15
Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

V E Taylor 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.

Water-Energy-Food Nexus: Toward Sustainable Resource Management
Spring 2017 Course Syllabus (CVEN 642-BAEN 642)

Instructor: Dr. Rabi H. Mohtar
E-mail: mohtar@tamu.edu
Office: Civil Engineering 401B and Scoates Hall 306B
Phone: 979-458-9886
Website: www.wefnexus.tamu.edu
Office Hours: by appointment
Class Day, Time, & Location: TR 9:35-10:50 SCTS 144

Course Description (3 lectures)
Study the principles and application of the Water-Energy-Food nexus to state, national and international Water-Energy-Food securities and the interlinkages between them. Explore a quantitative framework to develop and assess sustainable tradeoffs of resources. Hands on experiences: following subject matter fundamentals, students will work on relevant real world projects or case studies.

Prerequisites: Strong analytical background; with consent of instructor

Textbook/Resource Materials: Current literature will be used. In addition, the **Water-Energy-Food nexus tool** developed by Mohtar and Daher (2014) will be used in this course. The tool designed off a scenario-based framework that quantifies the interlinkages and tradeoffs between these resources. Reading material will be available on the course website.

Grading Policies:
Grading scale (A=90-100, B=80-89, C = <80).
Final project/paper = 40%
Presentation(s) = 20%
Biweekly progress reports = 30%
Class attendance and participation = 10%

Learning Outcomes:
By the end of the semester, you should be able to:
- Understanding of the global risks and the how the nexus can drive sustainability of the resources management and allocation
- Explicitly quantify the inter-linkages of the Water, Energy, Food systems and how to identify a nexus hot spot for a specific condition
- Competent in running the nexus too to simulate and conduct tradeoff analysis for the scenario of interest
- Understand how engineering and analytics interface with economics, policy and supply chain at local and global scale.
- Explore nexus friendly solutions for a specific case study towards a more sustainable resource nexus

Homework Assignments, test dates
Weekly assignments are expected and are listed by week on the syllabus.

Sample Lab/Case Studies: The instructor will meet potential students prior to the beginning of the semester to explore case studies and data gathering.

The Water-Energy-Food nexus is a crosscutting theme. We therefore aim to provide at least two case studies to connect domestic water use with industrial and agricultural use. The scope of the case studies is to provide the young generation with improved knowledge on water use all along the food supply chain. The following themes would be explored:

1. **Securing clean water:** Providing access to safe drinking water, revealing the extent of water use and thereby teaching a new generation on how to reduce water stress in the food value chain
2. **Green agriculture:** Growing agricultural production through innovative clean energy technologies and reduced carbon emissions
3. **Role of renewable energy** in energy portfolio and in bridging water and food gap.

Sample Case Studies to be explored through students projects:

a. Solar-Desalination
b. Soil - Water – Food
c. Water-wastewater reuse
d. Transportation- fracking- water
e. Energy-Food (bioenergy)

Calendar of activities, major assignments, test dates
Course will meet three hours weekly, biweekly written progress reports, and Final report due last meeting of class

Attendance and make-up policies
If an absence is excused, the instructor will either provide an opportunity to make up any quiz, exam or other work that contributes to the final grade or provide a satisfactory alternative by a date agreed upon by the student and instructor. The make-up work must be completed in a timeframe not to exceed 30 calendar days from the last day of the initial absence. See Student Rule 7 http://student-rules.tamu.edu/rule07 for details of excused absences. The fact that these are university-excused absences does not relieve the student of responsibility for prior notification and documentation. Failure to notify and/or document properly may result in an unexcused absence. Falsification of documentation is a violation of the Honor Code.

Americans with Disabilities Act (ADA) Policy Statement
- The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu.

Academic Integrity Statement and Policy - website link http://aggiehonor.tamu.edu
"An Aggie does not lie, cheat or steal, or tolerate those who do."

Class by Topics and Readings

Week 1 Jan 21st	Resource scarcity and spatial variability
Content	a. Introduction to ecosystems and ecosystem services b. Introduction to system's theory c. Situational analysis of water, energy, and food resources at the state, national and international levels Stresses on the resources (climate change, population, financial, health, governance, etc.)
Assignment	What are the nexus hotspots in the water, energy, food areas locally or worldwide (2-3 pages)
Readings	World Economic Forum. 2011. The Water-Energy-Food-Climate Nexus: Island Press: London. World Economic Forum. 2014. *The Future Availability of Natural Resources A New Paradigm for Global Resource Availability.* The United Nations. 2014. "The United Nations World Water Development Report- Water and Energy." [chapter 2 and 9 for this week] http://unesdoc.unesco.org/images/0022/002257/225741e.pdf. Brown, Becky J., Mark E. Hanson, Diana M. Liverman, and Robert W. Merideth. 1987. "Global Sustainability: Toward Definition." *Environmental Management* 11 (6): 713–19. Amigun, Bamikole, Josephine Kaviti Musango, and William Stafford. 2011. "Biofuels and Sustainability in Africa." *Renewable and Sustainable Energy Reviews* 15 (2): 1360–72. Gleick, PH, and M Palaniappan. 2010. "Peak Water Limits to Freshwater Withdrawal and Use." http://www.pnas.org/content/107/25/11155.full.pdf Immerzeel, Walter etal. 2011. "Middle-East and Northern Africa Water Outlook." *World Bank.* http://siteresources.worldbank.org/INTMNAREGTOPWATRES/Resources/MNAWaterOutlook_to_2050.pdf. Shi, Daniel; Naresh, Devineni; Upmanu, Lall; Edwin, Piñero. 2013. "America's Water Risk: Water Stress and Climate Variability – Columbia Water Center." *Columbia Water Center.* http://water.columbia.edu/2013/06/10/americas-water-risk-water-stress-and-climate-variability/.

Week 2 Jan 28th	Interdependencies in resources I
Content	Nexus elements a. Water for food b. Water for energy
Assignment	Individual Semester Class Project Scope Online data resources for water-energy-food
Readings	Texas Water Plan http://www.twdb.texas.gov/waterplanning/swp/ Hanjra, Munir A., and M. Ejaz Qureshi. 2010. "Global Water Crisis and Future Food Security in an Era of Climate Change." *Food Policy* 35 (5): 365–77. Hoekstra, A. Y. 2012. "The Hidden Water Resource Use behind Meat and Dairy." *Animal Frontiers* 2 (2). American Society of Animal Science: 3–8. Faeth, Paul. 2012. "U.S. Energy Security and Water: The Challenges We Face." *Environment: Science and Policy for Sustainable Development*. The United Nations. 2014. "The United Nations World Water Development Report- Water and Energy." [chapter 3 and 6 for this week] http://unesdoc.unesco.org/images/0022/002257/225741e.pdf.

Week 3 Feb 2nd	Interdependencies in resources II
Content	Nexus elements a. Energy for water b. Energy for food c. Food for energy Introduction to the nexus
Assignment	Project Groups and Project Timeline
Readings	Hoff, H. 2011. "Understanding the Nexus." *Background Paper*. Rabi H. Mohtar, and Bassel Daher. 2010. "Water, Energy, and Food: The Ultimate Nexus." U.S. Department of Energy. 2014. "The Water-Energy Nexus: Challenges and Opportunities."

	http://www.energy.gov/articles/department-energy-releases-water-energy-nexus-report. Gleick, P H. 1994. "Water and Energy." *Annual Review of Energy and the Environment* 19 (1). Murkowski, Lisa. 2014. *The Energy-Water Nexus Interlinked Resources That Are Vital For Economic Growth and Sustainability. An Energy 20/20 White Paper.* Fraiture, Charlotte de, Mark Giordano, and Yongsong Liao. 2008. "Biofuels and Implications for Agricultural Water Use: Blue Impacts of Green Energy." *Water Policy* 10 (S1): 67. Gerbens-Leenes, P.W., A.Y. Hoekstra, and Th. van der Meer. 2009. "The Water Footprint of Energy from Biomass: A Quantitative Assessment and Consequences of an Increasing Share of Bio-Energy in Energy Supply." *Ecological Economics* 68 (4): 1052–60. Cuéllar, Amanda D, and Michael E Webber. 2010. "Wasted Food, Wasted Energy: The Embedded Energy in Food Waste in the United States." *Environmental Science & Technology* 44 (16). American Chemical Society: 6464–69. Sanders, Kelly T, and Michael E Webber. 2012. "Evaluating the Energy Consumed for Water Use in the United States." *Environmental Research Letters*.

Week 4 Feb 9th	Virtual Water (guest lecture by Tony Allan, King's College London)
Content	History of the virtual water concept What is food-water Analysis of the nexus through a supply chain framework
Assignment	Articulate research questions Outline project timeline Describe system inter-dependencies
Readings	Virtual Water by Tony Allan http://www.amazon.com/gp/offer-listing/1845119843/ref=tmm_pap_used_olp_sr?ie=UTF8&condition=used&sr=&qid=

Week 5 Feb 16th	Nexus Success Stories
Content	. Energy (renewables, example solar farm)Water (alternative water,

	Singapore) . Food (low input farming, Nebraska, ICARDA or ICBA) . Sahara Forest Project . Stewart Orr (Water Stewardship Concept)
Assignment	Describe full data and data gaps for all the system interconnectedness
Readings	Water Stewardship http://wwf.panda.org/what_we_do/how_we_work/conservation/freshwater/water_management/ Giampietro, et al. 2013. "An Innovative Accounting Framework for the Food-Energy-Water Nexus : Application of the MuSIASEM Approach to Three Case Studies." *FAO*. [Chapter 1]

Week 6 Feb 23rd	Localizing water and food security
Content	Localizing water and food security Conceptual modelling (local-global nexus) Green water definition and accounting Water reuse Water conservation Technology (supplementary irrigation, genetics and breeding…)
Assignment	Development of scenarios and analysis framework
Readings	UN Concept paper (Mohtar, Assi, Daher) Integrative Modeling (Braudeau and Mohtar) Lele, U., M. Klousia-Marquis, and S. Goswami. 2013. "Good Governance for Food, Water and Energy Security." *Aquatic Procedia* 1 (January): 44–63. World Energy Council. 2014. *LAC Region High Level Scenario Explorations.* Perrone, Debra, Jennifer Murphy, and George M. Hornberger. 2011. "Gaining Perspective on the Water-Energy Nexus at the Community Scale." *Environmental Science and Technology* 45 (10): 4228–34. Qadir, M., B.R. Sharma, A. Bruggeman, R. Choukr-Allah, and F. Karajeh. 2007. "Non-Conventional Water Resources and Opportunities for Water Augmentation to Achieve Food Security in Water Scarce Countries." *Agricultural Water Management* 87 (1): 2–22. Sposito, Garrison. 2013. "Green Water and Global Food Security."

	Vadose Zone Journal 12 (4). The Soil Science Society of America, Inc. doi:10.2136/vzj2013.02.0041.

Week 7 March 2nd	Energy security and role of renewable energy in bridging the water and food gap
Content	Tradeoffs and Nexus solutions Systems Modelling Introduction to Nexus Tools
Assignment	Initial simulation/analytics/analysis
Readings	IRENA Report

Week 8 March 9th	Quantitative Nexus Framework
Content	Tradeoffs and Nexus solutions Systems Modelling Introduction to Nexus Tools
Assignment	Analytics and analysis
Readings	Nexus Tool Chatham house (Mohtar and Daher) Nexus Tool paper (Daher and Mohtar, SP WI)

Week 9 March 16-20	Monday-Friday, Spring Break (Wed-Fri Faculty and Staff holiday)

Week 10 March 23rd	Mid-Year Class Presentations

Week 11 March 30th	Nexus Tool 2.0
Content	Examples case studies using the nexus tools by the instructor. Data preparation and file management
Assignment	Updated report draft
Readings	Same as above

Week 12 April 6th	Catching up with unfinished material from nexus analytics

Week 13 April 13th	Environmental policy (guest lecture by Gabe Eckstein, Raya Stephan, Ron Kaiser)
Content	Environmental policy Regulations Policy reform
Assignment	Report draft
Readings	TBD

Week 14 April 20th	Lessons learned and current gaps
Content	From Science to policy (framework elaborated) Lessons learned Future Nexus governance
Assignment	Enhanced project report
Readings	No reading assignment

Week 15 April 27th	One Day Symposium
Content	Student presentations Nexus stakeholder panel discussion between students and decision-makers from the public and private sector

Week 16 May 4th	Final Report Due

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GRADUATE STUDIES

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EASA

Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

• Submit original form and attach a course syllabus •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Biomedical Engineering
3. Course prefix, number and complete title of course: BMEN 637, Pathologic Basis of Implantable Devices
4. Catalog course description (not to exceed 50 words):
Understanding the relationship that clinical presentation has for patients with primary heart disease; inflamation and repare, systeming pathology emphasis on cardiovascular disease, and the implantable device intervemtnio as a therapeutic adjunct in the heart.
5. Prerequisite(s): Graduate classification or approval of instructor

Cross-listed with: ______ Stacked with: ______

Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times.

Will this course be repeated within the same semester? ☐ Yes ☑ No

8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*

11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
BMEN	637	PATHOL BASIS IMPLANT DEVICES

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
3.00	0.00	0.00	3.00	1405010006	0450	16 - 17	0 0 3 6 3 2

Level 6

Approval recommended by:

Kristen Maitland 10/15/15
Department Head or Program Chair *(Type Name & Sign)* Date

Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Course: **BMEN 637**
M/W, 4:10 – 5:25 pm, ETB 1006

Course Title: Pathologic Basis of Implantable Devices

Instructor: Fred J. Clubb, Jr., DVM, PhD,
Office: bldg 1040,
Phone: 979/229-9862,
E-mail: deadbeatdoc@tamu.edu

Textbook: Robbins and Cotran Pathologic Basis of Disease (Inkling Chapters: 1-4, 6, 7, 11 & 12)
Kumar, Robbins and Cotran Pathologic Basis of Disease (9th Ed, TAMU eBook)
Robbins Basic Pathology, by Vinay Kumar, Adul Abbas, Nelson Fausto and Richard Mitchell.

Reference Texts:
An Introduction to Tissue-Biomaterial Interactions, by Kay Dee, David Puleo and Rena Bizios.
Handbook of Cardiac Anatomy, Physiology and Devices, by Paul Iaizzo.

Course Description:
This course will provide an understanding of the relationship that clinical presentation has for patients with primary heart disease; including lectures focused on general categories of inflammation and repair, systemic pathology emphasis on cardiovascular disease, and the importance elucidated on implantable device intervention as a therapeutic adjunct in heart disease.

Objectives and learning outcomes:
- Students will understand the physiological response of biological systems to implantable devices.
- Students will be able to describe the methods used in the pathology of medical devices and the tools used to study the interactions between biological systems and implantable devices.

Prerequisites: Graduate school classification or approval of instructor.

Outline of Subject Matter	**Week(s)**
Basic Pathology (Introduction)	1
Basic Pathology (Cellular and Tissue Responses)	1-3
Basic Pathology (Inflammation, Immunity)	4-5
Basic Pathology (Hemodynamic Disorders)	6
Basic Pathology (Healing and Repair)	7
Midterm Exam – October 14	7
Basic Pathology (Neoplasia)	8
Systemic Pathology (Cardiovascular – Anatomy and Physiology)	9
Systemic Pathology (Cardiovascular – Heart Failure)	9
Systemic Pathology (Cardiovascular – Congenital Heart Disease)	10
Systemic Pathology (Cardiovascular – Pericardial, Epi- and Endocardial Diseases)	10
Systemic Pathology (Cardiovascular – Myocardial Diseases)	11
Systemic Pathology (Cardiovascular – Peripheral Vascular Diseases)	12
Therapeutic use of Implantable Devices (Pathophysiologic Overview)	13
Course Review	14
Final Exam – December 14	15

Evaluation:	Class Participation: 20%	100-90%..........A
	Exams: 80% (mid-term 40%/final 40%)	80-89%............B

70-79%...........C
60-69%...........D
<60%..............F

- Attendance: Only University excused absences will be accepted for makeup exams/quizzes to be given. In accordance with University policies which can be found online at http://student-rules.tamu.edu/rule7.htm.

- Note: It is the student's responsibility to make arrangements to reschedule exams/quizzes. Exams and quizzes must be completed in accordance with University policies which can be found online at http://student-rules.tamu.edu/rule7.htm.

Americans with Disabilities Act

The *American with Disabilities Act (ADA)* is a federal antidiscrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room B118 of Cain Hall, or call 845-1637.

Academic Integrity

Aggie Code of Honor: "Aggies do not lie, cheat, or steal, nor do they tolerate those who do."
It is the responsibility of students to help maintain scholastic integrity at the university by refusing to participate in or tolerate scholastic dishonesty, which can be found online at http://aggiehonor.tamu.edu.

RECEIVED
NOV 17 2015
GRADUATE STUDIES

Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

•Submit original form and attach a course syllabus.•

RECEIVED
OCT 23 2015
ESSAP

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Biomedical Engineering
3. Course prefix, number and complete title of course: BMEN 676- Professional Development for Biomedical Engineering
4. Catalog course description (not to exceed 50 words):
Advanced concepts in professional interactions including oral and written communications; skills related to interviewing and obtaining job offers and understanding employment compensation and benefits; professional ethics.
5. Prerequisite(s): Graduate classification or approval of instructor.

Cross-listed with: ______ Stacked with: ______

Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times.

Will this course be repeated within the same semester? ☐ Yes ☑ No

8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
   a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
   required for MEng in biomedical engineering
   b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
   MS/PhD in biomedical engineering
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☐ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
BMEN	676	PROF DEV FOR BMEN

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	0.00		3.00	1405010006	0450	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Kristen Maitland 10/15/15
Department Head or Program Chair *(Type Name & Sign)* Date

V E Taylor 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

V E Taylor 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14

TEXAS A&M UNIVERSITY

SYLLABUS

Course Title and Number	**BMEN 676 – Professional Development for Biomedical Engineers**
Term	**Spring 2016**
Class Time and Location:	**M 1:00-2:30 in ETB 5039**

Course Description: Course will cover general concepts in professional interactions including oral and written communications; skills related to interviewing and obtaining job offers and understanding employment compensation and benefits; professional ethics.

Learning Outcomes:

1. Students will be able to apply written and oral communication principles to form concise and well-formed thoughts in a professional environment to achieve desired outcomes.
2. Students will be able to use evaluation factors to critically review the structure, content, and data analysis of professional documents.
3. Students will be able to construct oral communication structures to obtain desired responses when interviewing, being interviewed, or when providing micro-communication (such as an elevator pitch) relevantly and dependent on situational context.
4. Students will develop a general knowledge around the role of biomedical engineers in the medical device industry or research organizations, the hiring patterns in these organizations, career paths, and compensation structures.

Rationale:
This is a required course for Masters of Engineering Program students.
This course is timed to support ME students in seeking the mandatory internship that typically occurs in the summer of the same academic year.
This course is designed to support Masters of Engineering (ME) students who are within 6-18 months of seeking employment in biomedical related professions.

Course Materials:
Required Textbook: None, all required materials will be provided as part of the course in the form of handouts, and online links for papers, and other industry related journals.

References:
Interviewing: Principles and Practices 14th Edition *by Charles Stewart (Author), William Cash (Author)*
Style and Ethics of Communication in Science and Engineering, Jay D. Humphrey and Jeffrey W. Holmes,

Morgan & Claypool 2009, ISBN: 9781598292985 (paperback), ISBN: 9781598292992 (ebook).
The Craft of Scientific Writing, Michael Alley, Springer; 3rd edition 1998, ISBN 9780387947662.
The Craft of Scientific Presentations: Critical Steps to Succeed and Critical Errors to Avoid, Michael Alley, Springer 2007, ISBN 9780387947662.
The Craft of Editing, Michael Alley, Springer 1999, ISBN 9780387989648

Prerequisites: Graduate classification, or approval of instructor.

Instructor: Dr. Balakrishna Haridas, PhD
E-mail: bharidas@tamu.edu
979.845.3348
Office Hours: by appointment only

Grading Policies All assignments will receive a combined score based on instructor and peer-review assessment

BMEN 676

Writing Assignments:	60%
Oral Assignment:	40%

Grade Scale

90-100%..........A
80-89.99%.......B
70-79.99%.......C
60-69.99%.......D
<60%..............F

Course Policies:
Assignments turned in late will be marked down up to 50% within 24 hours of the deadline, after which they will not be accepted; exceptions to this rule will only be made in extreme cases
Grade Disputes: if you wish to dispute the grading of a specific assignment, quiz, or exam, please approach the instructor within 1 week of the grade being handed back to the class; thereafter the grade will not be changed. If you want to dispute the final grade you will need to quickly see the instructor before they are submitted by the end of the semester.

Attendance
- In accordance with Texas A&M University policies, only University-excused absences will be accepted for missing classes and for any makeup exams to be given.
- It is the student's responsibility to make arrangements to reschedule exams.
- If an absence is excused, the instructor will either provide the student an opportunity to make up any quiz, exam or other work that contributes to the final grade or provide a satisfactory alternative by a date agreed upon by the student and instructor.
- *If* the instructor has a regularly scheduled make up exam, students are expected to attend unless they have a university approved excuse.
- The make-up work must be completed in a timeframe not to exceed 30 calendar days from the last day of the initial absence.
- Refer to http://student-rules.tamu.edu/rule07 for ALL policies regarding excused absences. Please note: "The student is responsible for providing satisfactory evidence to the instructor to substantiate the reason for absence." In the case of injury or illness of 3 or more days,

"The medical confirmation note must contain the date and time of the illness and medical professional's confirmation of needed absence."

- Also, in case of injury or illness of less than 3 days, it is the policy of this class that the student likewise will provide a medical confirmation note containing the date and time of the illness and medical professional's confirmation of needed absence. The Texas A&M University Explanatory Statement for Absence from class form (http://attendance.tamu.edu.) WILL NOT be accepted as evidence of an excused absence for this course.

- Having a legitimate University-excused absence does not relieve the student of responsibility for prior notification and documentation. Failure to notify and/or document properly may result in an unexcused absence. Allowable excuses and documentation thereof must be provided to the professor in a timely manner.
- Other absences may be excused at the discretion of the instructor with prior notification and proper documentation. In cases where prior notification is not feasible (e.g., accident or emergency) the student must provide notification by the end of the second working day after the absence, including an explanation of why notice could not be sent prior to the class
- Falsification of attendance documentation is a violation of the Honor Code.

Americans with Disabilities Act (ADA) Policy Statement

The American with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information, visit http://disability.tamu.edu

Academic Integrity Statement and Policy

For additional information, visit http://aggiehonor.tamu.edu/

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

Academic Misconduct: Academic misconduct will not be tolerated and will be dealt with according to University Regulations.
See http://aggiehonor.tamu.edu/RulesAndProcedures/HonorSystemRules.aspx#definitions for the definitions of academic misconduct. Academic misconduct in ANY quiz, exam, or assignment will automatically result at a minimum in a large grade reduction (minimum of 30 points). A second violation receives an F (fail) grade in the course and an "Honor Violation Probation". Academic misconduct in the take-home exams and/or term projects means an automatic F (fail) grade in the course and an "Honor Violation Probation".

Course Topics, Calendar of Activities, & Approximate Weekly Schedule
(Preliminary, subject to update)

Topics	Week #
Clear and Concise Introductions: Assignments: introductory email, 60 second elevator pitch (oral)	1-2
Medical Device Market/Companies and Segmentation by various perspectives Bioengineering Research Organization segmentation	3-4
Medical Device Companies – organization, structure, engineering career paths Biomedical Engineering Research Organizations – organization, structure, and career paths	4-5
Salary and compensation structures; options vs stock; benefits	6-7
Hiring patterns in companies; how do companies plan staffing needs; human resources departments and their approach to recruiting.	8-9
Resume Creation / Story Telling preparing your pitch	10-11
Oral presentations: Know your audience, minimize distractions Assignments: 10 minute technical lecture/pitch	12-13
Ethics Introduction to ethics: Ethical issues in R&D, Marketing, Sales, and Scientific misconduct and plagiarism	14-15

Last modified: 1/15/15 @ 11:00 AM

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

•Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Zachry Department of Civil Engineering
3. Course prefix, number and complete title of course: CVEN 602, Remote Sensing in Hydrology

4. Catalog course description (not to exceed 50 words):
Precipitation; evapotranspiration; soil moisture; snow and ice; terrestrial water storage variations; land surface properties; water quality.

5. Prerequisite(s): ____________________
Cross-listed with: ____________________ Stacked with: ____________________
Cross-listed courses require the signature of both department heads

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ______ to ______
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ______ times.
Will this course be repeated within the same semester? ☐ Yes ☑ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
____
b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
MEN,M.S., Ph.D. in Civil Engineering
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
CVEN	602	Remote Sensing in Hydrology

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
3.00						-	0 0 3 6 3 2

Level	

Approval recommended by:

Dr. Robin Autenrieth R Autenrieth 11-6-15
Department Head or Program Chair *(Type Name & Sign)* Date

V E Taylor 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

V E Taylor 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

CVEN 602: Remote Sense in Hydrology

Spring Semester

Tuesdays and Thursdays, 2:20-3:35pm

Civil Building, 115

Instructor: Dr. Huilin Gao
Office: CE/TTI 410A
Office Hours: 4:00-5:00pm, Monday, Wednesday
Telephone: (979) 862-2581
Email: hgao@civil.tamu.edu
Website: http://ceprofs.tamu.edu/hgao

Course Objectives

Satellite remote sensing is a viable source of observations of land surface hydrologic fluxes and state variables, particularly in regions where *in situ* networks are sparse. Over the past several decades, the study of land surface hydrology using remote sensing techniques has advanced greatly. This is primarily due to the launch of a suite of research satellite platforms, and to the development of more sophisticated retrieval algorithms. This course focuses on introducing the satellite platforms, retrieval algorithms, data products, and applications for constituent variables in the land surface water balance that are observable via remote sensing (at varying spatial and temporal resolutions and accuracy). Specifically, after completing this course, you should be able to know how to use remote sensing products to enhance your own academic research.

Course Details

Text book: G.A. Schultz and E.T. Engman (2000): *Remote sensing in hydrology and water resources*. ISBN 978-3-642-59583-7.

Catalog Description: Remote Sensing in Hydrology (3-0). Credit 3. Precipitation; evapotranspiration; soil moisture; snow and ice; terrestrial water storage variations; land surface properties; water quality.

Prerequisites: CVEN 463 and/or CVEN 627 or registration therein. Basic programming skills recommended. If you are at all uncertain about your preparation for this course, please contact Dr. Gao.

Course Website: http://ecampus.tamu.edu

Course Assignments, Grading, and Policies

Task	Percentage of Grade	Grade Ranges
Class participation	5%	A $\geq$ 90%
Homework	40%	80% $\leq$ B < 90%
Midterm	20%	70% $\leq$ C < 80% 60% $\leq$ D < 70%
Final project	35%	F < 60%

Grading Policies: Requests for regrading must be completed within one week after the exam or homework is returned.

Absences and Course Participation: All absences will be handled according to TAMU Student Rule 7 (*http://student-rules.tamu.edu/rule07*), which states: "The university views class attendance as an individual student responsibility. Students are expected to attend class and to complete all assignments. Instructors are expected to give adequate notice of the dates on which major tests will be given and assignments will be due [i.e. this syllabus]." Homework assignments will have due dates extended by the number of days of excused absence. All excused absences must have appropriate documentation submitted to the instructor.

ADA Statement: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities, in Cain Hall or call 845-1637. Students already registered with Disability Services are encouraged to contact me as soon as possible, to make appropriate arrangements.

Academic Integrity Statement: *"An Aggie does not lie, cheat, or steal or tolerate those who do."* Texas A&M students, as part of their professional training, are expected to understand and follow the Aggie honor code, which may be found at *www.tamu.edu/aggiehonor*. The Dean of Faculties asks us to remind you that, "Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements of the processes of the Honor System."

Tentative Course Schedule

Week	Dates	Lecture Topics
1	1/19, 1/21	Introduction and physical principles
2	1/26, 1/28	Remote sensing application to hydrologic monitoring and modeling – an overview
3	2/2, 2/4	Precipitation: ground-based and space-borne radar
4	2/10, 2/12	Precipitation: single and multiple satellite precipitation
5	2/16, 2/18	Landsat&AVHRR; Moderate Resolution Imaging Spectroradiometer (MODIS)
6	2/23, 2/25	Cloud and radiation; Evaportranspiration
7	3/1, 3/3	Evaportranspiration; Soil moisture
8	3/8, 3/10	Soil moisture; Snow and Ice
9	3/22, 3/24	Midterm; Surface water
10	3/29, 3/31	Surface water; Flood detection
11	4/5, 4/7	Groundwater; Remote sensing data & products
12	4/12, 4/14	Closing the water budget through remote sensing; Remote sensing in hydrologic monitoring and forecasting
13	4/19, 4/21	Land-use and catchment characteristics
14	4/26, 4/28	Water quality; future perspectives
15	5/3	Review and Wrap-up

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NOV 17 2015

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GRADUATE STUDIES

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NOV 09 2015

EASA

Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

•Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Zachry Department of Civil Engineering
3. Course prefix, number and complete title of course: CVEN 642 Water-Engergy-Food Nexus: Toward Sustainable Resource Management
4. Catalog course description (not to exceed 50 words):
Study the principles and application of the Water-Energy-Food nexus to state, national and international Water-Energy-Food securities and the interlinkages between them. Explore a quantitative framework to develop and assess sustainable tradeoffs of resources. Hands on experiences: following subject matter fundamentals, students will work on relevant real world projects or case studies.

5. Prerequisite(s): Strong analytical background; with consent of instructor

Cross-listed with: BAEN 642 Stacked with:

Cross-listed courses require the signature of both department heads

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ______ to ______
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ______ times.

Will this course be repeated within the same semester? ☐ Yes ☐ No

8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:

a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
MS CVEN, MEn CVEN, PhD CVEN

11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
CVEN	642	WEF Nexus Sust Res Mgmt

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
3.00	0.00	0.00	3.00	1408050000	0433	16 - 17	0 0 3 6 3 2

Level: 6

Approval recommended by:

Robin Autenrieth — Robin Autenrieth (signature) — 11-5-15
Department Head or Program Chair *(Type Name & Sign)* — Date

V E Taylor — 11/17/2015
Chair, College Review Committee — Date

Stephen W. Searcy — Stephen W. Searcy (signature) — 10/30/15
Department Head or Program Chair *(Type Name & Sign)* — Date
(if cross-listed course)

V E Taylor — 11/17/2015
Dean of College — Date

Submitted to Coordinating Board by:

Chair, GC or UCC — Date

Associate Director, Curricular Services — Date — Effective Date

Water-Energy-Food Nexus: Toward Sustainable Resource Management
Spring 2017 Course Syllabus (CVEN 642-BAEN 642)

Instructor: Dr. Rabi H. Mohtar
E-mail: mohtar@tamu.edu
Office: Civil Engineering 401B and Scoates Hall 306B
Phone: 979-458-9886
Website: www.wefnexus.tamu.edu
Office Hours: by appointment
Class Day, Time, & Location: TR 9:35-10:50 SCTS 144

Course Description (3 lectures)
Study the principles and application of the Water-Energy-Food nexus to state, national and international Water-Energy-Food securities and the interlinkages between them. Explore a quantitative framework to develop and assess sustainable tradeoffs of resources. Hands on experiences: following subject matter fundamentals, students will work on relevant real world projects or case studies.

Prerequisites: Strong analytical background; with consent of instructor

Textbook/Resource Materials: Current literature will be used. In addition, the **Water-Energy-Food nexus tool** developed by Mohtar and Daher (2014) will be used in this course. The tool designed off a scenario-based framework that quantifies the interlinkages and tradeoffs between these resources. Reading material will be available on the course website.

Grading Policies:
Grading scale (A=90-100, B=80-89, C = <80).
Final project/paper = 40%
Presentation(s) = 20%
Biweekly progress reports = 30%
Class attendance and participation = 10%

Learning Outcomes:
By the end of the semester, you should be able to:
- Understanding of the global risks and the how the nexus can drive sustainability of the resources management and allocation
- Explicitly quantify the inter-linkages of the Water, Energy, Food systems and how to identify a nexus hot spot for a specific condition
- Competent in running the nexus too to simulate and conduct tradeoff analysis for the scenario of interest
- Understand how engineering and analytics interface with economics, policy and supply chain at local and global scale.
- Explore nexus friendly solutions for a specific case study towards a more sustainable resource nexus

Homework Assignments, test dates
Weekly assignments are expected and are listed by week on the syllabus.

Sample Lab/Case Studies: The instructor will meet potential students prior to the beginning of the semester to explore case studies and data gathering.

The Water-Energy-Food nexus is a crosscutting theme. We therefore aim to provide at least two case studies to connect domestic water use with industrial and agricultural use. The scope of the case studies is to provide the young generation with improved knowledge on water use all along the food supply chain. The following themes would be explored:

1. **Securing clean water:** Providing access to safe drinking water, revealing the extent of water use and thereby teaching a new generation on how to reduce water stress in the food value chain
2. **Green agriculture:** Growing agricultural production through innovative clean energy technologies and reduced carbon emissions
3. **Role of renewable energy** in energy portfolio and in bridging water and food gap.

Sample Case Studies to be explored through students projects:

a. Solar-Desalination
b. Soil - Water – Food
c. Water-wastewater reuse
d. Transportation- fracking- water
e. Energy-Food (bioenergy)

Calendar of activities, major assignments, test dates
Course will meet three hours weekly, biweekly written progress reports, and Final report due last meeting of class

Attendance and make-up policies
If an absence is excused, the instructor will either provide an opportunity to make up any quiz, exam or other work that contributes to the final grade or provide a satisfactory alternative by a date agreed upon by the student and instructor. The make-up work must be completed in a timeframe not to exceed 30 calendar days from the last day of the initial absence. See Student Rule 7 http://student-rules.tamu.edu/rule07 for details of excused absences. The fact that these are university-excused absences does not relieve the student of responsibility for prior notification and documentation. Failure to notify and/or document properly may result in an unexcused absence. Falsification of documentation is a violation of the Honor Code.

Americans with Disabilities Act (ADA) Policy Statement
- The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu.

Academic Integrity Statement and Policy - website link http://aggiehonor.tamu.edu
"An Aggie does not lie, cheat or steal, or tolerate those who do."

Class by Topics and Readings

Week 1 Jan 21st	Resource scarcity and spatial variability
Content	a. Introduction to ecosystems and ecosystem services b. Introduction to system's theory c. Situational analysis of water, energy, and food resources at the state, national and international levels Stresses on the resources (climate change, population, financial, health, governance, etc.)
Assignment	What are the nexus hotspots in the water, energy, food areas locally or worldwide (2-3 pages)
Readings	World Economic Forum. 2011. The Water-Energy-Food-Climate Nexus: Island Press: London. World Economic Forum. 2014. *The Future Availability of Natural Resources A New Paradigm for Global Resource Availability.* The United Nations. 2014. "The United Nations World Water Development Report- Water and Energy." [chapter 2 and 9 for this week] http://unesdoc.unesco.org/images/0022/002257/225741e.pdf. Brown, Becky J., Mark E. Hanson, Diana M. Liverman, and Robert W. Merideth. 1987. "Global Sustainability: Toward Definition." *Environmental Management* 11 (6): 713–19. Amigun, Bamikole, Josephine Kaviti Musango, and William Stafford. 2011. "Biofuels and Sustainability in Africa." *Renewable and Sustainable Energy Reviews* 15 (2): 1360–72. Gleick, PH, and M Palaniappan. 2010. "Peak Water Limits to Freshwater Withdrawal and Use." http://www.pnas.org/content/107/25/11155.full.pdf Immerzeel, Walter etal. 2011. "Middle-East and Northern Africa Water Outlook." *World Bank.* http://siteresources.worldbank.org/INTMNAREGTOPWATRES/Resources/MNAWaterOutlook_to_2050.pdf. Shi, Daniel; Naresh, Devineni; Upmanu, Lall; Edwin, Piñero. 2013. "America's Water Risk: Water Stress and Climate Variability – Columbia Water Center." *Columbia Water Center.* http://water.columbia.edu/2013/06/10/americas-water-risk-water-stress-and-climate-variability/.

Week 2 Jan 28th	Interdependencies in resources I
Content	Nexus elements a. Water for food b. Water for energy
Assignment	Individual Semester Class Project Scope Online data resources for water-energy-food
Readings	Texas Water Plan http://www.twdb.texas.gov/waterplanning/swp/ Hanjra, Munir A., and M. Ejaz Qureshi. 2010. "Global Water Crisis and Future Food Security in an Era of Climate Change." *Food Policy* 35 (5): 365–77. Hoekstra, A. Y. 2012. "The Hidden Water Resource Use behind Meat and Dairy." *Animal Frontiers* 2 (2). American Society of Animal Science: 3–8. Faeth, Paul. 2012. "U.S. Energy Security and Water: The Challenges We Face." *Environment: Science and Policy for Sustainable Development*. The United Nations. 2014. "The United Nations World Water Development Report- Water and Energy." [chapter 3 and 6 for this week] http://unesdoc.unesco.org/images/0022/002257/225741e.pdf.

Week 3 Feb 2nd	Interdependencies in resources II
Content	Nexus elements a. Energy for water b. Energy for food c. Food for energy Introduction to the nexus
Assignment	Project Groups and Project Timeline
Readings	Hoff, H. 2011. "Understanding the Nexus." *Background Paper*. Rabi H. Mohtar, and Bassel Daher. 2010. "Water, Energy, and Food: The Ultimate Nexus." U.S. Department of Energy. 2014. "The Water-Energy Nexus: Challenges and Opportunities."

	http://www.energy.gov/articles/department-energy-releases-water-energy-nexus-report. Gleick, P H. 1994. "Water and Energy." *Annual Review of Energy and the Environment* 19 (1). Murkowski, Lisa. 2014. *The Energy-Water Nexus Interlinked Resources That Are Vital For Economic Growth and Sustainability. An Energy 20/20 White Paper*. Fraiture, Charlotte de, Mark Giordano, and Yongsong Liao. 2008. "Biofuels and Implications for Agricultural Water Use: Blue Impacts of Green Energy." *Water Policy* 10 (S1): 67. Gerbens-Leenes, P.W., A.Y. Hoekstra, and Th. van der Meer. 2009. "The Water Footprint of Energy from Biomass: A Quantitative Assessment and Consequences of an Increasing Share of Bio-Energy in Energy Supply." *Ecological Economics* 68 (4): 1052–60. Cuéllar, Amanda D, and Michael E Webber. 2010. "Wasted Food, Wasted Energy: The Embedded Energy in Food Waste in the United States." *Environmental Science & Technology* 44 (16). American Chemical Society: 6464–69. Sanders, Kelly T, and Michael E Webber. 2012. "Evaluating the Energy Consumed for Water Use in the United States." *Environmental Research Letters*.

Week 4 Feb 9th	**Virtual Water (guest lecture by Tony Allan, King's College London)**
Content	History of the virtual water concept What is food-water Analysis of the nexus through a supply chain framework
Assignment	Articulate research questions Outline project timeline Describe system inter-dependencies
Readings	Virtual Water by Tony Allan http://www.amazon.com/gp/offer-listing/1845119843/ref=tmm_pap_used_olp_sr?ie=UTF8&condition=used&sr=&qid=

Week 5 Feb 16th	**Nexus Success Stories**
Content	. Energy (renewables, example solar farm)Water (alternative water,

	Singapore) . Food (low input farming, Nebraska, ICARDA or ICBA) . Sahara Forest Project . Stewart Orr (Water Stewardship Concept)
Assignment	Describe full data and data gaps for all the system interconnectedness
Readings	Water Stewardship http://wwf.panda.org/what_we_do/how_we_work/conservation/freshwater/water_management/ Giampietro, et al. 2013. "An Innovative Accounting Framework for the Food-Energy-Water Nexus : Application of the MuSIASEM Approach to Three Case Studies." *FAO*. [Chapter 1]

Week 6 Feb 23rd	Localizing water and food security
Content	Localizing water and food security Conceptual modelling (local-global nexus) Green water definition and accounting Water reuse Water conservation Technology (supplementary irrigation, genetics and breeding…)
Assignment	Development of scenarios and analysis framework
Readings	UN Concept paper (Mohtar, Assi, Daher) Integrative Modeling (Braudeau and Mohtar) Lele, U., M. Klousia-Marquis, and S. Goswami. 2013. "Good Governance for Food, Water and Energy Security." *Aquatic Procedia* 1 (January): 44–63. World Energy Council. 2014. *LAC Region High Level Scenario Explorations*. Perrone, Debra, Jennifer Murphy, and George M. Hornberger. 2011. "Gaining Perspective on the Water-Energy Nexus at the Community Scale." *Environmental Science and Technology* 45 (10): 4228–34. Qadir, M., B.R. Sharma, A. Bruggeman, R. Choukr-Allah, and F. Karajeh. 2007. "Non-Conventional Water Resources and Opportunities for Water Augmentation to Achieve Food Security in Water Scarce Countries." *Agricultural Water Management* 87 (1): 2–22. Sposito, Garrison. 2013. "Green Water and Global Food Security."

	Vadose Zone Journal 12 (4). The Soil Science Society of America, Inc. doi:10.2136/vzj2013.02.0041.

Week 7 March 2nd	**Energy security and role of renewable energy in bridging the water and food gap**
Content	Tradeoffs and Nexus solutions Systems Modelling Introduction to Nexus Tools
Assignment	Initial simulation/analytics/analysis
Readings	IRENA Report

Week 8 March 9th	**Quantitative Nexus Framework**
Content	Tradeoffs and Nexus solutions Systems Modelling Introduction to Nexus Tools
Assignment	Analytics and analysis
Readings	Nexus Tool Chatham house (Mohtar and Daher) Nexus Tool paper (Daher and Mohtar, SP WI)

Week 9 March 16-20	Monday-Friday. Spring Break (Wed-Fri Faculty and Staff holiday)

Week 10 March 23rd	**Mid-Year Class Presentations**

Week 11 March 30th	**Nexus Tool 2.0**
Content	Examples case studies using the nexus tools by the instructor. Data preparation and file management
Assignment	Updated report draft
Readings	Same as above

Week 12 April 6th	Catching up with unfinished material from nexus analytics

Week 13 April 13th	**Environmental policy (guest lecture by Gabe Eckstein, Raya Stephan, Ron Kaiser)**
Content	Environmental policy Regulations Policy reform
Assignment	Report draft
Readings	TBD

Week 14: April 20th	Lessons learned and current gaps
Content	From Science to policy (framework elaborated) Lessons learned Future Nexus governance
Assignment	Enhanced project report
Readings	No reading assignment

Week 15: April 27th	One Day Symposium
Content	Student presentations Nexus stakeholder panel discussion between students and decision-makers from the public and private sector

Week 16 May 4th	Final Report Due

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GRADUATE STUDIES

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EASA

Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

•Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Zachry Department of Civil Engineering
3. Course prefix, number and complete title of course: CVEN 650 Stochastic Mechanics
4. Catalog course description (not to exceed 50 words):

This course introduces the use of Bayesian inference methods to solve mechanical inverse problems with varying evidence conditions: experimental observations, model complexity and expert beliefs. This solution represents the probabilistic calibration of models with varying parameters in space and time, in the form of boundary conditions, material properties, and even numerical parameters. The course is intended to improve significantly the scientific and engineering inferences stemmed from research practice.

5. Prerequisite(s): STAT 201

Cross-listed with: N/A Stacked with: N/A

Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ______ to ______
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ______ times.

Will this course be repeated within the same semester? ☐ Yes ☑ No

8. Will this course be submitted to the Core Curriculum Council? ☑ Yes ☐ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
   a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
   N/A
   b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
   N/A
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
CVEN	650	Stochastic Mechanics

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
						-	0 0 3 6 3 2

Level

Approval recommended by:

Yunlong Zhang 11/09/15

Department Head or Program Chair *(Type Name & Sign)* Date

V E Taylor 11/17/2015

Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

V E Taylor 11/17/2015

Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.

Curricular Services – 07/14

SYLLABUS

CVEN-650: **Stochastic Mechanics**
Spring 2016

Instructor
Prof. Zenon Medina-Cetina
808 'S' CVLB Building
Office Hours: TBA, or by appointment
Office phone number: (979) 845-6567

Schedule and Location
TBA

Prerequisites
Statistics and Probability at the undergraduate level
Advanced Mechanics at the graduate level (can vary depending on the student's specialty)

Lecture Periods
Lecture period = 3 hours/week

E-mail, class communications, notes, grade reports
Only via e-campus at http://ecampus.tamu.edu

Course Objective
This course is oriented towards the application of probabilistic techniques for solving inverse problems of mechanical nature. The course focus is in simulating realistic scenarios where both the forward model predictions and the conditioning experimental observations used to parameterize it, may vary. Varying scenarios for the forward model include initial and boundary conditions, loading and excitations, material composition, number of 'physics' (mechanics, thermal, hydro, bio, chemical), for the model's numerical parameters (e.g. mesh resolution, time integration, etc.), and even for the numerical probabilistic sampling (e.g. probabilistic hyper-parameters, sampling step, correlation parameters, etc.). Varying scenarios for the experimental observations may vary in type (e.g. temperature, displacements, pressure, solution content, etc.). Furthermore, the elements of the forward model, the experimental observations, and the numerical probabilistic sampling may vary in space and time. The aim is to measure the impact of formulating mechanistic predictions based on available evidence via Uncertainty Quantification techniques.

Approach
The proposed approach aim at generating measurable impacts of evidence in the understanding of mechanistic processes, to provide improved inferences that can facilitate decision making when these are addressed in terms or reliability or risk. For this purpose, a 'hands on' approach is considered, implying the use of computational coupling between probabilistic assessment techniques, and

current mechanical solvers. This means that a non-intrusive approach will be privileged (i.e. all what will be required is an input, executable solver, and output file), although theoretical considerations will be outlined, to formulate an intrusive approach (i.e. when the varying processes are handled inside the mechanistic solvers, and access to their code is permitted).

Course Contents

Topic	Week
Stochastic Mechanics as an Evidence-Based Approach for Improved Decision-Making: The impact of incorporating evidence in the understanding of a given mechanical problem as it becomes available (i.e. model predictions, experimental observations, and expert's beliefs).	1
Elements of Statistics and Probability.	2
Design of Experiments	3
Simulation of Random Fields and Stochastic Processes: From Spatial and Temporal to Spatio-Temporal; from Single to Multivariate; from Stationary Gaussian to Non-Stationary Non-Gaussian	4
Spectral Methods	5
Geostatistical Methods	6
Series Expansion Methods: Karhunen-Loeve and Polynomial Chaos	7
Kalman Filtering	
Bayesian Forecasting	
Causal Probability	
Bayesian Networks	8
Inverse Problem Theory: Deterministic and Probabilistic	
Elements of Inverse Theory	9
Experimental Observations	
Optimization-Based Approach	10
Bayesian Approach	11
Tarantola's Approach	12
Computational Statistics	
Markov Chain Monte Carlo	13
Parallel Computing	
Sensitivity Analysis	14
Use of Surrogate Models	15

SYLLABUS

Professional course outcomes
Upon completion of the course, students will be able to:

- ✓ Identify key uncertainty sources from available scientific evidence for a given engineering process, and formulate what their impacts are on the mechanistic model predictions of interest.
- ✓ Understand the fundamental principles of current approaches for the deterministic solution of inverse problems.
- ✓ Understand the fundamental principles of current approaches for the simulation of multivariate spatio-temporal processes based on stochastic or random field models.
- ✓ Formulate and implement theoretical and computational probabilistic solutions of a given inverse problem, where the domain of interest or/and the participating parameters are multivariate spatio-temporal processes simulated via stochastic or random field models.
- ✓ Present results of the probabilistic solution of a given inverse problem in the form of a draft for the publication of a journal paper.

Method of Evaluation
This course will be evaluated by the submission of assignments, one midterm and a final examination.

- Weekly assignments will be formulated according to the course contents.
- Midterm and Final
  - *Midterm* scheduled for the 3rd week of March.
  - *Final exam* scheduled according to the Registrar's office: http://registrar.tamu.edu/.

The final grade will be comprised of:

Evaluation Method	**%**
Assignments	30
Midterm	30
Final	40
Total	**100**

The grading criteria to be applied for each grade are defined as:

Grade	Criteria
A	*Outstanding* ability for problem solving, logic and cleanliness in the presentation of results. Greater than or equal to 90 % credit
B	*Acceptable* ability for problem solving, logic and cleanliness in the presentation of results. Greater than or equal to 80 % credit and less than 90 % credit
C	*Limited* ability for problem solving, logic and cleanliness in the presentation of results. Greater than or equal to 70 % credit and less than 80 % credit
D	*Poor* ability for problem solving, logic and cleanliness in the presentation of results. Greater than or equal to 60 % credit and less than 70 % credit
F	*Unacceptable* ability for problem solving, logic and cleanliness in the presentation of results. Less than 60 % credit

Additional information regarding student academic rules can be found at http://student-rules.tamu.edu .

References

There is no precedent of a textbook that can capture the integration between stochastic and random field theory with mechanical processes from an engineering perspective. For this reason it is not proposed a specific textbook for the course, for which it is expected to be based on the Instructor's notes, and supporting references including textbooks and journal papers that are provided below.

- *Class Notes*, published via e-learning.
- *Textbooks*:

Ang, A.H-S. and Tang W.H., (2007). Probability Concepts in Engineering: Emphasis on Applications to Civil and Environmental Engineering, 2nd Edition, Wiley.

Aster R.C., Borchers B. and Thurber C.H. (2005). Parameter Estimation and Inverse Problems, Elsevier, Burlington MA, USA.

Benjamin, J.R. and C.A. Cornell (1970), "Probability, Statistics, and Decision for Civil Engineers," McGraw-Hill.

SYLLABUS

Congdon P. (2006). Bayesian Statistical Modeling, 2nd Edition, Wiley, West Sussex UK.

Dale A.I. (1999). A History of Inverse Probability. From Thomas Bayes to Karl Pearson. 2nd Edition. Springer, New York.

Denison D.G.T., Holmes C.C., Mallick B.K., A.F.M. Smith (2002). Bayesian Methods for Nonlinear Classification and Regression, Wiley, England.

Gentle J.E., Hardle W. and Mori Y. eds. (2004). Handbook or Computational Statistics, Concepts and Methods, Springer, Fairfax USA.

Ghanem R. and Spanos P.D. (2003). Stochastic Finite Elements: A Spectral Approach, Revised Edition, Dover Publications, New York.

Grigoriu M. (1995). Applied Non-Gaussian Processes: Examples, Theory, Simulation, Linear Random Vibration, and Matlab Solutions. Prentice Hall, New Jersey.

Grigoriu M. (2002). Stochastic Calculus, Birkhauser, Boston USA.

Jaynes E.T. (2003). Probability Theory, The Logic of Science, Cambridge UK.

Korb K. B. and Nicholson A.E. (2003). Bayesian Artificial Intelligence, Chapman and Hall/CRC, London UK.

Martinez W.L. and Martinez A.R. (2007). Computational Statistics Handbook with MATLAB, 2nd Edition, Chapman Hall.

Neapolitan R. E. (2004). Learning Bayesian Networks, Prentice Hall, Upper Saddle River NJ, USA.

Robert C.P. and Casella G. (2004). Monte Carlo Statistical Methods, 2nd Edition, New York, USA.

Mood A.M. and Graybill F.A. (1970). Mcgraw Hill Higher Education; 3rd edition, USA.

Myers R.H. and Montgomery D.C. (1995). *Response Surface Methodology: Process and Product in Optimization Using Designed Experiments*. John Wiley and Sons Inc. New York.

Papoulis A. (2002). Probability, Random Variables and Stochastic Processes, McGraw-Hill Europe, 4th edition.

Press, J. (2003). Subjective and Objective Bayesian Statistics: Principles, Models, and Applications, 2nd Edition. Wiley-Inter Science, New Jersey.

Robert C. P. and Casella G. (2005). Monte Carlo Statistical Methods. Springer, New York USA.

Robert C.P. (2001). The Bayesian Choice, Springer-Verlag, New York USA.

Santamarina C. and Fratta D. (2005). Discrete Signals and Inverse Problems: An Introduction for Engineers and Scientists. John Wiley & Sons Ltd, West Sussex, UK.

Tarantola A. (2004). Inverse Problem Theory and Methods for Model Parameter Estimation, SIAM, Philadelphia USA.

Tikhonov A.N., Goncharsky A.V., Stepanov V.V. and Yagola A.G. (1995). Numerical Methods for the Solution of Ill-Posed Problems. Luwer Academic Publishers, Netherlands.

Van Trees H.L. (2001). Detection, Estimation, and Modulation Theory. Part I. John Wiley and Sons Inc., New York.

– *Scientific Journals*:

Chu T.C., Ranson W.F., Sutton M.A. and Peters W.H. (1985) Applications of digital-image-correlation techniques to experimental mechanics. Experimental Mechanics, 25, 232-244.4

Desceliers C., Ghanem R. and Soize C. (2006). Maximum likelihood estimation of stochastic chaos representations from experimental data. International Journal for Numerical Methods in Engineering, 66(6), 978-1001.

Fadale T.D., Nenarokomov A.V. and Emery A.F. (1995). Uncertainties in parameter estimation: The inverse problem. International Journal of Heat and Mass Transfer, 38 (3), 511-518.

Fitzpatrick B.G. (1991). Bayesian analysis in inverse problems. Inverse Problems, 7, 675-702.

Ghanem R. (1999). "Ingredients for a General Purpose Stochastic Finite Elements Implementation," Computer Methods in Applied Mechanics and Engineering, 168, 19-34.

Ghanem R. and Doostan A. (2006). On the construction and analysis of stochastic models: Characterization and propagation of the errors associated to limited data. Journal of Computational Physics, 217, 63-81.

Grigoriu M. (1993). Simulation of stationary processes via the sampling theorem. Journal of Sound and Vibration, 166 (22), 301-313.

Grigoriu M. (1993). Simulation of stationary processes via the sampling theorem. Journal of Sound and Vibration, 166 (22), 301-313.

McLaughlin D. and Townley L.R. (1996). A reassessment of the groundwater inverse problem. Water Resources Research. 32 (5), 1131-1161.

Sakamoto S. and Ghanem R. (2002a). Simulation of multi-dimensional non-Gaussian non-stationary random fields. Probabilistic Engineering Mechanics, 17 (2), 167-176.

Sakamoto S. and Ghanem R. (2002b). Polynomial chaos decomposition for the simulation of non-Gaussian non-stationary stochastic processes. Journal of Engineering Mechanics, 128 (2), 190-201.

Schueller G.I. ed. (1997). "A State-of-the-Art Report on Computational Stochastic Mechanics," Probabilistic Engineering Mechanics, 12 (4), 197-321.

Schueller G.I. (2011). "Computational Stochastic Mechanics – Recent Advances," *Computers and Structures*, 79, 2225-2234.

Shinozuka M. and Deodatis G. (1991). Simulation of stochastic processes by spectral representation. Applied Mechanics Reviews, 44(4), 191-204.

Snyman J.A. (2000). The LFOPC Leap-Frog algorithm for constrained optimization. Computers and Mathematics with Applications. 40, 1085-1096.

Sutton, M.A., McNeill, S.R., Helm, J.D. and Chao, Y.J. (2000). Advances in two-dimensional and three-dimensional computer vision. *Photomechanics, Topics in Applied Physics*, 77, 323-372.

Class Rules

- Assignments should be submitted via e-learning. Lack of a grade on any of these will be given automatically zero credit at the end of the course. <u>Students are responsible of checking their grades as these are posted on e-learning</u>.

- Late assignments will be penalized 50% only if this is submitted within the week after the deadline. Zero credit will be given after that. In the case of a valid excuse according to University rules (http://student-rules.tamu.edu/rule07), an official document should be submitted to the instructor to arrange for a non-penalized submission.
- In the case of missing a lecture, it is the student's responsibility to follow the course contents through the instructor's notes posted on e-learning, the references provided in this syllabus, and to submit on time the corresponding assignments and final report.
- The use of portable devices for communication during lectures is prohibited.
- <u>The instructor reserves the right to ask a student to leave the classroom if his/her behavior is not acceptable for the standards of excellence expected for an Aggie</u>.
- All assignments must be prepared individually unless otherwise instructed. Copying is not permitted and is considered cheating. Teamwork is strongly advised, in the spirit of collaborating to clarify methods, concepts and procedures needed to advance in the reports, presentations and paper.
- Cheating will not be tolerated. Cheating will be reported and handled in accordance with the Aggie Honor System Process. Examinations will be open book and notes; however "looking at another student's examination or using other external aids (e.g. calculators, conversation with other students, or use of electronic devices)" during these examinations is a violation of Texas A&M Aggie Honor Code, unless specifically allowed in advance by the instructor.
- The handouts used in this course are copyrighted. By "handouts," it is understood all materials generated for this class, which include but are not limited to syllabi, class notes, and class presentations. Because these materials are copyrighted, you do not have the right to copy them unless the instructor expressly grants permission.
- The instructor strongly suggests that the class content be studied before the corresponding lecture. And that notes taken during the lecture be amplified through use of the text and the other referenced material, and by asking him questions during and after class. It is important that the student use a great deal of care in advancing the preparation of the reports and paper.
- The student authorizes the instructor to return graded class material on a specified location (TBA) where all class students can have free access to it as a way to expedite the grading process and avoid using time class for this purpose. The student will collect only his/her graded material.

Americans with Disabilities Act (ADA) policy statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu.

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University Statement on Harrasment and Discrimination
Texas A&M is committed to the fundamental principles of academic freedom, equality of opportunity and human dignity. To fulfill its multiple missions as an institution of higher learning, Texas A&M encourages a climate that values and nurtures collegiality, diversity, pluralism and the uniqueness of the individual within our state, nation and world. All decisions and actions involving students and employees should be based on applicable law and individual merit. Texas A&M University, in accordance with applicable federal and state law, prohibits discrimination, including harassment on the basis of race, color, national or ethnic origin, religion, sex, disability, age, sexual orientation, or veteran status. Individuals who believe they have experienced harassment or discrimination prohibited by this statement are encouraged to contact the appropriate offices within their respective units. Students should contact the Office of the Dean of Student Life at 845-3111.

Texas A&M academic integrity statement and policy
This course is based on the Aggie academic integrity statement policy:

"An Aggie does not lie, cheat or steal, or tolerate those who do."

I agree to the terms and conditions described in this course's syllabus and rules:

Student's name

--- --
Student's signature Date

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus.•

RECEIVED
OCT 19 2015
ESSAP

Form Instructions

1. Course request type: ☐ Undergraduate ☒ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Electrical and Computer Engineering
3. Course prefix, number and complete title of course: ECEN 765 Machine Learning with Networks

4. Catalog course description (not to exceed 50 words): Scientific analysis of large-scale data may discover useful knowledge. While many machine learning courses focus on analyzing data in a matrix format without taking care of relationships among variables, the major focus of this course is to introduce advanced methods that are designed to analyze structured data represented as networks.

5. Prerequisite(s): Approval of instructor

   Cross-listed with: ______ Stacked with: ______

   Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☒ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☒ No If yes, this course may be taken ____ times.

   Will this course be repeated within the same semester? ☐ Yes ☐ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☒ No
9. How will this course be graded: ☒ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:

    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*

    Masters and Ph.D. students in Electrical Engineering, and Computer Engineering
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☒ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
ECEN	765	MACH LEARN W/ NET

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
3.00	0.00		3.00	1410010006	0936	16 - 17	0 0 3 6 3 2

Level 6

Approval recommended by:

Jose Silva-Martinez 10/15/2015

Department Head or Program Chair *(Type Name & Sign)* Date

Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	ECEN 765 Machine Learning with Networks
Term	TBD
Meeting times and location	TBD

Course Description and Prerequisites

In the past decades, with two main technology advancements: Internet and high-throughput molecular profiling techniques, we have witnessed the outburst of the unprecedented amount of data from different disciplines, such as biology, engineering, social science, etc. The scientific analysis of these extremely large-scale data is critical to discover useful knowledge that benefits human beings. Machine learning provides a set of important tools to find patterns and generalize rules from data. While many machine learning courses focus on analyzing data in a matrix format without seriously taking care of relationships among variables, the major focus of this course is to introduce basic machine learning techniques together with the advanced methods that are designed to analyze structured data, typically represented as graphs or empirical networks. The course covers the basics of machine learning (supervised and unsupervised learning) focusing on Bayesian reasoning, basic graph theory, as well as some advanced, recent research topics.

Prerequisites:
1. Undergraduate-level linear algebra, multivariate calculus, and probability theory
2. Basic programming skills in any programming language (Matlab, Python, C, C++, Java, etc.)

There will be a lot of math and statistics in this course, please do talk to me about prerequisites if you are not sure.

Learning Outcomes

At the end of this course, the students should
1. Have good knowledge of basic machine learning and Bayesian reasoning methods.
2. Identify and understand real-world applications of machine learning methods.
3. Have hands-on experience on analyzing real-world data with the integration of relationships among different variables.

Instructor Information

Name	Xiaoning Qian
Telephone number	979-845-6268
Email address	xqian@ece.tamu.edu
Office hours	Friday 11:00AM-noon
Office location	WERC214H

Textbook and/or Resource Material

Textbook: Bayesian Reasoning and Machine Learning by D Barber (ISBN 9780521518147)
Recommended Reading:
1. Machine Learning in Action by *P Harrington* (ISBN 9781617290183)

2. Networks: An Introduction by *MEJ Newman* (ISBN 9780199206650)
3. Machine Learning by *KP Murphy* (ISBN 9780262018029)
4. Elements of Statistical Learning by *T Hastie, R Tibshirani*, and *J Friedman* (ISBN 0387952845)
5. Pattern Classification (Second Edition) by *RO Duda, PE Hart*, and *DG Stork* (ISBN 0471056693)
6. Other relevant surveys and papers will be distributed in class.

Grading Policies

Grading is relative. The plus/minus grading system will be applied. The final grade will be based on the following weights (tentative):
Homework assignments (50%) + Midterm exam (30%) + Final project (20%)

Grading scale: 90-100 A, 80-89 B, 70-79 C, 60-69 D, below 60 F.
Collaboration Policy: You are welcome to collaborate on homework and the final project. However, you must write the solutions and reports on your own and acknowledge your collaborators.

Attendance and Make-up Policies

Attendance and make-up policies will follow the general student rule of the university: http://student-rules.tamu.edu/rule07.

Course Topics, Calendar of Activities, Major Assignment Dates

Week 1-2	Course overview; Math refresher: graph and probability theory
Week 3-6	Learning with unstructured data (supervised and unsupervised linear models)
Week 7-10	Structured sparse models (learning with network prior)
Week 11-13	Markov models (network clustering and network diffusion)
Week 14-15	Bayesian networks and real-world applications

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

Academic Integrity

For additional information please visit: http://aggiehonor.tamu.edu

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

RECEIVED

NOV 12 2015

GRADUATE STUDIES

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus. •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Geology and Geophysics
3. Course prefix, number and complete title of course: GEOL 647: Radiogenic Isotope Geology
4. Catalog course description (not to exceed 50 words):
   The use of radiogenic isotopes in addressing problems in high- and low-temperature geochemistry, including their use as tracers for past and present-day processes at the surface and interior of the Earth.
5. Prerequisite(s): permission of instructor

   Cross-listed with: ________ Stacked with: ________

   Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☐ No If yes, this course may be taken ____ times.

   Will this course be repeated within the same semester? ☐ Yes ☑ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
    MS, PhD in Geology
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
GEOL	647	Radiogenic Isotope Geology

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
3.00	0.00		3.00			16 - 17	0 0 3 6 3 2

Level:

Approval recommended by:

ME for Michael Pope Everett Nov. 11/15

Department Head or Program Chair *(Type Name & Sign)* Date

Chair, College Review Committee 11/11/15 Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Dean of College 11/11/15 Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14

GEOL 647—Radiogenic Isotope Geology

Instructor	Franco Marcantonio (979-845-9240)
	marcantonio@tamu.edu
Meeting times/location	TR 2:20-3:35 / 327 HALB
Office hours	Mondays 8-10 am
Office location	Rm 257 Halbouty

Course Description and Prerequisites

The use of radiogenic isotopes in addressing problems in high- and low-temperature geochemistry, including their use as tracers for past and present-day processes at the surface and interior of the Earth.

Learning Outcomes

Graduates will be able to:

- describe the role that radiogenic isotope geochemistry plays in Earth Sciences
- solve Earth Science problems using radiogenic isotope data sets
- explain processes that take place at depth and at the surface of our planet using radiogenic isotope systematics

Textbook

Isotopes Principles and Applications, 3rd ed, G. Faure and T. Mensing, 2005, Wiley.

Grading {A: 90-100%, B: 80-89.99%, C: 70-79.99%, D:60-60.99%, F<60%}

100 points total

Problem Sets	50 points	will involve quantitative manipulation and analysis of isotope geochemical data sets.
Presentations	25 points	
Paper	25 points	

Course Topics, Tentative Calendar of Activities

Week	Topic
1	Introduction to nuclear systematics; decay modes of radionuclides
2	Atom physics problem set
3	Introduction to radioactive decay; geochronometry; mass spectrometry
4	Rb-Sr, Sm-Nd methods
5	K-Ar, $^{40}Ar^{*}/^{39}Ar$ methods
6	U-Th-Pb, Re-Os methods
7	Radiogenic isotope mixing theory; radiogenic isotopes in rivers
8	Radiogenic isotopes in the oceans
9	Short-lived radionuclides; U-Th disequilibrium;

10	U-Th Bateman equations; Cosmogenic radionuclides
11	Radiogenic isotopes and the origin of igneous rocks
12	Student Presentations
13	Student Presentations
14	Student Presentations
15	Student Presentations

Americans with Disabilities Act

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Academic Integrity

For additional information please visit: http://www.tamu.edu/aggiehonor

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

Attendance and Makeup Policy

Student absences will be administered in accordance with Student Rule #7. All deadlines for problem sets and presentations/papers are strict. There will be no opportunities for makeups.

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Geology and Geophysics
3. Course prefix, number and complete title of course: GEOP 618 Numerical Methods for the Geosciences
4. Catalog course description (not to exceed 50 words):

Mathematical theory and numerical techniques for modeling physical systems and processes in the Geosciences; discretization of continuum equations for solids and fluids; finite difference methods, convergence, consistency, and stability; finite element and spectral methods in fluid dynamics and seismology; iterative solvers; implicit and explicit methods for diffusion and advection.

5. Prerequisite(s): Graduate classification or approval of instructor.

Cross-listed with: ATMO 618 and OCNG 618 Stacked with:

Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times.

Will this course be repeated within the same semester? ☐ Yes ☑ No

8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:

a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
M.S., Ph.D. in all Geosciences majors.

11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
GEOP	618	NUMERICAL METHODS GEOSCIENCES

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
03	00	00	03	4006070002	1305	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Michael Pope Michael C Pope 11/09/15

Department Head or Program Chair *(Type Name & Sign)* Date

11/11/15

Chair, College Review Committee Date

Deborah Thomas 11/10/15

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

11/11/15

Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	**Numerical Methods for the Geosciences, OCNG 618**
Term (e.g., Fall 200X)	Fall 201X
Meeting times and location	TBD

Course Description and Prerequisites

Mathematical theory and numerical techniques for modeling physical systems and processes in the Geosciences; discretization of continuum equations for solids and fluids; finite difference methods, convergence, consistency, and stability; finite element and spectral methods in fluid dynamics and seismology; iterative solvers; implicit and explicit methods for diffusion and advection.

The goal of this course is to provide students with the mathematical and numerical foundations required to understand how to develop numerical models in the various disciplines of the Geosciences that employ the continuum approximation to study systems with a large number of degrees of freedom.

Students in this course are assumed to have a graduate-level working knowledge of and experience with continuum dynamics.

Prerequisites: Graduate classification or approval of instructor.

Learning Outcomes

By the end of this course, students will be able to:

1. Apply fundamental discretization techniques to the continuum partial differential equations (PDEs) used in the Geosciences to describe the physical behavior of solids and fluids;
2. Evaluate convergence, consistency, and stability of numerical solutions of initial value problems obtained by finite difference methods;
3. Identify problems of interest in the Geosciences whose solution may be approximated by using the finite element or spectral method and create a simplified numerical scheme based on the selected method;
4. Apply iterative methods to solve systems of linear equations resulting from discretized PDEs and address convergence issues;
5. Create one or more numerical models for specific physical processes in the Geosciences by identifying and applying the most suitable numerical techniques learned in the course;
6. Write a comprehensive technical report.

Instructor Information

Name	Ping Chang
Telephone number	979-845-8196
Email address	ping@tamu.edu
Office hours	Open
Office location	O&M 624

Textbook and/or Resource Material

Course material will be provided to the students in the form of lecture notes and handouts.

Students are encouraged, but not required, to read the following:

1. Roache, J.P., Fundamentals of Computational Fluid Dynamics, Hermosa Publishers, 1988
2. Ferziger, J.H., Peric, M., Computational Methods for Fluid Dynamics, 3rd rev. ed., Springer-Verlag Berlin Heidelberg, 2002
3. Fletcher, C.A.J., Computational Techniques for Fluid Dynamics, Volume 1: Fundamental and General Techniques, Springer-Verlag, Berlin, 1988
4. Fletcher, C.A.J., Computational Techniques for Fluid Dynamics, Volume 2: Specific Techniques for Different Flow Categories, Springer-Verlag, Berlin, 1988
5. Canuto, C., et al., Spectral Methods in Fluid Dynamics, Springer-Verlag, Berlin Heidelberg, 1988
6. Gerya, T., Introduction to Numerical Geodynamic Modelling, Cambridge University Press, 2010
7. Haidvogel, D.B, Beckmann, A., Numerical Ocean Circulation Modeling, Imperial College Press, 1999
8. Griffies, S., Fundamentals of Ocean Climate Models, Princeton University Press, 2004
9. Mesinger, F., Arakawa, A., Numerical Methods Used in Atmospheric Models, Volume 1, GARP Publication Series No. 17, August 1976
10. Haltiner, G.J., Williams, R.T., Numerical Prediction and Dynamic Meteorology, Wiley, 1980
11. Washington, W.M., Parkinson, C.L., An Introduction to Three-Dimensional Climate Modeling, 2nd Ed., University Science Books, 2005
12. Bedford, A., Drumheller, D.S., Introduction to Elastic Wave Propagation, Wiley, 1994
13. Pujol, J., Elastic Wave Propagation and Generation in Seismology, Cambridge University Press, 2003
14. Yanfei Wang, Anatoly G. Yagola, Changchun Yang (Eds.), Computational Methods for Applied Inverse Problems. Higher Education Press, 2012

Grading Policies

Final grades will be based on the following weights:

1) Assignments (30% of course grade)
2) Midterm exam (20% of course grade)
3) Final project (50% of course grade)

Assignments will be due at the beginning of class on the scheduled week, unless stated otherwise by the instructor. Late homework will be assessed a penalty equal to 20% of its grade per day unless the students submits a university-excused absence (see Attendance and Make-up Policies section). An unexcused delay longer than 4 working days will automatically result in receiving zero points on the assignment.

Midterm. There will be a two-hour long in-class midterm exam.

Final Project. A final modeling project will be due by 5pm on the last day of the university's Final Examination Schedule for the semester, available at http://registrar.tamu.edu/Courses,-Registration,-Scheduling/Final-Exam-Schedule. This final project must include a 10-page written scientific report that comprehensively summarizes foundations, methods, and results of the modeling project in the style of the American Geophysical Union *Geophysical Research Letters* journal (http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)1944-8007/).

Final course grades will be posted on http://elearning.tamu.edu

Please consult University Student Rule 10 (Grading) at http://student-rules.tamu.edu/rule10 for additional details on grading policies.

Grading Scale

A final percentage grade will be calculated based on your total weighted scores as listed above. A final letter grade will be assigned as follows:

A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F = <60%

Attendance and Make-up Policies

The university views class attendance as an individual student responsibility. You are expected to attend class and to complete all assignments. Attendance is essential to complete the course successfully.

Please consult the University Student Rule 7 at http://student-rules.tamu.edu/rule07 for details on university-excused absences and make-up policies.

Course Topics, Calendar of Activities, Major Assignment Dates

Week	Topic	Assignment
Week 1	Introduction to fundamental physical systems and processes in Geosciences that can be represented using continuum partial differential equations (PDEs). Basic concepts in numerical modeling.	
Week 2	Mathematical description of continuum media and key physical properties: Fluids – Continuity equation; viscosity; classification of flow regimes; Eulerian and Lagrangian descriptions; advection. Solids – Deformation and stresses; stress and strain tensors; equations of motion; gravity and gravitational potential.	
Week 3	Fundamental equations in the Geosciences. Traditional working approximations. Primitive equations: continuity, momentum, thermal energy. Beta plane approximation in fluid dynamics.	
Week 4	Boundary value problems in the Geosciences. Dynamic and thermodynamic boundary conditions. Elliptic (Laplace's equation), parabolic (diffusion equation), and hyperbolic (wave equation) PDEs. Examples of common transition cases between PDE types in solids (e.g. homogenous to localized deformation) and fluids (e.g. steady, irrotational, isentropic, compressible flow below and above the speed of sound).	
Week 5-6	Discretization techniques for PDEs: Finite Difference Method (FDM), Finite Element Method (FEM), Spectral Method, Pseudospectral Method.	
Week 7	Consistency, convergence, and stability of numerical solutions of initial value problems by FDMs. Equivalence theorem.	
Week 8	Iterative solvers for discretized linear PDEs used in large three-dimensional problems: Jacobi method, Gauss-Seidel (GS) Iteration, Successive Over Relaxation (SOR) method, Conjugate Gradient Method (CGM), Steepest Descent method. Convergence and preconditioning.	
Week 8		**Midterm Exam**
Week 9	Modeling diffusive processes: explicit and implicit methods.	

Week 10	Modeling linear advective processes: explicit and implicit methods. Modeling transport.	**Assignment #1 due**
Week 11-12	Modeling nonlinear advective processes: Burger's equation. Positive-definite processes and flux-corrected methods. Nonlinear wave processes: Korteweg-de Vries equation.	**Assignment #2 due**
Week 13	Elliptic boundary-value problems in the Geosciences. Energy- and enstrophy-conserving space finite-difference schemes.	**Assignment #3 due**
Week 14	Basic models of physical systems in the Geosciences: spectral model for a homogeneous, non-divergent, incompressible flow on the surface of a sphere; quasi-geostrophic ocean model; spectral-element model for seismic wave propagation;	

Final project due by 5pm on the last day of the university's Final Examination Schedule for the semester.

Please note that the above schedule and topics are subject to change.

Other Pertinent Course Information

Copyright Policy. All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information visit http://disability.tamu.edu

Academic Integrity

For additional information please visit: http://aggiehonor.tamu.edu

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

Students are encouraged to study together and discuss the information presented in the course lectures and material with other students. However, all coursework submitted to the instructor must be the result of the original work of the student. Intentional or careless appropriation of someone else's work or ideas, even with their explicit consent, violates the Aggie Honor System Rules (Student Rule 20.1.2) and will result in all the students involved automatically receiving zero points for the assignment as well as mandatory reporting of the violation.

Each student is responsible for authenticating all submitted work and, if asked, to produce proof that the item submitted is indeed the work of that student. The inability to authenticate one's work upon the instructor's request is sufficient grounds to initiate an academic dishonesty case.

Supporting statement for ATMO 618

We request to create a new course, ATMO 618 – Numerical Methods for the Geosciences, which will duplicate the requested OCNG 618 for cross-listing purposes. This course has been developed to fulfill the requirements of the certificate program in Computational Geosciences that is being created within the College of Geosciences.

We request cross-listing ATMO 618 with OCNG 618 and GEOP 618 to improve interdisciplinary exchanges among graduate students and between college programs, and to provide a common knowledge set emphasizing shared aspects of computational modeling to graduate students of different disciplines and backgrounds.

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	**Numerical Methods for the Geosciences, ATMO 618**
Term (e.g., Fall 200X)	Fall 201X
Meeting times and location	TBD

Course Description and Prerequisites

Mathematical theory and numerical techniques for modeling physical systems and processes in the Geosciences; discretization of continuum equations for solids and fluids; finite difference methods, convergence, consistency, and stability; finite element and spectral methods in fluid dynamics and seismology; iterative solvers; implicit and explicit methods for diffusion and advection.

The goal of this course is to provide students with the mathematical and numerical foundations required to understand how to develop numerical models in the various disciplines of the Geosciences that employ the continuum approximation to study systems with a large number of degrees of freedom.

Students in this course are assumed to have a graduate-level working knowledge of and experience with continuum dynamics.

Prerequisites: Graduate classification or approval of instructor.

Learning Outcomes

By the end of this course, students will be able to:

1. Apply fundamental discretization techniques to the continuum partial differential equations (PDEs) used in the Geosciences to describe the physical behavior of solids and fluids;
2. Evaluate convergence, consistency, and stability of numerical solutions of initial value problems obtained by finite difference methods;
3. Identify problems of interest in the Geosciences whose solution may be approximated by using the finite element or spectral method and create a simplified numerical scheme based on the selected method;
4. Apply iterative methods to solve systems of linear equations resulting from discretized PDEs and address convergence issues;
5. Create one or more numerical models for specific physical processes in the Geosciences by identifying and applying the most suitable numerical techniques learned in the course;
6. Write a comprehensive technical report.

Instructor Information

Name	Ping Chang
Telephone number	979-845-8196
Email address	ping@tamu.edu
Office hours	Open
Office location	O&M 624

Textbook and/or Resource Material

Course material will be provided to the students in the form of lecture notes and handouts.

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14. Yanfei Wang, Anatoly G. Yagola, Changchun Yang (Eds.), Computational Methods for Applied Inverse Problems. Higher Education Press, 2012

Grading Policies

Final grades will be based on the following weights:

1) Assignments (30% of course grade)
2) Midterm exam (20% of course grade)
3) Final project (50% of course grade)

Assignments will be due at the beginning of class on the scheduled week, unless stated otherwise by the instructor. Late homework will be assessed a penalty equal to 20% of its grade per day unless the students submits a university-excused absence (see Attendance and Make-up Policies section). An unexcused delay longer than 4 working days will automatically result in receiving zero points on the assignment.

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Final Project. A final modeling project will be due by 5pm on the last day of the university's Final Examination Schedule for the semester, available at http://registrar.tamu.edu/Courses,-Registration,-Scheduling/Final-Exam-Schedule. This final project must include a 10-page written scientific report that comprehensively summarizes foundations, methods, and results of the modeling project in the style of the American Geophysical Union *Geophysical Research Letters* journal (http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)1944-8007/).

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Grading Scale

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A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F = <60%

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The university views class attendance as an individual student responsibility. You are expected to attend class and to complete all assignments. Attendance is essential to complete the course successfully.

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Course Topics, Calendar of Activities, Major Assignment Dates

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Week 4	Boundary value problems in the Geosciences. Dynamic and thermodynamic boundary conditions. Elliptic (Laplace's equation), parabolic (diffusion equation), and hyperbolic (wave equation) PDEs. Examples of common transition cases between PDE types in solids (e.g. homogenous to localized deformation) and fluids (e.g. steady, irrotational, isentropic, compressible flow below and above the speed of sound).	
Week 5-6	Discretization techniques for PDEs: Finite Difference Method (FDM), Finite Element Method (FEM), Spectral Method, Pseudospectral Method.	
Week 7	Consistency, convergence, and stability of numerical solutions of initial value problems by FDMs. Equivalence theorem.	
Week 8	Iterative solvers for discretized linear PDEs used in large three-dimensional problems: Jacobi method, Gauss-Seidel (GS) Iteration, Successive Over Relaxation (SOR) method, Conjugate Gradient Method (CGM), Steepest Descent method. Convergence and preconditioning.	
Week 8		**Midterm Exam**
Week 9	Modeling diffusive processes: explicit and implicit methods.	

Week 10	Modeling linear advective processes: explicit and implicit methods. Modeling transport.	**Assignment #1 due**
Week 11-12	Modeling nonlinear advective processes: Burger's equation. Positive-definite processes and flux-corrected methods. Nonlinear wave processes: Korteweg-de Vries equation.	**Assignment #2 due**
Week 13	Elliptic boundary-value problems in the Geosciences. Energy- and enstrophy-conserving space finite-difference schemes.	**Assignment #3 due**
Week 14	Basic models of physical systems in the Geosciences: spectral model for a homogeneous, non-divergent, incompressible flow on the surface of a sphere; quasi-geostrophic ocean model; spectral-element model for seismic wave propagation;	

Final project due by 5pm on the last day of the university's Final Examination Schedule for the semester.

Please note that the above schedule and topics are subject to change.

Other Pertinent Course Information

Copyright Policy. All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information visit http://disability.tamu.edu

Academic Integrity

For additional information please visit: http://aggiehonor.tamu.edu

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

Students are encouraged to study together and discuss the information presented in the course lectures and material with other students. However, all coursework submitted to the instructor must be the result of the original work of the student. Intentional or careless appropriation of someone else's work or ideas, even with their explicit consent, violates the Aggie Honor System Rules (Student Rule 20.1.2) and will result in all the students involved automatically receiving zero points for the assignment as well as mandatory reporting of the violation.

Each student is responsible for authenticating all submitted work and, if asked, to produce proof that the item submitted is indeed the work of that student. The inability to authenticate one's work upon the instructor's request is sufficient grounds to initiate an academic dishonesty case.

Supporting statement for GEOP 618

We request to create a new course, GEOP 618 – Numerical Methods for the Geosciences, which will duplicate the requested OCNG 618 for cross-listing purposes. This course has been developed to fulfill the requirements of the certificate program in Computational Geosciences that is being created within the College of Geosciences.

We request cross-listing GEOP 618 with ATMO 618 and OCNG 618 to improve interdisciplinary exchanges among graduate students and between college programs, and to provide a common knowledge set emphasizing shared aspects of computational modeling to graduate students of different disciplines and backgrounds.

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	**Numerical Methods for the Geosciences, GEOP 618**
Term (e.g., Fall 200X)	Fall 201X
Meeting times and location	TBD

Course Description and Prerequisites

Mathematical theory and numerical techniques for modeling physical systems and processes in the Geosciences; discretization of continuum equations for solids and fluids; finite difference methods, convergence, consistency, and stability; finite element and spectral methods in fluid dynamics and seismology; iterative solvers; implicit and explicit methods for diffusion and advection.

The goal of this course is to provide students with the mathematical and numerical foundations required to understand how to develop numerical models in the various disciplines of the Geosciences that employ the continuum approximation to study systems with a large number of degrees of freedom.

Students in this course are assumed to have a graduate-level working knowledge of and experience with continuum dynamics.

Prerequisites: Graduate classification or approval of instructor.

Learning Outcomes

By the end of this course, students will be able to:

1. Apply fundamental discretization techniques to the continuum partial differential equations (PDEs) used in the Geosciences to describe the physical behavior of solids and fluids;
2. Evaluate convergence, consistency, and stability of numerical solutions of initial value problems obtained by finite difference methods;
3. Identify problems of interest in the Geosciences whose solution may be approximated by using the finite element or spectral method and create a simplified numerical scheme based on the selected method;
4. Apply iterative methods to solve systems of linear equations resulting from discretized PDEs and address convergence issues;
5. Create one or more numerical models for specific physical processes in the Geosciences by identifying and applying the most suitable numerical techniques learned in the course;
6. Write a comprehensive technical report.

Instructor Information

Name	Ping Chang
Telephone number	979-845-8196
Email address	ping@tamu.edu
Office hours	Open
Office location	O&M 624

Textbook and/or Resource Material

Course material will be provided to the students in the form of lecture notes and handouts.

Students are encouraged, but not required, to read the following:

1. Roache, J.P., Fundamentals of Computational Fluid Dynamics, Hermosa Publishers, 1988
2. Ferziger, J.H., Peric, M., Computational Methods for Fluid Dynamics, 3rd rev. ed., Springer-Verlag Berlin Heidelberg, 2002
3. Fletcher, C.A.J., Computational Techniques for Fluid Dynamics, Volume 1: Fundamental and General Techniques, Springer-Verlag, Berlin, 1988
4. Fletcher, C.A.J., Computational Techniques for Fluid Dynamics, Volume 2: Specific Techniques for Different Flow Categories, Springer-Verlag, Berlin, 1988
5. Canuto, C., et al., Spectral Methods in Fluid Dynamics, Springer-Verlag, Berlin Heidelberg, 1988
6. Gerya, T., Introduction to Numerical Geodynamic Modelling, Cambridge University Press, 2010
7. Haidvogel, D.B, Beckmann, A., Numerical Ocean Circulation Modeling, Imperial College Press, 1999
8. Griffies, S., Fundamentals of Ocean Climate Models, Princeton University Press, 2004
9. Mesinger, F., Arakawa, A., Numerical Methods Used in Atmospheric Models, Volume 1, GARP Publication Series No. 17, August 1976
10. Haltiner, G.J., Williams, R.T., Numerical Prediction and Dynamic Meteorology, Wiley, 1980
11. Washington, W.M., Parkinson, C.L., An Introduction to Three-Dimensional Climate Modeling, 2nd Ed., University Science Books, 2005
12. Bedford, A., Drumheller, D.S., Introduction to Elastic Wave Propagation, Wiley, 1994
13. Pujol, J., Elastic Wave Propagation and Generation in Seismology, Cambridge University Press, 2003
14. Yanfei Wang, Anatoly G. Yagola, Changchun Yang (Eds.), Computational Methods for Applied Inverse Problems. Higher Education Press, 2012

Grading Policies

Final grades will be based on the following weights:

1) Assignments (30% of course grade)
2) Midterm exam (20% of course grade)
3) Final project (50% of course grade)

Assignments will be due at the beginning of class on the scheduled week, unless stated otherwise by the instructor. Late homework will be assessed a penalty equal to 20% of its grade per day unless the students submits a university-excused absence (see Attendance and Make-up Policies section). An unexcused delay longer than 4 working days will automatically result in receiving zero points on the assignment.

Midterm. There will be a two-hour long in-class midterm exam.

Final Project. A final modeling project will be due by 5pm on the last day of the university's Final Examination Schedule for the semester, available at http://registrar.tamu.edu/Courses,-Registration,-Scheduling/Final-Exam-Schedule. This final project must include a 10-page written scientific report that comprehensively summarizes foundations, methods, and results of the modeling project in the style of the American Geophysical Union *Geophysical Research Letters* journal (http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)1944-8007/).

Final course grades will be posted on http://elearning.tamu.edu

Please consult University Student Rule 10 (Grading) at http://student-rules.tamu.edu/rule10 for additional details on grading policies.

Grading Scale

A final percentage grade will be calculated based on your total weighted scores as listed above. A final letter grade will be assigned as follows:

A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F = <60%

Attendance and Make-up Policies

The university views class attendance as an individual student responsibility. You are expected to attend class and to complete all assignments. Attendance is essential to complete the course successfully.

Please consult the University Student Rule 7 at http://student-rules.tamu.edu/rule07 for details on university-excused absences and make-up policies.

Course Topics, Calendar of Activities, Major Assignment Dates

Week	**Topic**	**Assignment**
Week 1	Introduction to fundamental physical systems and processes in Geosciences that can be represented using continuum partial differential equations (PDEs). Basic concepts in numerical modeling.	
Week 2	Mathematical description of continuum media and key physical properties: Fluids – Continuity equation; viscosity; classification of flow regimes; Eulerian and Lagrangian descriptions; advection. Solids – Deformation and stresses; stress and strain tensors; equations of motion; gravity and gravitational potential.	
Week 3	Fundamental equations in the Geosciences. Traditional working approximations. Primitive equations: continuity, momentum, thermal energy. Beta plane approximation in fluid dynamics.	
Week 4	Boundary value problems in the Geosciences. Dynamic and thermodynamic boundary conditions. Elliptic (Laplace's equation), parabolic (diffusion equation), and hyperbolic (wave equation) PDEs. Examples of common transition cases between PDE types in solids (e.g. homogenous to localized deformation) and fluids (e.g. steady, irrotational, isentropic, compressible flow below and above the speed of sound).	
Week 5-6	Discretization techniques for PDEs: Finite Difference Method (FDM), Finite Element Method (FEM), Spectral Method, Pseudospectral Method.	
Week 7	Consistency, convergence, and stability of numerical solutions of initial value problems by FDMs. Equivalence theorem.	
Week 8	Iterative solvers for discretized linear PDEs used in large three-dimensional problems: Jacobi method, Gauss-Seidel (GS) Iteration, Successive Over Relaxation (SOR) method, Conjugate Gradient Method (CGM), Steepest Descent method. Convergence and preconditioning.	
Week 8		**Midterm Exam**
Week 9	Modeling diffusive processes: explicit and implicit methods.	

Week 10	Modeling linear advective processes: explicit and implicit methods. Modeling transport.	**Assignment #1 due**
Week 11-12	Modeling nonlinear advective processes: Burger's equation. Positive-definite processes and flux-corrected methods. Nonlinear wave processes: Korteweg-de Vries equation.	**Assignment #2 due**
Week 13	Elliptic boundary-value problems in the Geosciences. Energy- and enstrophy-conserving space finite-difference schemes.	**Assignment #3 due**
Week 14	Basic models of physical systems in the Geosciences: spectral model for a homogeneous, non-divergent, incompressible flow on the surface of a sphere; quasi-geostrophic ocean model; spectral-element model for seismic wave propagation;	

Final project due by 5pm on the last day of the university's Final Examination Schedule for the semester.

Please note that the above schedule and topics are subject to change.

Other Pertinent Course Information

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Academic Integrity

For additional information please visit: http://aggiehonor.tamu.edu

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Students are encouraged to study together and discuss the information presented in the course lectures and material with other students. However, all coursework submitted to the instructor must be the result of the original work of the student. Intentional or careless appropriation of someone else's work or ideas, even with their explicit consent, violates the Aggie Honor System Rules (Student Rule 20.1.2) and will result in all the students involved automatically receiving zero points for the assignment as well as mandatory reporting of the violation.

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Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Geology and Geophysics
3. Course prefix, number and complete title of course: GEOP 634 - Fundamentals of High Performance Computing for the Geosciences
4. Catalog course description (not to exceed 50 words):

Architecture of High Performance Computing (HPC) systems; Unix operating system, shell environment; algorithms and programming languages for the Geosciences; concurrency, dependency, parallelism; parallel performance, scalability; structured programming; serial, parallel patterns; parallel programming models; parallel algorithms and software design for the Geosciences; techniques for empirical parallel performance analysis.

5. Prerequisite(s): Graduate classification or approval of instructor.

Cross-listed with: ATMO 634 and OCNG 634 Stacked with:

Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times.

Will this course be repeated within the same semester? ☐ Yes ☑ No

8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:

a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
M.S., Ph.D. in all Geosciences majors.

11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
GEOP	634	FUND HPC GEOSCIENCES

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
03	02	00	04	4006990202	1305	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Michael Pope Michael C Pope 11/09/15

Department Head or Program Chair *(Type Name & Sign)* Date

Chair, College Review Committee 11/11/15 Date

Deborah Thomas DJ 11/10/15

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Dean of College 11/11/15 Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14

Supporting statement for ATMO 634

We request to create a new course, ATMO 634 – Fundamentals of High Performance Computing for the Geosciences. This course has been developed to fulfill the requirements of the certificate program in Computational Geosciences that is being created within the College of Geosciences.

We request cross-listing ATMO 634 with OCNG 634 and GEOP 634 to improve interdisciplinary exchanges among graduate students and between college programs, and to provide a common knowledge set emphasizing shared aspects of computational modeling to graduate students of different disciplines and backgrounds.

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	**Fundamentals of High Performance Computing for the Geosciences, ATMO 634**
Term (e.g., Fall 200X)	Spring 201X
Meeting times and location	Lectures: TBD (3 hours); Laboratory: TBD (2 hours).

Course Description and Prerequisites

This course will present the architectural concepts, theoretical basis, common tools, and practical knowledge required to use current, state-of-the-art High-Performance Computing (HPC) systems to accurately and efficiently solve large-scale problems in the Geosciences.

The basic architecture of HPC systems will be discussed, and you will become familiar with Unix-based operating systems and shell environments. The main part of the course will focus on how to design and implement serial and parallel algorithms specific to Geosciences' problems by using structured, pattern-based programming techniques along with computer languages and widely used models in the Geosciences' research community. Concepts such as concurrency, dependency, and parallelism will be used as basis for understanding parallel code performance and techniques for empirical performance analysis.

The course will specifically focus on programming languages such as Fortran and deal with design and implementation concepts present in current models for general circulation, regional climate and weather, seismic wave propagation, data inversion, and others, as used on HPC systems. Dominant performance bottlenecks deriving from the data-intensive nature of computations in the Geosciences will be discussed, including disk I/O.

The course includes a laboratory section designed to improve the understanding of the topics presented during lecture hours and to further develop your computational skills. Through lab exercises you will become familiar with available computing environments, software and tools, and gain realistic, hands-on experience on HPC systems that may be applied to your future research work.

The intent of this course is to provide Geosciences students with diverse backgrounds a common knowledge set that will help them advance more effectively in their discipline, and to emphasize shared aspects of computational modeling in the Geosciences that may be leveraged to foster interdisciplinary exchanges.

There are no course prerequisites, but basic knowledge of programming is required.

Prerequisites: Graduate classification or approval of instructor.

Learning Outcomes

By the end of this course, you will be able to:

1. Describe the basic architecture and design features of a modern HPC system;
2. Understand the structure of the Unix operating system and make use of its main capabilities;
3. Break down a given computational task into primary steps and design a basic algorithm to carry out the work;
4. Use a programming language (Fortran) and leverage its main features to implement serial and parallel Geosciences-oriented computer codes;
5. Understand structured, pattern-based serial and parallel programming;
6. Identify and apply parallel programming patterns to parallel code design for modeling in the Geosciences;

7. Understand the concepts of concurrency, dependency, and parallelism;
8. Evaluate the performance of a parallel code on a HPC system;
9. Develop a parallel computer code to simulate a basic physical process relevant to the Geosciences;
10. Give an oral presentation of your programming project;
11. Write a comprehensive technical report of your programming project.

Instructor Information

Name	Raffaele Montuoro
Telephone number	979-862-3182
Email address	rmontuoro@tamu.edu
Office hours	Open
Office location	O&M 1017B

Textbook and/or Resource Material

Course material will be provided in the form of lecture notes and handouts.

I encourage you to consult the following reference material:

1. Chivers, I., Sleightholme, J., Introduction to Programming with Fortran, 2nd Ed., Springer, 2012, ISBN 978-0-85729-232-2.
2. Akin, E., Object Oriented Programming via Fortran 90/95, 1st Ed., Cambridge University Press, 2003, ISBN 0-521-52408-3.
3. Chapman, S.J., Fortran 95/2003 for Scientists and Engineers, 3rd Ed., McGraw-Hill, 2007, ISBN 978-0-07-319157-7.
4. Press, W.H., Teukolsky, S.A., Vetterling, W.T., Flannery, B.P., Numerical Recipes: The Art of Scientific Computing, Third Edition, Cambridge University Press, 2007, ISBN 978-0-521-88068-8. See also, by the same authors: Fortran Numerical Recipes, 2nd Edition, Vol. 1 and 2, Cambridge University Press, 1992, 1997, available on line at: http://apps.nrbook.com/fortran/index.html.
5. McCool, M., Robinson, A., Reinders, J., Structured Parallel Programming: Patterns for Efficient Computation, Morgan Kaufmann, 2012, ISBN: 978-0-12-415993-8. See also: http://parallelbook.com
6. Foster, I., Designing and Building Parallel Programs: Concepts and Tools for Parallel Software Engineering, Addison-Wesley, 1995, ISBN: 978-0-20-157594-1.
7. Mattson, T.G., Sanders, B.A., Massingill, B.L., Patterns for Parallel Programming, Addison-Wesley Professional, 2013, ISBN 978-0-32-194078-0.
8. Hager, G., Wellein, G., Introduction to High Performance Computing for Scientists and Engineers, Chapman & Hall/CRC Press, 2011, ISBN: 978-1-4398-1192-4.
9. Levesque, J., Wagenbreth, G., High Performance Computing: Programming and Applications, Chapman & Hall/CRC Press, 2011, ISBN: 978-1-4200-7705-6.
10. Zhao, C., Hobbs, B.E., Ord, A., Fundamentals of Computational Geoscience, Numerical Methods and Algorithms, Lecture Notes in Earth Sciences, Vol. 122, Springer-Verlag Berlin Heidelberg, 2009, ISBN 978-3-540-89742-2.

Grading Policies

Your final grade will be determined based on the following categories and weights:

1) Programming assignments (20% of course grade)
2) Midterm exam (30% of course grade)
3) Final project (50% of course grade)

Assignments. Assignments will be due at the beginning of class on the scheduled week, unless stated otherwise by the instructor. Late homework without a university-excused absence (see Attendance and Make-up Policies section) will be assessed a penalty equal to 20% of its grade per day. An unexcused delay longer than 4 working days will automatically result in receiving zero points on the assignment.

Midterm Exam. There will be a two-hour, in-class midterm exam.

Final Project. A final programming project will be due by 5pm on the last day of the university's Final Examination Schedule for the semester, available at http://registrar.tamu.edu/Courses,-Registration,-Scheduling/Final-Exam-Schedule.

This final project must include:

1) a 10-page technical report written in the style of the Institute of Electrical and Electronics Engineers (IEEE) Transactions (https://www.ieee.org/publications_standards/publications/authors/author_templates.html). The report must comprehensively summarize and explain the objectives and technical approach, software design and implementation, and computational results of your project;
2) a presentation during last week of class.

Final course grades will be posted on http://elearning.tamu.edu

Please consult University Student Rule 10 (Grading) at http://student-rules.tamu.edu/rule10 for additional details on grading policies.

Grading Scale

You will be assigned a final letter grade based on your final percentage grade according to the following scale:

A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F = <60%

Your final percentage grade will be calculated by adding your weighted scores, divided by the maximum attainable score, for each of the categories listed in the Grading Policies section.

Attendance and Make-up Policies

The university views class attendance as an individual student responsibility. You are expected to attend class and to complete all assignments. Attendance is essential to complete the course successfully.

Please consult the University Student Rule 7 at http://student-rules.tamu.edu/rule07 for details on university-excused absences and make-up policies.

Course Topics, Calendar of Activities, Major Assignment Dates

Week	Topic	Assignment
Week 1	Introduction to the architecture and design of state-of-the-art High Performance Computing systems	
Week 2	Description of the UNIX operating system, including the shell environment.	
Week 3	Algorithm design and basic principles of computer programming.	
Week 4-5	Fundamentals of Fortran programming language.	
Week 6	Advanced Fortran features for computational Geosciences. Introduction to structured programming. Pattern-based serial programming.	**Assignment #1 due:** Serial codes for one-dimensional physical models

Week 7	Concepts of concurrency, dependency, and parallelism. Potential and actual parallelism, data locality, parallel efficiency, speedup, and scalability.	**Assignment #2 due:** Apply structured programming techniques and serial patterns to design and implement simple models
Week 8		**Midterm Exam**
Week 10	Pattern-based parallel programming in the Geosciences. Examples include: geometrical decomposition and communication patterns in climate models, sequences in coupled models and reservoir simulations, map/reduce operations for convergence testing or large matrix operations.	
Week 11	Description of the main parallel programming models used in computational Geosciences. Shared-memory parallelism with OpenMP.	**Assignment #3 due:** Design a pattern-based parallel code for a two dimensional problem
Week 12-13	Distributed-memory parallelism with the Message Passing Interface (MPI)	**Assignment #4 due:** Use OpenMP to create a shared-memory parallel code. Evaluate parallel efficiency.
Week 14	Concepts and tools for empirical performance analysis of parallel codes.	**Assignment #5 due:** Use MPI to create a distributed-memory parallel code. Evaluate parallel efficiency.

Final project due by 5pm on the last day of the university's Final Examination Schedule for the semester.

Please note that the schedule and topics of lectures and laboratory assignments are subject to change.

Other Pertinent Course Information

Email. All Texas A&M students are expected to use their official TAMU email account for all the communications regarding this course. It is the student's responsibility to check your TAMU email account regularly throughout the course.

Cell Phones/Mobile devices. You should set your mobile devices to silent and refrain from texting during class.

Access to HPC systems. You should have a working account on one of Texas A&M HPC systems to take full advantage of this course and successfully complete your assignments. You may apply for a basic supercomputing account by contacting High Performance Research Computing (http://sc.tamu.edu) before the beginning of the course. I am also available to help you obtaining a supercomputing account if you contact me during the first week of class.

Copyright Policy. All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

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Academic Integrity

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You are encouraged to study together and discuss the information presented in the course lectures and material with other students. However, all coursework submitted to the instructor must be the result of the your original work. Intentional or careless appropriation of someone else's work or ideas, even with their explicit consent, violates the Aggie Honor System Rules (Student Rule 20.1.2) and will result in all the students involved automatically receiving zero points for the assignment as well as mandatory reporting of the violation.

You are responsible for authenticating all submitted work and, if asked, to produce proof that the item submitted is indeed the work of that student. The inability to authenticate one's work upon the instructor's request is sufficient grounds to initiate an academic dishonesty case.

Supporting statement for OCNG 634

We request to create a new course, OCNG 634 – Fundamentals of High Performance Computing for the Geosciences, which will duplicate the new requested ATMO 634 for cross-listing purposes. This course has been developed to fulfill the requirements of the certificate program in Computational Geosciences that is being created within the College of Geosciences.

We request cross-listing OCNG 634 with ATMO 634 and GEOP 634 to improve interdisciplinary exchanges among graduate students and between college programs, and to provide a common knowledge set emphasizing shared aspects of computational modeling to graduate students of different disciplines and backgrounds.

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	**Fundamentals of High Performance Computing for the Geosciences, OCNG 634**
Term (e.g., Fall 200X)	Spring 201X
Meeting times and location	Lectures: TBD (3 hours); Laboratory: TBD (2 hours).

Course Description and Prerequisites

This course will present the architectural concepts, theoretical basis, common tools, and practical knowledge required to use current, state-of-the-art High-Performance Computing (HPC) systems to accurately and efficiently solve large-scale problems in the Geosciences.

The basic architecture of HPC systems will be discussed, and you will become familiar with Unix-based operating systems and shell environments. The main part of the course will focus on how to design and implement serial and parallel algorithms specific to Geosciences' problems by using structured, pattern-based programming techniques along with computer languages and widely used models in the Geosciences' research community. Concepts such as concurrency, dependency, and parallelism will be used as basis for understanding parallel code performance and techniques for empirical performance analysis.

The course will specifically focus on programming languages such as Fortran and deal with design and implementation concepts present in current models for general circulation, regional climate and weather, seismic wave propagation, data inversion, and others, as used on HPC systems. Dominant performance bottlenecks deriving from the data-intensive nature of computations in the Geosciences will be discussed, including disk I/O.

The course includes a laboratory section designed to improve the understanding of the topics presented during lecture hours and to further develop your computational skills. Through lab exercises you will become familiar with available computing environments, software and tools, and gain realistic, hands-on experience on HPC systems that may be applied to your future research work.

The intent of this course is to provide Geosciences students with diverse backgrounds a common knowledge set that will help them advance more effectively in their discipline, and to emphasize shared aspects of computational modeling in the Geosciences that may be leveraged to foster interdisciplinary exchanges.

There are no course prerequisites, but basic knowledge of programming is required.

Prerequisites: Graduate classification or approval of instructor.

Learning Outcomes

By the end of this course, you will be able to:

1. Describe the basic architecture and design features of a modern HPC system;
2. Understand the structure of the Unix operating system and make use of its main capabilities;
3. Break down a given computational task into primary steps and design a basic algorithm to carry out the work;
4. Use a programming language (Fortran) and leverage its main features to implement serial and parallel Geosciences-oriented computer codes;
5. Understand structured, pattern-based serial and parallel programming;
6. Identify and apply parallel programming patterns to parallel code design for modeling in the Geosciences;

7. Understand the concepts of concurrency, dependency, and parallelism;
8. Evaluate the performance of a parallel code on a HPC system;
9. Develop a parallel computer code to simulate a basic physical process relevant to the Geosciences;
10. Give an oral presentation of your programming project;
11. Write a comprehensive technical report of your programming project.

Instructor Information

Name	Raffaele Montuoro
Telephone number	979-862-3182
Email address	rmontuoro@tamu.edu
Office hours	Open
Office location	O&M 1017B

Textbook and/or Resource Material

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I encourage you to consult the following reference material:

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2. Akin, E., Object Oriented Programming via Fortran 90/95, 1st Ed., Cambridge University Press, 2003, ISBN 0-521-52408-3.
3. Chapman, S.J., Fortran 95/2003 for Scientists and Engineers, 3rd Ed., McGraw-Hill, 2007, ISBN 978-0-07-319157-7.
4. Press, W.H., Teukolsky, S.A., Vetterling, W.T., Flannery, B.P., Numerical Recipes: The Art of Scientific Computing, Third Edition, Cambridge University Press, 2007, ISBN 978-0-521-88068-8. See also, by the same authors: Fortran Numerical Recipes, 2nd Edition, Vol. 1 and 2, Cambridge University Press, 1992, 1997, available on line at: http://apps.nrbook.com/fortran/index.html.
5. McCool, M., Robinson, A., Reinders, J., Structured Parallel Programming: Patterns for Efficient Computation, Morgan Kaufmann, 2012, ISBN: 978-0-12-415993-8. See also: http://parallelbook.com
6. Foster, I., Designing and Building Parallel Programs: Concepts and Tools for Parallel Software Engineering, Addison-Wesley, 1995, ISBN: 978-0-20-157594-1.
7. Mattson, T.G., Sanders, B.A., Massingill, B.L., Patterns for Parallel Programming, Addison-Wesley Professional, 2013, ISBN 978-0-32-194078-0.
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10. Zhao, C., Hobbs, B.E., Ord, A., Fundamentals of Computational Geoscience, Numerical Methods and Algorithms, Lecture Notes in Earth Sciences, Vol. 122, Springer-Verlag Berlin Heidelberg, 2009, ISBN 978-3-540-89742-2.

Grading Policies

Your final grade will be determined based on the following categories and weights:

1) Programming assignments (20% of course grade)
2) Midterm exam (30% of course grade)
3) Final project (50% of course grade)

<u>Assignments</u>. Assignments will be due at the beginning of class on the scheduled week, unless stated otherwise by the instructor. Late homework without a university-excused absence (see Attendance and Make-up Policies section) will be assessed a penalty equal to 20% of its grade per day. An unexcused delay longer than 4 working days will automatically result in receiving zero points on the assignment.

Midterm Exam. There will be a two-hour, in-class midterm exam.

Final Project. A final programming project will be due by 5pm on the last day of the university's Final Examination Schedule for the semester, available at http://registrar.tamu.edu/Courses,-Registration,-Scheduling/Final-Exam-Schedule.

This final project must include:

1) a 10-page technical report written in the style of the Institute of Electrical and Electronics Engineers (IEEE) Transactions (https://www.ieee.org/publications_standards/publications/authors/author_templates.html). The report must comprehensively summarize and explain the objectives and technical approach, software design and implementation, and computational results of your project;
2) a presentation during last week of class.

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Please consult University Student Rule 10 (Grading) at http://student-rules.tamu.edu/rule10 for additional details on grading policies.

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Attendance and Make-up Policies

The university views class attendance as an individual student responsibility. You are expected to attend class and to complete all assignments. Attendance is essential to complete the course successfully.

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Course Topics, Calendar of Activities, Major Assignment Dates

Week	**Topic**	**Assignment**
Week 1	Introduction to the architecture and design of state-of-the-art High Performance Computing systems	
Week 2	Description of the UNIX operating system, including the shell environment.	
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Week 4-5	Fundamentals of Fortran programming language.	
Week 6	Advanced Fortran features for computational Geosciences. Introduction to structured programming. Pattern-based serial programming.	**Assignment #1 due:** Serial codes for one-dimensional physical models

Week 7	Concepts of concurrency, dependency, and parallelism. Potential and actual parallelism, data locality, parallel efficiency, speedup, and scalability.	**Assignment #2 due:** Apply structured programming techniques and serial patterns to design and implement simple models
Week 8		**Midterm Exam**
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Week 12-13	Distributed-memory parallelism with the Message Passing Interface (MPI)	**Assignment #4 due:** Use OpenMP to create a shared-memory parallel code. Evaluate parallel efficiency.
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Final project due by 5pm on the last day of the university's Final Examination Schedule for the semester.

Please note that the schedule and topics of lectures and laboratory assignments are subject to change.

Other Pertinent Course Information

Email. All Texas A&M students are expected to use their official TAMU email account for all the communications regarding this course. It is the student's responsibility to check your TAMU email account regularly throughout the course.

Cell Phones/Mobile devices. You should set your mobile devices to silent and refrain from texting during class.

Access to HPC systems. You should have a working account on one of Texas A&M HPC systems to take full advantage of this course and successfully complete your assignments. You may apply for a basic supercomputing account by contacting High Performance Research Computing (http://sc.tamu.edu) before the beginning of the course. I am also available to help you obtaining a supercomputing account if you contact me during the first week of class.

Copyright Policy. All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information visit http://disability.tamu.edu

Academic Integrity

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You are responsible for authenticating all submitted work and, if asked, to produce proof that the item submitted is indeed the work of that student. The inability to authenticate one's work upon the instructor's request is sufficient grounds to initiate an academic dishonesty case.

Supporting statement for GEOP 634

We request to create a new course, GEOP 634 – Fundamentals of High Performance Computing for the Geosciences, which will duplicate the new requested ATMO 634 for cross-listing purposes. This course has been developed to fulfill the requirements of the certificate program in Computational Geosciences that is being created within the College of Geosciences.

We request cross-listing GEOP 634 with ATMO 634 and OCNG 634 to improve interdisciplinary exchanges among graduate students and between college programs, and to provide a common knowledge set emphasizing shared aspects of computational modeling to graduate students of different disciplines and backgrounds.

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	**Fundamentals of High Performance Computing for the Geosciences, GEOP 634**
Term (e.g., Fall 200X)	Spring 201X
Meeting times and location	Lectures: TBD (3 hours); Laboratory: TBD (2 hours).

Course Description and Prerequisites

This course will present the architectural concepts, theoretical basis, common tools, and practical knowledge required to use current, state-of-the-art High-Performance Computing (HPC) systems to accurately and efficiently solve large-scale problems in the Geosciences.

The basic architecture of HPC systems will be discussed, and you will become familiar with Unix-based operating systems and shell environments. The main part of the course will focus on how to design and implement serial and parallel algorithms specific to Geosciences' problems by using structured, pattern-based programming techniques along with computer languages and widely used models in the Geosciences' research community. Concepts such as concurrency, dependency, and parallelism will be used as basis for understanding parallel code performance and techniques for empirical performance analysis.

The course will specifically focus on programming languages such as Fortran and deal with design and implementation concepts present in current models for general circulation, regional climate and weather, seismic wave propagation, data inversion, and others, as used on HPC systems. Dominant performance bottlenecks deriving from the data-intensive nature of computations in the Geosciences will be discussed, including disk I/O.

The course includes a laboratory section designed to improve the understanding of the topics presented during lecture hours and to further develop your computational skills. Through lab exercises you will become familiar with available computing environments, software and tools, and gain realistic, hands-on experience on HPC systems that may be applied to your future research work.

The intent of this course is to provide Geosciences students with diverse backgrounds a common knowledge set that will help them advance more effectively in their discipline, and to emphasize shared aspects of computational modeling in the Geosciences that may be leveraged to foster interdisciplinary exchanges.

There are no course prerequisites, but basic knowledge of programming is required.

Prerequisites: Graduate classification or approval of instructor.

Learning Outcomes

By the end of this course, you will be able to:

1. Describe the basic architecture and design features of a modern HPC system;
2. Understand the structure of the Unix operating system and make use of its main capabilities;
3. Break down a given computational task into primary steps and design a basic algorithm to carry out the work;
4. Use a programming language (Fortran) and leverage its main features to implement serial and parallel Geosciences-oriented computer codes;
5. Understand structured, pattern-based serial and parallel programming;
6. Identify and apply parallel programming patterns to parallel code design for modeling in the Geosciences;

7. Understand the concepts of concurrency, dependency, and parallelism;
8. Evaluate the performance of a parallel code on a HPC system;
9. Develop a parallel computer code to simulate a basic physical process relevant to the Geosciences;
10. Give an oral presentation of your programming project;
11. Write a comprehensive technical report of your programming project.

Instructor Information

Name	Raffaele Montuoro
Telephone number	979-862-3182
Email address	rmontuoro@tamu.edu
Office hours	Open
Office location	O&M 1017B

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GRADUATE STUDIES

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NOV 0 5 2015
EASA

Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

•Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☒ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Mechanical Engineering
3. Course prefix, number and complete title of course: MEEN 604 - Time Frequency Nonlinear Vibration Control
4. Catalog course description (not to exceed 50 words): Deployment of simultaneous vibration and frequency control in real-time to efficiently negate nonlinear dynamic instability. Addresss nonlineare vibrations in the join time-frequency domain; theories on incorporating nonlinear dynamics and nonlinear time-frequency control into the control of bifurcation and route-to-chaos; integration on basic and advanced topics from several engineering disciplines into the creation of an innovative, new control theory effective in denying bifurcation and chaotic state from emerging.
5. Prerequisite(s): Graduate classification
   Cross-listed with: ______ Stacked with: ______
   Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☒ No If yes, from ______ to ______
7. Is this a repeatable course? ☐ Yes ☒ No If yes, this course may be taken ______ times.
   Will this course be repeated within the same semester? ☐ Yes ☒ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☒ No
9. How will this course be graded: ☒ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
       M.Eng. M.S. and Ph.D. in MEEN
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☒ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
MEEN	604	TIME FREQ NONLINEAR VIB CNTRL

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
3.00			3.00	1419010006	1920	16 - 17	0 0 3 6 3 2

Level 6

Approval recommended by:

Dr. Daniel McAdams [signature]
Department Head or Program Chair *(Type Name & Sign)* Date

V E Taylor 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

V E Taylor 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date Effective Date

MEEN 604
Time-Frequency Nonlinear Vibration Control
Course Syllabus • Fall 2015

Lecture: TBD

Instructor: Dr. C. Steve Suh, MEOB 215, ssuh@tamu.edu, 845-1417
Office Hours: MWF 9:00 AM – 10:30 AM, and by email appointment

Textbook: "Control of Cutting Vibration and Machining Instability – A Time-Frequency Approach for Precision, Micro and Nano Machining" by C. S. Suh and M. K. Liu, John Wiley and Sons, 2013.

References: 1. "Machine Tool Vibrations and Cutting Dynamics" by Gegg, Suh and Luo, Springer, 2010.
2. "Fundamental of Wavelets, Theory, Algorithms and Applications" by Goswami and Chan, John Wiley and Sons, 2011.

Descriptions: Dynamic instability is a temporal-spectral aberration in the simultaneous time-frequency domain. This aberration is particularly prominent at high frequency as it is nonlinear, non-stationary, and characteristically broadband. Proper mitigation of instability requires that vibration amplitudes in the time-domain and vibration spectra in the frequency-domain be simultaneously suppressed. The new course is novel, original, and unique in that it deploys simultaneous vibration and frequency control in *real-time* to efficiently negate nonlinear dynamic instability. There are no courses available anywhere that address nonlinear vibrations in the joint time-frequency domain. Nor are there theories on incorporating nonlinear dynamics and nonlinear time-frequency control into the control of bifurcation and route-to-chaos. The new course differentiates itself from all available courses on control in that it integrates both basic and advanced topics from several engineering disciplines into the creation of an innovative, new control theory effective in denying bifurcation and chaotic state from emerging.

Objectives: The objective is to teach graduate students to formulate a control methodology that mitigates instability and enables robust controller design. Powerful analytical tools essential for the characterization of dynamic instability which is inherently complex and oftentimes chaotic will be developed in the course. Concepts viable for the stipulation of instability control and system identification and signal processing will also be derived. Students will develop substantial knowledge along with computer tools through example problems on high-speed micromachining control and synchronization of chaos, among others. All students will be required as individual to formulate time-frequency control scheme for specific engineering problems that are transient, aperiodic, and broadband in nature. Such efforts will be collected as term projects and provided as a proper demonstration of course outcome.

Grading:

5 Homework Assignments	40% (8% each)		100-90. A
2 Computer Projects	60% (30% each)		89-80... B
Attendance (See Absences policy)			79-70... C
			69-60... D

59-0.... F

Topics No. of Hours

1. Analog signals, Basis, Vectors, Projection, Vector Spaces	4
2. Integral Transform: Fourier Analysis	3
3. Sampling, Sampling Theorem, Discrete-Time Signals	3
4. Nonlinear Dynamics	4
5. Nonlinear Non-Stationary Signals	3
6. Discrete Fourier Transform, Short-Time Fourier Transform, Gabor Transform	4
7. Time-Frequency Analysis: Wavelets, Filters and Filterbanks	3
8. Time-Frequency Analysis: Instantaneous Frequency	3
9. Time-Frequency Control Theory	6
10. High Speed Time-Frequency Cutting Control	6
11. Synchronization of Chaos	6
Total number of hours:	**45**

Absences: ***Attendance is mandatory. Attendance will be taken at the discretion of the instructor and it will be used in individual grading.***

Beginning with Week 1 of the semester, attendance will be taken periodically. Unexcused absence when attendance is taken will result in the following adjustments to whatever letter grade a student has otherwise earned during this course:

0 – 2 total absences	No Penalty
3 – 4 total absences	Reduction by 1 Letter Grade
5 – 6 total absences	Reduction by 2 Letter Grades
More than 6 total absences	Automatic Grade of "F" for the course

Work missed due to absences will be excused only for University-approved activities in accordance with TEXAS A&M UNIVERSITY STUDENT RULES (see http://student-rules.tamu.edu). Students are encouraged to read these rules to refresh familiarity. Specific arrangements for make-up work in such instances will be handled on a case-by-case basis. In accordance with recent changes to Rule 7, please be aware that in this class any "injury or illness that is too severe or contagious for the student to attend class" will require "a medical confirmation note from his or her medical provider" even if the absence is for less than 3 days (see 7.1.6.2 Injury or illness less than three days.).

Homework and Projects:

Homework will be assigned per the instructor's discretion and typically graded for content, neatness, methodology, and accuracy. Partial credit will be given in most cases. In some instances, homework may be just 'checked-in' and not 'graded in detail'. This will at least provide a measure of effort and participation and should also create additional motivation for working all homework problems. Homework is due in class. Late homework will not be accepted. Some homework problems will require design work and as such will not necessarily have unique solutions. These will be more open-ended assignments requiring significant problem definition, engineering judgment, and decision making, and interpretation. Computer projects will require reports with appropriate supporting calculations and documentation.

<u>Academic Misconduct and Dishonesty</u> will not be tolerated and, if any instances arise, they will be handled according to TEXAS A&M UNIVERSITY STUDENT RULES (see http://student-rules.tamu.edu/rule20.htm).

Academic Integrity Statement

<u>Aggie Honor Code:</u> "An Aggie does not lie, cheat, or steal, or tolerate those who do."

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the Texas A&M University community from the requirements or the processes of the Honor System. For additional information please visit: http://aggiehonor.tamu.edu. On all assignments, the following Honor Pledge shall be preprinted and signed by the student:

"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

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GRADUATE STUDIES

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EASA

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

Form Instructions • Submit original form and attach a course syllabus. •

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Materials Science and Engineering
3. Course prefix, number and complete title of course: MSEN 610, Principles of Composite Materials
4. Catalog course description (not to exceed 50 words):
Classification and characteristics of composite materials; micromechanical and macromechanical behavior of composite laminate; macromechanical behavior of laminates using classical laminate theory; interlaminar stresses and failure modes; structural design concepts, testing and manufacturing techniques.
5. Prerequisite(s): MEMA 602
Cross-listed with: MEMA 613 Stacked with:
Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times.
Will this course be repeated within the same semester? ☐ Yes ☐ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
M.S., Ph.D. in Materials Science and Engineering
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
MSEN	610	PRINC OF COMPOSITE MTL

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
3.00	0.00	0.00	3.00	1418010006	1864	16 - 17	0 0 3 6 3 2

Level: 6

Approval recommended by:

Miladin Radovic - MSEN [signature] 11/05/2015
Department Head or Program Chair *(Type Name & Sign)* Date

Vikram K. Kinra - AERO [signature] 11/06/2015
Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Prasad Enjeti [signature] 11/17/2015
Chair, College Review Committee Date

Prasad Enjeti [signature] 11/17/2015
Dean of College Date

Karen Butler-Purry
Chair, GC or UCC Date

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14

TEXAS A&M UNIVERSITY

Syllabus

Principles of Composite Materials
MEMA 613/MSEN 610 Spring 2017

Instructor	Dr. Ramesh Talreja, Professor, Department of Aerospace Engineering, and Department of Materials Science and Engineering
Instructor contact	(979) 458-3256; talreja@tamu.edu; 736A HRBB
Text	Book: Analysis and Performance of Fiber Composites, Third Edition, B.D. Agarwal, L. J. Broutman & K. Chandrashekhara, John Wiley, 2006. Selected papers and handout notes
Course Description	Introduction to fiber reinforced composite material systems with emphasis on the fundamental principles; introduction to processing and manufacturing of polymer-, metal- and ceramic-matrix composites; introduction to simple micromechanics estimates of elastic properties; elastic behavior of a unidirectional lamina; laminate plate theory; experimental characterization of composites; emerging composites; damage, fatigue, and failure; selected special topics.
Prerequisite:	Basic courses in mechanics and materials science; graduate classification.
Learning outcomes	Students will become familiar with the fundamental principles underlying composite material systems; they will understand the criteria for selection of composite constituents for given applications; they will learn how to estimate and characterize elastic behavior of composites with multiple fiber orientations; they will understand the basic mechanisms governing failure of composites; they will gain additional knowledge of composites in selected areas through directed studies.
Grading Assignments	The course letter grade will be based on homework assignments, and one term paper. Homework will be assigned typically once a week, due the week after, and will carry 60%; the project term paper will have 40%.
Grading scale	The final weighted average of each student will be calculated based on the indicated grade distribution. The letter grade will be assigned by the following criterion: A>=90; 80=<B< 90; 70 =< C< 80; 60=<D<70; F<60.
Copyrights	The handouts used in this course are copyrighted. By "handouts" we mean all materials generated for this class, which include but are not limited to syllabi, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless the author expressly grants permission.

Topics to be covered		
Week 1		Types of fiber and matrix materials.
Week 2		Processing and manufacturing methods
Week 3		Micromechanics estimates of properties
Week 4		Unidirectional composites; orthotropic solids
Week 5		Laminate plate theory
Week 6		Laminate plate theory – contd.
Week 7		Short-fiber composites
Week 8		Experimental characterization
Week 9		Interlaminar stresses and free-edge effects
Week 10		Nonlinear/time-dependent constitutive relations (plasticity/viscoelasticity/viscoplasticity)
Week 11		Failure – static and fatigue
Week 12		Selected applications – emerging composite systems
Week 13		Selected applications, contd.
Week 14		*Project Term Paper Due*
Americans with Disabilities Act (ADA) Policy Statement	The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu	
Academic Integrity Statement and Policy	"An Aggie does not lie, cheat or steal, or tolerate those who do." For additional information, please visit: http://aggiehonor.tamu.edu. As commonly defined, plagiarism consists of passing off as one's own the ideas, work, writings, etc., that belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules [http://student-rules.tamu.edu/], under the section "Scholastic Dishonesty."	
Attendance policy	The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located on-line at http://student-rules.tamu.edu/rule07 . Please come on time. Silence cell-phones and other electronic distractions.	

Make-up Policy	If an absence is excused, the instructor will either provide the student an opportunity to make up any quiz, exam or other work that contributes to the final grade or provide a satisfactory alternative by a date agreed upon by the student and instructor. If the instructor has a regularly scheduled make up exam, students are expected to attend unless they have a university approved excuse. The make-up work must be completed in a timeframe not to exceed 30 calendar days from the last day of the initial absence. The student is responsible for providing satisfactory evidence to the instructor to substantiate the reason for the absence. Among the reasons absences are considered excused by the university are the following (see Student Rule 7 for details http://student-rules.tamu.edu/rule07). The fact that these are university -excused absences does not relieve the student of responsibility for prior notification and documentation. Failure to notify and/or document properly may result in an unexcused absence. Falsification of documentation is a violation of the Honor Code. 1. Participation in an activity that is required for a class and appears on the university authorized activity list at https://studentactivities.tamu.edu/app/sponsauth/index 2. Death or major illness in a student's immediate family. 3. Illness of a dependent family member. 4. Participation in legal proceedings or administrative procedures that require a student's presence. 5. Religious holy day. NOTE: Prior notification is NOT required. 6. Injury or illness that is too severe or contagious for the student to attend class. i. Injury or illness of three or more class days: Student will provide a medical confirmation note from his or her medical provider within one week of the last date of the absence (see Student Rules 7.1.6.1) ii. Injury or illness of less than three class days: Student will provide one or both of these (at instructor's discretion), within one week of the last date of the absence: a) Texas A&M University Explanatory Statement for Absence from Class form available at http://attendance.tamu.edu or b) Confirmation of visit to a health care professional affirming date and time of visit. 7. Required participation in military duties. 8. Mandatory admission interviews for professional or graduate school that cannot be rescheduled.

	9. Mandatory participation as a student-athlete in NCAA-sanctioned competition. 10. In accordance with Title IX of the Educational Amendments of 1972, Texas A&M University shall treat pregnancy (childbirth, false pregnancy, termination of pregnancy and recovery therefrom) and related conditions as a justification for an excused absence for so long a period of time as is deemed medically necessary by the student's physician. Requests for excused absence related to pregnancy should be directed to the instructor. Other absences may be excused at the discretion of the instructor with prior notification and proper documentation In cases where prior notification is not feasible (e.g., accident or emergency) the student must provide notification by the end of the second working day after the absence, including an explanation of why notice could not be sent prior to the class. Accommodations sought for absences due to the observance of a religious holiday can be sought either prior or after the absence, but not later than two working days after the absence.

Cl
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Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

•Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Materials Science and Engineering
3. Course prefix, number and complete title of course: MSEN 618, Data-Driven Discovery of Materials
4. Catalog course description (not to exceed 50 words):
Use of informatics approaches to establish quantitative structure-property relations (QSPRs) in materials and materials systems. Topics include: basic concepts of data mining, introduction to QSPRs, unsupervised learning, supervised learning, search algorithms applied to materials discovery.
5. Prerequisite(s): Knowledge of basic materials science, permission from instructor.
   Cross-listed with: Stacked with:
   Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times.
   Will this course be repeated within the same semester? ☐ Yes ☐ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
    Certificate in Materials Informatics Design
    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
    M.E., M.S., Ph.D. in Chemistry, Physics, Chemical Eng., Electrical & Computer Eng., Materials Science, and Mechanical Eng
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
MSEN	618	DATA-DRIVEN DISCOVERY MTLS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
3.00	0.00	0.00	3.00	1418010006	1864	16 - 17	0 0 3 6 3 2

Level 6

Approval recommended by:

Miladin Radovic [signature] 11/05/2015
Department Head or Program Chair *(Type Name & Sign)* Date

Prasad Enjeti
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Prasad Enjeti
Dean of College Date

Submitted to Coordinating Board by:

Karen Butler-Purry
Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14

TEXAS A&M UNIVERSITY

SYLLABUS

Course Title and Number	**MSEN 618**
Course Name	**Data-Driven Discovery of Materials**
Term	Fall 2016
Meeting Times and Location	TBD
Credit Hours:	3-0

Course Description and Prerequisites

This course will introduce students to the use of informatics approaches to establish quantitative structure-property relations (QSPRs) in materials and materials systems. Topics include: basic concepts of data mining, introduction to QSPRs, unsupervised learning, supervised learning, search algorithms applied to materials discovery

Prerequisites: Knowledge of basic materials science, permission from instructor.

Goals: The students will attain good understanding of the different methods available to accelerate the discovery of materials through data mining and machine learning approaches.

Learning Outcomes

At the end of the course students will be able to:

- Understand the materials science forward problem as the establishment quantitative structure-property relations (QSPRs)
- Apply supervised learning techniques to establish QSPRs
- Use unsupervised learning approaches for dimensional reduction and clustering analysis in multi-dimensional materials data sets
- Apply advanced materials informatics approaches to establish connections between structural descriptors and materials indicators in realistic materials discovery problems

Instructor Information

Name	Ulisses Braga-Neto
Telephone number	979-862-6441
Email address	ulisses@ece.tamu.edu
Office hours	TBD
Office location	TBD

Textbook and/or Resource Material

Textbook(s): Informatics in Materials Science and Engineering, K. Rajan, Ed

Grading Policies

Projects: 50%
Participation (Quizzes): 20%
Exams: 30%

Grade Basis: A $\geq$ 90; 80 $\leq$ B < 90; 70 $\leq$ C < 80; 60 $\leq$ D < 70; F < 60.

Students will be expected to submit homework assignments.
Students will be expected to participate during in-class discussions or quizzes
Students will be expected to complete exams
Students will be expected to complete projects

Course Topics, Calendar of Activities, Major Assignment Dates

Calendar

Week	Topic
1	Introduction to Materials Informatics
2	Quantitative-Structure Property Relationships (QSPRs) in Materials Science and Engineering
3	Review of Probability
4	Optimal Prediction: Least-Squares Estimation
5	Optimal Prediction: MMSE Estimation
6	Supervised Learning: Basics of Classification
7	Supervised Learning: Linear and Nonlinear Classification Rules
8	Supervised Learning: Regression
9	Supervised Learning: Case Study in Classification and Regression for Materials Informatics Problems
10	Unsupervised Learning: Dimensional Reduction
11	Unsupervised Learning: Clustering
12	Unsupervised Learning: Case Study: Dimensional Reduction and Clustering in Materials Informatics Problems
13	Project Presentations
14	Project Presentations

Attendance

The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located on-line (http://student-rules.tamu.edu/rule07).

Make-up Policy
If an absence is excused, the instructor will either provide the student an opportunity to make up any quiz, exam or other work that contributes to the final grade or provide a satisfactory alternative by a date agreed upon by the student and instructor. If the instructor has a regularly scheduled make up exam, students are expected to attend unless they have a university approved excuse. The make-up work must be completed in a timeframe not to exceed 30 calendar days from the last day of the initial absence. The reasons absences are considered excused by the university are located on-line. See Student Rule 7 for details (http://studentrules.tamu.edu/rule07).

Americans with Disabilities Act (ADA)
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Academic Integrity
+Aggie Honor Code: *"An Aggie does not lie, cheat, or steal, or tolerate those who do."*
It is the responsibility of students and instructors to help maintain scholastic integrity at the university by refusing to participate in or tolerate scholastic dishonesty. Conduct contradicting to this policy will be punished according to the current rules and regulations. *For additional information please visit: http://aggiehonor.tamu.edu*

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GRADUATE STUDIES

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

•Submit original form and attach a course syllabus.•

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EASA

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Materials Science and Engineering
3. Course prefix, number and complete title of course: MSEN 655, Materials Design Studio
4. Catalog course description (not to exceed 50 words):
Project-driven studio course based on the integration of informatics and engineering systems design to address problems in materials discovery and development. Student teams select projects derived from real industry-driven needs.
5. Prerequisite(s): MEEN 601, MSEN/ECEN 618, MSEN 601 or equivalent, Permission from Instructor
Cross-listed with: Stacked with:
Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times.
Will this course be repeated within the same semester? ☐ Yes ☐ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
Certificate in Materials Informatics Design
b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
M.E., M.S., Ph.D. in Chemistry, Physics, Chemical Eng., Electrical & Computer Eng., Materials Science, and Mechanical Eng
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
MSEN	655	MATERIALS DESIGN STUDIO

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
2.00	3.00	0.00	3.00	4010010002	1864	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Miladin Radovic [signature] 11/05/2015	Prasad Enjeti [signature] 11/17/2015
Department Head or Program Chair *(Type Name & Sign)* Date	Chair, College Review Committee Date
	Prasad Enjeti [signature] 11/17/2015
Department Head or Program Chair *(Type Name & Sign)* Date (if cross-listed course)	Dean of College Date
	Karen Butler-Purry
Submitted to Coordinating Board by:	Chair, GC or UCC Date
Associate Director, Curricular Services	Date / Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14

TEXAS A&M UNIVERSITY

SYLLABUS

Course Title and Number	**MSEN 655 / MEEN 6xx**
Course Name	**Materials Design Studio**
Term	Spring 2016
Meeting Times and Location	TBD
Credit Hours	2-3

Course Description and Prerequisites

This is a project-driven studio course based on the integration of informatics and engineering systems design to address problems in materials discovery and development. Student teams select projects derived from real industry-driven needs.

Prerequisites: MEEN 601, MSEN/ECEN 618, MSEN 601 or equivalent, Permission from Instructor

Goals: The students will attain good understanding of the different methods available to accelerate the discovery of materials through data mining and machine learning approaches.

Learning Outcomes

Listed below are the learning outcomes for this course that will be addressed

- Apply concepts of systems engineering to materials
- Frame materials development/discovery problems in terms of processing-structure-property-relationships
- Create and interpret requirements for a materials discovery/design project
- Create and interpret physics and statistical-based models that connect processing, structure, property and performance metrics
- Apply informatics approaches to explore the materials design space
- Apply design theoretic methods to identify optimal materials solutions

Instructor Information

Name	Raymundo Arroyave
Telephone number	979-845-5416
Email address	rarroyave@tamu.edu
Office hours	TBD
Office location	RDMD 218

Textbook and/or Resource Material

Textbook(s): **Integrated Design of Multiscale, Multifunctional Materials and Products,** *David L. McDowell, Jitesh H. Panchal, Hae-Jin Choi, Carolyn Conner Seepersad, Janet K. Allen and Farrokh Mistree*

Grading Policies

Projects: 80%
- Project 1: 15%
- Project 2: 20%
- Project 3: 45%

Participation: 20%

Grade Basis: A $\geq$ 90; 80 $\leq$ B < 90; 70 $\leq$ C < 80; 60 $\leq$ D < 70; F < 60.

Students will be expected to submit homework assignments.
Students will be expected to participate during in-class discussions or quizzes
Students will be expected to complete projects

Course Topics, Calendar of Activities, Major Assignment Dates

Week	Topic
1	Materials as Hierarchical Systems
2	Materials Design as an Inverse Problem
3 4	Data-enabled Quantitative Structure Property Relationships **Project 1 is due**
5 6	Decision Making in Materials Design
7 8	Search and Optimization of Materials Design Spaces
9	Design under Uncertainty **Project 2 is due**
10	Integrated Computational Materials Science and Engineering (ICME)
11	Computational Approaches to Materials Discovery
12	Experimental Methods for High-throughput Materials Synthesis and Characterization
13 14	Innovation and Entrepreneurship: Bring Materials Solutions to Markets • creation of a business model canvas • understanding and testing of hypotheses for new ventures • structuring and conducting customer interviews for maximum effect • role of financing for new ventures **Project 3 is due**

Attendance
The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located on-line (http://student-rules.tamu.edu/rule07).
Make-up Policy
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Academic Integrity
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GRADUATE STUDIES

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

•Submit original form and attach a course syllabus.•

RECEIVED

NOV 09 2015

EASA

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Materials Science and Engineering
3. Course prefix, number and complete title of course: MSEN 657, Summer School in Computational Materials Science
4. Catalog course description (not to exceed 50 words):
   Introduction to a wide range of computational methods to simulate materials behavior at multiple scales. The school consists of 10 days of instruction, with each day divided into theoretical and practical sessions.
5. Prerequisite(s): Permission from instructor.
   Cross-listed with: ________ Stacked with: ________
   Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☑ Yes ☐ No If yes, from 0 to 3
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times.
   Will this course be repeated within the same semester? ☐ Yes ☐ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☐ Grade ☑ S/U ☐ P/F (CLMD)
10. This course will be:
    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
       Certificate in Materials Informatics Design
    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
       M.E., M.S., Ph.D. in Chemistry, Physics, Chemical Eng., Electrical & Computer Eng., Materials Science, and Mechanical Eng
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
MSEN	657	SUMMER SCH COMP MATLS SCI

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
2.00	3.00	0.00	3.00	4010010002	1864	16 - 17	0 0 3 6 3 2

Level 6

Approval recommended by:

Miladin Radovic [signature] 11/05/2015
Department Head or Program Chair *(Type Name & Sign)* Date

Prasad Enjeti [signature] 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Prasad Enjeti [signature] 11/17/2015
Dean of College Date

Karen Butler-Purry
Chair, GC or UCC Date

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Date

Effective Date

TEXAS A&M UNIVERSITY

SYLLABUS

Course Title and Number	**MSEN 657**
Course Name	**Summer School in Computational Materials Science**
Term	Summer 2016
Meeting Times and Location	TBD
Credit Hours:	Variable Credit Course, 0 – 3

Course Description and Prerequisites

This course provides a thorough introduction to a wide range of computational methods to simulate materials behavior at multiple scales. The school consists of 10 days of instruction, with each day divided into theoretical and practical sessions.

Prerequisites: Permission from Instructor

Goals: The students will attain good understanding of the different methods available to simulate materials behavior across multiple scales in space and time.

Learning Outcomes

Listed below are the learning outcomes for this course that will be addressed

- Identify the need to use different computational methods to describe materials phenomena at different scales.
- Gain elementary understanding of the basic structure of computational methods in materials science.
- Develop a basic understanding of different computational materials science approaches, including electronic structure methods, molecular dynamics, computational thermodynamics and kinetics, mesoscale simulation of materials, continuum methods, etc.

Instructor Information

Name	Raymundo Arroyave
Telephone number	979-845-5416
Email address	rarroyave@tamu.edu
Office hours	TBD
Office location	RDMD 218

Textbook and/or Resource Material

Textbook(s): **Introduction to Computational Materials Science: Fundamentals to Applications 1st Edition, R. Lesar**

Grading Policies

Daily Practical Exercises

Grade Basis: S/U

Students are expected to complete all daily exercises in order to receive S grade.

Course Topics, Calendar of Activities, Major Assignment Dates

1. Introduction to Computational Materials Science
2. Electronic Structure Methods
3. Classical Molecular Dynamics
4. Computational Thermodynamics and the CALPHAD Approach
5. Phase Field Models of Microstructure Evolution
6. Dislocation Dynamics and Mesoscale Phenomena
7. Coarse-graining Approaches
8. Microstructure-sensitive Mechanics of Materials
9. Homogenization Methods
10. Challenges in Multi-scale Materials Modeling

Attendance

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Make-up Policy

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Americans with Disabilities Act (ADA)

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Academic Integrity
***+Aggie Honor Code:** "An Aggie does not lie, cheat, or steal, or tolerate those who do."*
It is the responsibility of students and instructors to help maintain scholastic integrity at the university by refusing to participate in or tolerate scholastic dishonesty. Conduct contradicting to this policy will be punished according to the current rules and regulations. *For additional information please visit: http://aggiehonor.tamu.edu*

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GRADUATE STUDIES

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EASA

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Materials Science and Engineering
3. Course prefix, number and complete title of course: MSEN 659, Communicating Materials, Informatics & Design Learning ~~Experiences ePortfolio~~
4. Catalog course description (not to exceed 50 words):
   Students will capture and reflect upon components of what they learned and why it matters within an electronic portfolio aligned with learning outcomes of the interdisciplinary program.
5. Prerequisite(s): MSEN 601, MEEN 601, MSEN618/ECEN618 and MSEN 657 concurrently
   Cross-listed with: Stacked with:
   Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☑ No If yes, from 0 to 3
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ______ times.
   Will this course be repeated within the same semester? ☐ Yes ☐ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☐ Grade ☑ S/U ☐ P/F (CLMD)
10. This course will be:
    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
       Certificate in Materials Informatics Design
    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
       M.E., M.S., Ph.D. in Chemistry, Physics, Chemical Eng., Electrical & Computer Eng., Materials Science, and Mechanical Eng.
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
MSEN	659	MATL INFORM DESIGN EPORTFOLIO

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
0.00	0.00	0.00	0.00	1418010006	1864	16 - 17	0 0 3 6 3 2

Level 6

Approval recommended by:

Miladin Radovic [signature] 11/05/2015
Department Head or Program Chair *(Type Name & Sign)* Date

Prasad Enjeti [signature] 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Prasad Enjeti [signature] 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Karen Butler-Purry
Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

TEXAS A&M UNIVERSITY	SYLLABUS

Course Title and Number	**MSEN 659**
Course Name	**Communicating Materials, Informatics & Design Learning Experiences in an ePortfolio**
Term	Spring 2017
Meeting Times and Location	TBD
Credit Hours	0

Course Description and Prerequisites

Students will capture and reflect upon components of what they learned and why it matters within an electronic portfolio aligned with learning outcomes of the interdisciplinary program. Some experiences may be from previous or concurrent courses that are captured in the electronic portfolio format where it can be shared with other researchers or future employers.

Prerequisites: MSEN 601, MEEN 601, MSEN618/ECEN618 and MSEN 657 concurrently

Goals: The goal is to capture learning experiences throughout student participation in a Materials, Informatics and Design context that exemplify the knowledge and skills obtained.

Learning Outcomes

Upon completion of the course a student will be able to:

- Articulate how foundational components of their discipline contribute to addressing problems in a materials, informatics and design context.
- Describe how corresponding discipline concepts and methodologies relate and oppose your foundational discipline.
- Describe how potential threats to effective group progress were addressed and issues of conflict resolved to assist in collaboration with team members.
- Describe your role in the interdisciplinary collaboration and what the experience will mean for future interactions.
- Create and display ideas and results in a format that is understood by lay people as well as colleagues or potential employers describing why you chose that particular format.
- Share examples of confronting an ethical choice and your actions during and following the situation.
- Summarize experiences in designing interdisciplinary research or project including what you chose to design and why it matters.

Instructor Information

Name	Debra Fowler
Telephone number	979-845-0717
Email address	dfowler@tamu.edu
Office hours	TBD
Office location	YMCA 206A

Textbook and/or Resource Material

Textbook(s):

There is no textbook for this course.

Class resources will be posted on the course website at http:// ecampus.tamu.edu to include the following:

1. Articles about ePortfolio and Interdisciplinarity
2. ePortfolio templates using google sites
3. ePortfolio self-reflection and student survey

Grading Policies

Daily Practical Exercises

Grade Basis: S/U

Students are expected to complete all daily exercises in order to receive S grade.

Course Topics, Calendar of Activities, Major Assignment Dates

1. ePortfolio and Interdisciplinarity
2. Introduction to Google Sites
3. Personal Profile and Future Plan
4. D3EM Courses, Activities, and References
5. D3EM Publications and Special Projects
6. Reflection on Your D3EM Courses
7. Reflection on Your D3EM Activities
8. Benefits from D3EM
9. Professional Skills You Learned from D3EM
10. Technical Skills You Learned from D3EM

Attendance

The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located on-line (http://student-rules.tamu.edu/rule07).

Make-up Policy

If an absence is excused, the instructor will either provide the student an opportunity to make up any quiz, exam or other work that contributes to the final grade or provide a satisfactory alternative by a date agreed upon by the student and instructor. If the instructor has a regularly scheduled make up exam, students are expected to attend unless they have a university approved excuse. The make-up work must be completed in a timeframe not to exceed 30 calendar days from the last day of the initial absence. The reasons absences are considered excused by the university are located on-line. See Student Rule 7 for details (http://studentrules.tamu.edu/rule07).

Americans with Disabilities Act (ADA)
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

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Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus. •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Oceanography
3. Course prefix, number and complete title of course: OCNG 634 - Fundamentals of High Performance Computing for the Geosciences

4. Catalog course description (not to exceed 50 words):

Architecture of High Performance Computing (HPC) systems; Unix operating system, shell environment; algorithms and programming languages for the Geosciences; concurrency, dependency, parallelism; parallel performance, scalability; structured programming; serial, parallel patterns; parallel programming models; parallel algorithms and software design for the Geosciences; techniques for empirical parallel performance analysis.

5. Prerequisite(s): Graduate classification or approval of instructor.

   Cross-listed with: ATMO 634 and GEOP 634 Stacked with:

   Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ______ to ______
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ______ times.

   Will this course be repeated within the same semester? ☐ Yes ☑ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:

    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
    M.S., Ph.D. in all Geosciences majors.

11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
OCNG	634	FUND HPC GEOSCIENCES

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
03	02	00	04	4006990202	2140	~~16~~ - 17	0 0 3 6 3 2

Level: 6

Approval recommended by:

Deborah Thomas [signature] 11/10/15
Department Head or Program Chair *(Type Name & Sign)* Date

[signature] 11/11/15
Chair, College Review Committee Date

Michael C Pope Michael C. Pope 11/09/15
Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

[signature] 11/11/15
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	**Fundamentals of High Performance Computing for the Geosciences, OCNG 634**
Term (e.g., Fall 200X)	Spring 201X
Meeting times and location	Lectures: TBD (3 hours); Laboratory: TBD (2 hours).

Course Description and Prerequisites

This course will present the architectural concepts, theoretical basis, common tools, and practical knowledge required to use current, state-of-the-art High-Performance Computing (HPC) systems to accurately and efficiently solve large-scale problems in the Geosciences.

The basic architecture of HPC systems will be discussed, and you will become familiar with Unix-based operating systems and shell environments. The main part of the course will focus on how to design and implement serial and parallel algorithms specific to Geosciences' problems by using structured, pattern-based programming techniques along with computer languages and widely used models in the Geosciences' research community. Concepts such as concurrency, dependency, and parallelism will be used as basis for understanding parallel code performance and techniques for empirical performance analysis.

The course will specifically focus on programming languages such as Fortran and deal with design and implementation concepts present in current models for general circulation, regional climate and weather, seismic wave propagation, data inversion, and others, as used on HPC systems. Dominant performance bottlenecks deriving from the data-intensive nature of computations in the Geosciences will be discussed, including disk I/O.

The course includes a laboratory section designed to improve the understanding of the topics presented during lecture hours and to further develop your computational skills. Through lab exercises you will become familiar with available computing environments, software and tools, and gain realistic, hands-on experience on HPC systems that may be applied to your future research work.

The intent of this course is to provide Geosciences students with diverse backgrounds a common knowledge set that will help them advance more effectively in their discipline, and to emphasize shared aspects of computational modeling in the Geosciences that may be leveraged to foster interdisciplinary exchanges.

There are no course prerequisites, but basic knowledge of programming is required.

Prerequisites: Graduate classification or approval of instructor.

Learning Outcomes

By the end of this course, you will be able to:

1. Describe the basic architecture and design features of a modern HPC system;
2. Understand the structure of the Unix operating system and make use of its main capabilities;
3. Break down a given computational task into primary steps and design a basic algorithm to carry out the work;
4. Use a programming language (Fortran) and leverage its main features to implement serial and parallel Geosciences-oriented computer codes;
5. Understand structured, pattern-based serial and parallel programming;
6. Identify and apply parallel programming patterns to parallel code design for modeling in the Geosciences;

7. Understand the concepts of concurrency, dependency, and parallelism;
8. Evaluate the performance of a parallel code on a HPC system;
9. Develop a parallel computer code to simulate a basic physical process relevant to the Geosciences;
10. Give an oral presentation of your programming project;
11. Write a comprehensive technical report of your programming project.

Instructor Information

Name	Raffaele Montuoro
Telephone number	979-862-3182
Email address	rmontuoro@tamu.edu
Office hours	Open
Office location	O&M 1017B

Textbook and/or Resource Material

Course material will be provided in the form of lecture notes and handouts.

I encourage you to consult the following reference material:

1. Chivers, I., Sleightholme, J., Introduction to Programming with Fortran, 2nd Ed., Springer, 2012, ISBN 978-0-85729-232-2.
2. Akin, E., Object Oriented Programming via Fortran 90/95, 1st Ed., Cambridge University Press, 2003, ISBN 0-521-52408-3.
3. Chapman, S.J., Fortran 95/2003 for Scientists and Engineers, 3rd Ed., McGraw-Hill, 2007, ISBN 978-0-07-319157-7.
4. Press, W.H., Teukolsky, S.A., Vetterling, W.T., Flannery, B.P., Numerical Recipes: The Art of Scientific Computing, Third Edition, Cambridge University Press, 2007, ISBN 978-0-521-88068-8. See also, by the same authors: Fortran Numerical Recipes, 2nd Edition, Vol. 1 and 2, Cambridge University Press, 1992, 1997, available on line at: http://apps.nrbook.com/fortran/index.html.
5. McCool, M., Robinson, A., Reinders, J., Structured Parallel Programming: Patterns for Efficient Computation, Morgan Kaufmann, 2012, ISBN: 978-0-12-415993-8. See also: http://parallelbook.com
6. Foster, I., Designing and Building Parallel Programs: Concepts and Tools for Parallel Software Engineering, Addison-Wesley, 1995, ISBN: 978-0-20-157594-1.
7. Mattson, T.G., Sanders, B.A., Massingill, B.L., Patterns for Parallel Programming, Addison-Wesley Professional, 2013, ISBN 978-0-32-194078-0.
8. Hager, G., Wellein, G., Introduction to High Performance Computing for Scientists and Engineers, Chapman & Hall/CRC Press, 2011, ISBN: 978-1-4398-1192-4.
9. Levesque, J., Wagenbreth, G., High Performance Computing: Programming and Applications, Chapman & Hall/CRC Press, 2011, ISBN: 978-1-4200-7705-6.
10. Zhao, C., Hobbs, B.E., Ord, A., Fundamentals of Computational Geoscience, Numerical Methods and Algorithms, Lecture Notes in Earth Sciences, Vol. 122, Springer-Verlag Berlin Heidelberg, 2009, ISBN 978-3-540-89742-2.

Grading Policies

Your final grade will be determined based on the following categories and weights:

1) Programming assignments (20% of course grade)
2) Midterm exam (30% of course grade)
3) Final project (50% of course grade)

Assignments. Assignments will be due at the beginning of class on the scheduled week, unless stated otherwise by the instructor. Late homework without a university-excused absence (see Attendance and Make-up Policies section) will be assessed a penalty equal to 20% of its grade per day. An unexcused delay longer than 4 working days will automatically result in receiving zero points on the assignment.

Midterm Exam. There will be a two-hour, in-class midterm exam.

Final Project. A final programming project will be due by 5pm on the last day of the university's Final Examination Schedule for the semester, available at http://registrar.tamu.edu/Courses,-Registration,-Scheduling/Final-Exam-Schedule.

This final project must include:

1) a 10-page technical report written in the style of the Institute of Electrical and Electronics Engineers (IEEE) Transactions (https://www.ieee.org/publications_standards/publications/authors/author_templates.html). The report must comprehensively summarize and explain the objectives and technical approach, software design and implementation, and computational results of your project;
2) a presentation during last week of class.

Final course grades will be posted on http://elearning.tamu.edu

Please consult University Student Rule 10 (Grading) at http://student-rules.tamu.edu/rule10 for additional details on grading policies.

Grading Scale

You will be assigned a final letter grade based on your final percentage grade according to the following scale:

A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F = <60%

Your final percentage grade will be calculated by adding your weighted scores, divided by the maximum attainable score, for each of the categories listed in the Grading Policies section.

Attendance and Make-up Policies

The university views class attendance as an individual student responsibility. You are expected to attend class and to complete all assignments. Attendance is essential to complete the course successfully.

Please consult the University Student Rule 7 at http://student-rules.tamu.edu/rule07 for details on university-excused absences and make-up policies.

Course Topics, Calendar of Activities, Major Assignment Dates

Week	Topic	Assignment
Week 1	Introduction to the architecture and design of state-of-the-art High Performance Computing systems	
Week 2	Description of the UNIX operating system, including the shell environment.	
Week 3	Algorithm design and basic principles of computer programming.	
Week 4-5	Fundamentals of Fortran programming language.	
Week 6	Advanced Fortran features for computational Geosciences. Introduction to structured programming. Pattern-based serial programming.	**Assignment #1 due:** Serial codes for one-dimensional physical models

Week 7	Concepts of concurrency, dependency, and parallelism. Potential and actual parallelism, data locality, parallel efficiency, speedup, and scalability.	**Assignment #2 due:** Apply structured programming techniques and serial patterns to design and implement simple models
Week 8		**Midterm Exam**
Week 10	Pattern-based parallel programming in the Geosciences. Examples include: geometrical decomposition and communication patterns in climate models, sequences in coupled models and reservoir simulations, map/reduce operations for convergence testing or large matrix operations.	
Week 11	Description of the main parallel programming models used in computational Geosciences. Shared-memory parallelism with OpenMP.	**Assignment #3 due:** Design a pattern-based parallel code for a two dimensional problem
Week 12-13	Distributed-memory parallelism with the Message Passing Interface (MPI)	**Assignment #4 due:** Use OpenMP to create a shared-memory parallel code. Evaluate parallel efficiency.
Week 14	Concepts and tools for empirical performance analysis of parallel codes.	**Assignment #5 due:** Use MPI to create a distributed-memory parallel code. Evaluate parallel efficiency.

Final project due by 5pm on the last day of the university's Final Examination Schedule for the semester.

Please note that the schedule and topics of lectures and laboratory assignments are subject to change.

Other Pertinent Course Information

Email. All Texas A&M students are expected to use their official TAMU email account for all the communications regarding this course. It is the student's responsibility to check your TAMU email account regularly throughout the course.

Cell Phones/Mobile devices. You should set your mobile devices to silent and refrain from texting during class.

Access to HPC systems. You should have a working account on one of Texas A&M HPC systems to take full advantage of this course and successfully complete your assignments. You may apply for a basic supercomputing account by contacting High Performance Research Computing (http://sc.tamu.edu) before the beginning of the course. I am also available to help you obtaining a supercomputing account if you contact me during the first week of class.

Copyright Policy. All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

Americans with Disabilities Act (ADA)

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Academic Integrity

For additional information please visit: http://aggiehonor.tamu.edu

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

You are encouraged to study together and discuss the information presented in the course lectures and material with other students. However, all coursework submitted to the instructor must be the result of the your original work. Intentional or careless appropriation of someone else's work or ideas, even with their explicit consent, violates the Aggie Honor System Rules (Student Rule 20.1.2) and will result in all the students involved automatically receiving zero points for the assignment as well as mandatory reporting of the violation.

You are responsible for authenticating all submitted work and, if asked, to produce proof that the item submitted is indeed the work of that student. The inability to authenticate one's work upon the instructor's request is sufficient grounds to initiate an academic dishonesty case.

RECEIVED
OCT 29 2015
GRADUATE STUDIES

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus. •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Oceanography
3. Course prefix, number and complete title of course: OCNG 656 MATLAB Programming for Ocean Sciences
4. Catalog course description (not to exceed 50 words):
This course is designed to train students in computation techniques for oceanographic data processing using MATLAB. Each class will be a combination of lecture and lab on the day's topic. Students will be given background information and an assignment that will be worked on during the allotted time. Whenever possible, the assignments will focus on the analysis of oceanographic-related data sets and real-world oceanographic applications. Students are encouraged to bring their own data sets to analyze.
5. Prerequisite(s): Graduate Classification
Cross-listed with: ______ Stacked with: OCNG 456
Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ______ to ______
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ______ times.
Will this course be repeated within the same semester? ☐ Yes ☑ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
M.S. OCNG, MOST, PhD OCNG
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
OCNG	656	MATLAB Prog for Ocean Sciences

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
2.00	2.00	0.00	3.00	4006070002	2140	16 - 17	0 0 3 6 3 2

Level 6

Approval recommended by:

Debbie Thomas 10/8/15
Department Head or Program Chair *(Type Name & Sign)* Date

Eric Riggs 10/15/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Kate Miller 10/15/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	OCNG 456/656, MATLAB Programming for Ocean Sciences
Term	Spring 2016
Meeting times and location	M/W 9-11 Room 602

Course Description and Prerequisites

This course is designed to train students in computation techniques for oceanographic data processing using MATLAB. Each class will be a combination of lecture and lab on the day's topic. Students will be given background information and an assignment that will be worked on during the allotted time. Whenever possible, the assignments will focus on the analysis of oceanographic-related data sets and real-world oceanographic applications. Students are encouraged to bring their own data sets to analyze.

Learning Outcomes or Course Objectives

Course Objectives: To provide instruction of MATLAB techniques useful to oceanographers.
Learning Outcomes: After completing this course student should be able to successfully write MATLAB scripts that load, manipulate, and visually display various large oceanographic data sets.

Instructor Information

Name	Dr. Christina L. Wiederwohl Instructional Assistant Professor Department of Oceanography
Telephone number	979-845-7191
Email address	chrissyw@tamu.edu
Office hours	TBA
Office location	410 O&M Building, TAMU

Textbook and/or Resource Material

Required: Laptop with access to MATLAB software. This is a BYOD (Bring your own Device) course. Computers will not be provided. Matlab software is provide for free to students via software.tamu.edu. iPads also work, but require matlab via the virtual open access labs (voal.tamu.edu).

Prerequisites:

OCNG 456: U3 or U4 status or approval of instructor
OCNG 656: No prerequisites.
A survey course in Oceanography is recommended for all students, but not required.

Grading Policies

Undergraduates and Graduates: There will be a total of 11 assignments. The lowest grade will be dropped and the remaining 10 assignments reports for this course are each worth 8% of the final grade. Grades will be based on the following grading system: 90-100%=A, 80-89%=B, 70-79%=C, 60-69%=D, <60=F. Assignments are to be turned in by 5pm on Friday the week the assignment was assigned. Late assignments will not be accepted without prior arrangement before the assignment. **Graduate** student assignments will be more in-depth and intensive than **undergraduate** student assignments. There is no final exam.

Graduates: Graduate student will be given a final project at the end of the semester encompassing all skill sets learned in the course.

Undergraduates: Attendance: 20%, Assignments: 80%
Graduates: Assignments: 80%, Final Project: 20%

Attendance Policy:

Attendance is mandatory for this course. Make up opportunities will only be given for students with excused absences. Please refer to http://student-rules.tamu.edu. Please see Part 1: Academic Rules, #7 Attendance

Course Topics, Calendar of Activities, Major Assignment Dates

Week	Topic
1	The art of Scientific computing, logging on
2	Introduction MATLAB programming: basics of programing
3	Introduction MATLAB programming: m-scripts, functions (Assignment 1 due)
4	Introduction to MATLAB programming II: debugging, loading various data formats, loops (Assignment 2 due)
5	Introduction to MATLAB programming III: Manipulating CTD and bottle data (Assignment 3 due)
6	Basics of MATLAB programming: working with vectors: times series plotting (Assignment 4 due)
7	Basics of MATLAB programming: matrices, scripting and command line statistics (Assignment 5 due)
8	Accessing data from NODC (The National Ocean Data Center) and CCHDO (CLIVAR and Carbon Hydrographic Data Office
9	Introduction to Oceanographic toolboxes: seawater toolbox; calculating oceanographic variables (Assignment 6 due)
10	Graphical representations of oceanographic data (Assignment 7 due)
11	Mapping techniques (Assignment 8 due)
12	Gridding and contouring (Assignment 9 due)
13	Vertical sections (Assignment 10 due)
14	Semester wrap up (Assignment 11 due) Graduates: final project due.

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Academic Integrity

For additional information please visit: http://www.tamu.edu/aggiehonor

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System.

Copyright and Plagiarism Policy

The materials used in this course are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even is you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the *Texas A&M University Student Rules*, http://student-rules.tamu.edu, under the section "Scholastic Dishonesty."

RECEIVED NOV 1 7 2015 GRADUATE STUDIES

RECEIVED AUG 0 7 2015 ESSAP

cc

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional (DDS, MD, JD, PharmD, DVM)
2. Request submitted by *(Department or Program Name)*: Harold Vance Department of Petroleum Engineering
3. Course prefix, number and complete title of course: PETE 614-Master Graduate Student Paper Contest

4. Catalog course description (not to exceed 50 words):
Presentation of a technical petroleum engineering topic judged by petroleum professionals at the master graduate level departmental student paper contest.

5. Prerequisite(s): Master Level Graduate classification
Cross-listed with: Stacked with:
Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☑ Yes ☐ No If yes, this course may be taken ____ times.
Will this course be repeated within the same semester? ☐ Yes ☑ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☐ Grade ☑ S/U ☐ P/F (CLMD)
10. This course will be:
a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
Master level graduate students
b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*

11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
PETE	614	MS Grad Student Paper Contest

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
0.00	0.00	0.00	0.00	1425010006	2210	16 - 17	0 0 3 6 3 2

Level 6

Approval recommended by:

I. Yucel Akkutlu [signature] 8/5/2015
Department Head or Program Chair *(Type Name & Sign)* Date

V E Taylor 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

V E Taylor 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	PETE 614
Term (e.g., Fall 200X)	Fall 2016
Meeting times and location	The Student Paper Contest is held annually on a Saturday near the end of January.

Course Description and Prerequisites

Participate satisfactorily in the Master division of the Petroleum Engineering Department annual Student Paper Contest. Students will give a 10-15 minute oral presentation of their graduate research to a panel of judges from industry.

Prerequisites: Master MS/MEN Classification

Learning Outcomes

Professional presentation to Industry representatives.

Instructor Information

Name	Duane A. McVay
Telephone number	979-862-8466
Email address	Duane.mcvay@pe.tamu.edu
Office hours	TBD
Office location	407 B Richardson

Method of Evaluation

Each student will be awarded a grade of satisfactory or unsatisfactory based on industry judges' review of the presentation and the student's responses during a 5-minute question-and-answer session following the presentation.

Attendance and Make-up Policies

Individual requests will be reviewed by instructor.

Other Pertinent Course Information

Course is taken satisfactory/unsatisfactory and for zero credit hours.

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

Academic Integrity

For additional information please visit: http://aggiehonor.tamu.edu

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

RECEIVED
NOV 17 2015
GRADUATE STUDIES

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AUG 07 2015
ESSAP

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus. •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Harold Vance Department of Petroleum Engineering
3. Course prefix, number and complete title of course: PETE 615-PHD Grad Student Paper Contest
4. Catalog course description (not to exceed 50 words):
Presentation of a technical petroleum engineering topic judged by petroleum professionals at the PHD graduate level departmental student paper contest.
5. Prerequisite(s): PHD graduate classification
Cross-listed with: ______ Stacked with: ______
Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☑ Yes ☐ No If yes, this course may be taken ____ times.
Will this course be repeated within the same semester? ☐ Yes ☑ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☐ Grade ☑ S/U ☐ P/F (CLMD)
10. This course will be:
a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
PHD level graduate students
b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
PETE	615	PHD Grad Student Paper Contest

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
0.00	0.00	0.00	0.00	1425010006	2210	16 - 17	0 0 3 6 3 2

Level 6

Approval recommended by:

I. Yucel Akkutlu 8/5/2015
Department Head or Program Chair *(Type Name & Sign)* Date

Chair, College Review Committee 11/17/2015 Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Dean of College 11/17/2015 Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	PETE 615
Term (e.g., Fall 200X)	Fall 2016
Meeting times and location	The Student Paper Contest is held annually on a Saturday near the end of January.

Course Description and Prerequisites

Participate satisfactorily in the PhD division of the Petroleum Engineering Department annual Student Paper Contest. Students will give a 10-15 minute oral presentation of their graduate research to a panel of judges from industry.

Prerequisites: PHD Classification

Learning Outcomes

Professional presentation to Industry representatives.

Instructor Information

Name	Duane A. McVay
Telephone number	979-862-8466
Email address	Duane.mcvay@pe.tamu.edu
Office hours	TBD
Office location	407 B Richardson

Method of Evaluation

Each student will be awarded a grade of satisfactory or unsatisfactory based on industry judges' review of the presentation and the student's responses during a 5-minute question-and-answer session following the presentation.

Attendance and Make-up Policies

Individual requests will be reviewed by instructor.

Other Pertinent Course Information

Course is taken satisfactory/unsatisfactory and for zero credit hours.

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

Academic Integrity

For additional information please visit: http://aggiehonor.tamu.edu

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Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

• Submit original form and attach a course syllabus.•

RECEIVED
NOV 17 2015
CC
GRADUATE STUDIES

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional (DDS, MD, JD, PharmD, DVM)
2. Request submitted by *(Department or Program Name)*: Dwight Look College of Engineering
3. Course prefix, number and complete title of course: SUBS 601 - Fundamentals of Subsea Engineering

4. Catalog course description (not to exceed 50 words):
Orientation to subsea engineering fundamentals, including SURF (Subsea, Umbilicals/Controls, Risers, Flowlines) equipment and configurations; exposure to practical, industry focused problems; subsea equipment components; design considerations and design drivers; subsea production operations; integrity critical maintenance activities.

5. Prerequisite(s): Restriction – graduate classification, Enrolled in Dwight Look College of Engineering or approval of instructor
Cross-listed with: ______ Stacked with: SUBS 401
Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times.
Will this course be repeated within the same semester? ☐ Yes ☑ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
M. Eng. in Engineering
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
SUBS	601	FUND SUBSEA ENGR

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
3.00	0.00	0.00	3.00	1424010006	0965	16 - 17	0 0 3 6 3 2

Level: 6

Approval recommended by:

Dr. John Hurtado [signature] 11/16/15
Department Head or Program Chair *(Type Name & Sign)* Date

V E Taylor 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

V E Taylor 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14

ENGINEERING
TEXAS A&M UNIVERSITY

SUBS 601: Fundamentals of Subsea Engineering

Fall 2016

Instructor: Mr. Grayum L. Davis

Telephone: (832) 368-7113

Email: g13@tamu.edu

Location: Engineering Activities Building C

Hours: TBA

Course Description:

This course provides a thorough orientation to subsea engineering fundamentals, covering the full suite of SURF (Subsea, Umbilicals/Controls, Risers, Flowlines) equipment and configurations. The course is targeted toward students that desire to further their subsea engineering education or are interested in broadening their skills into the multidisciplinary subsea engineering field. The course is intended to provide exposure to practical, industry focused problems, and will be taught by industry experienced experts. Topics covered will include subsea equipment components, design considerations and design drivers, subsea production operations, and integrity critical maintenance activities.

Prerequisites:

A high level of familiarity and competence in the following areas is strongly recommended: 1) materials, 2) Fluid mechanics, 3) Heat transfer, 4) Structures, 5) Electrical circuits/controls.

Overall Course Learning Outcomes

Upon completion of this course, students will be able to:

1. Describe functional requirements of common SURF (Subsea, Umbilicals, Risers, Flowlines) hardware components and configurations.
2. Describe design considerations, troubleshoot subsea control system components
3. Demonstrate a basic understanding of the types of reservoirs, and how reservoir modelling uncertainties impact subsea field architecture.
4. Demonstrate understanding of design drivers for subsea equipment, subsea systems, and interfaces using actual subsea field design data.
5. Demonstrate familiarity with the scope of the various API SC 17 Recommended Practices.
6. Apply design philosophies to new subsea configurations, evaluate options and summarize design considerations for recommended configuration.
7. Demonstrate familiarity with typical subsea materials, corrosion management, seals, and requirements per industry standards
8. Exercise and demonstrate sound and practical engineering judgments involving complex design tradeoffs presented in reality based scenarios, also demonstrate communication skills.
9. Describe and evaluate typical subsea production operations, maintenance activities, and integrity-critical testing and surveillance.

Getting Started

To get started within this course, you will need to:

- Review the syllabus in its entirety
- Login to the course website, eCampus (see directions below), to:
  - ensure that you have access and the correct plug-ins installed (ie. Blackboard Collaborate Plug-In),
  - update your user profile,
  - spend some time becoming familiar with the course layout, and
  - complete the introductory forum.

Note: Additional details to complete these activities can be found within the eCampus.

Resource Materials & Course Technology

Required Textbook and Resource Materials:

The required materials for ENGR 689 can be accessed on the TAMU Course Reserves via eCampus. You will be able to access the readings and save the documents associated with the course from the TAMU Course Reserves.

- American Petroleum Institute (API) Subcommittee (SC) 17 Standards Series Recommended Practices.
- Bai, Y. and Bai, Q. (2012), Subsea Engineering Handbook, 1 edition, Gulf Professional Publishing.
- Dataset from an existing subsea producing field.
- Additional lecture materials and readings will be provided within the course modules on eCampus.

eCampus:

This course will use the TAMU eCampus, powered by Blackboard Learn, as the virtual classroom. Within eCampus, you can find all course related content and assessments (including but not limited to course materials, content, videos, activities, assessments, etc.). The recommended browsers for eCampus access are Mozilla Firefox or Google Chrome (Internet Explorer is not recommended). For additional information on support browsers for eCampus, please visit http://tx.ag/eCampusBrowserSupport.
To login to eCampus:

- Go to http://ecampus.tamu.edu
- Click the Login button
- Use your TAMU NetID and password to login

Once logged into eCampus, you will see a list of all courses for which you are enrolled in for the semester. To navigate to this course, click on the name of the course. If you have any problems logging into the course, please see the technology support section below.

To navigate the course with eCampus, use the menu on the left side of the browser window. The syllabus and course introductory materials can be found within the "Getting Started & Syllabus" section of the course menu. The weekly modules will be available live and recorded within the "Module Materials" section of the course website. All assessments (ie. assignments and discussions) to be completed as part of the course can be found with the course menu on the left. Each assessment contains a description of the content that you should have learned prior to completing the assessment. Grades for the course can be access by clicking on "My Grades". The link to the weekly Tuesday 7-8pm sessions, can be found in "Module Materials" folder. If you have any questions about navigating eCampus, please contact the instructor.

Technology Requirements & Recommendations:

Technology Requirements:

- Reliable and frequent access to a computer and to the high-speed Internet. If you do not have frequent and reliable access to a computer with Internet connection, please contact the instructor to discuss your situation and determine an appropriate solution.
- To attend virtual office hours, students will need to make sure they have setup Blackboard Collaborate to run on their computer(s) and mobile devices. Please visit http://blackboard.force.com/publickbarticleview?id=kA770000000CbIW to check your system requirements and test your connection.
  - It is required to have a microphone and webcam when using Bb Collaborate. While many students use a built in webcam, it is recommended to have a headset with a microphone, such as a smart phone headset, for the virtual office hours and group collaboration.

Course Support

In addition to contacting the instructor or graduate assistant for course content related questions, there are a variety of campus resources for course support.

Academic Services Support:

The Office of Graduate & Professional Studies (OGAPS) offers graduate student services and advocates for graduate education for Texas A&M students who are both on-campus and at a distance. For additional information regarding OGAPS, visit: http://ogaps.tamu.edu/Home

Technology Support:

For technological issues related to eCampus and software, contact the TAMU Help Desk:

- Student eCampus Help Website, http://ecampus.tamu.edu/student-help.php
- TAMU IT Help Desk:
  - Website: http://hdc.tamu.edu/index.php (Online Chat is available)
  - Phone: (979) 845-8300
  - Email: helpdesk@tamu.edu

The TAMU Help Desk is open 24 hours a day 7 days a week. If your technical problems are unable to be resolved within 48 hours, please contact the instructor for additional assistance.

Technology issues are not an excuse for missing a course requirement – make sure your computer is configured correctly and address issues well in advance of deadlines.

Course Assignments

This course is designed to provide an interactive and collaborative environment that fosters the development of engineering. Participation in all activities in considered essential to this development. All specific instructions for each assessment are provided in eCampus.

Assessments	Percentage
Weekly Scenarios Assignments	25%
2 Quizzes	10%
Midterm Exam	20%
Final Exam	25%
Final Project	20%
Total	100%

Determination of Final Grades within the Course

Letter Grade	Percentage
A	100.00%-90.00%
B	89.99%-80.00%
C	79.99%-70.00%
D	69.99%-60.00%
F	Less than 60.00%

Course Outline

Module 1: Introduction and Overview	
Module 1.1: Subsea Engineering Overview; Geology Overview; Reservoir Overview	
Watch: Introduction to Subsea Engineering Part 1, 2 and 3 Videos	
Watch: Geology Overview Video	
Participate: Synchronous Weekly Class Meeting	
Post: Introduce Yourselves Forum	
Solve: Scenario 1	
Module 1.2: Subsea Well Construction Overview	
Watch: Drilling Basics Part 1 Video	
Interact: Basic Drilling Process / Prepared by Cameron & One Subsea	
Watch: Drilling Basics Part 2 Video	
Interact: Well Heads / Prepared by Cameron & One Subsea	
Watch: Drilling Basics Part 3 & 4 Videos	
Participate: Synchronous Weekly Class Meeting	
Solve: Scenario 2	
Module 2: Subsea Field Architecture	
Read: Subsea Field Architecture	
Read: API 17A - Design and Operation of Subsea Production Systems	
Read: API 17TR13 - General Overview of Subsea Production Systems	
Supplemental: Subsea Engineering Handbook - Part I Subsea Production Systems, Chapters 1 & 2	
Interact: Introduction to Subsea Production Systems / Prepared by Cameron & One Subsea	
Watch: Subsea Field Development Planning Parts 1 - 4 Videos	
Participate: Synchronous Weekly Class Meeting	
Solve: Scenario 3	
Answer: Quiz 1	
Module 3: Deepwater Riser Design	
Read: OMAE2014-24240 from the Proceedings of the ASME 2014 33rd International Conference on...	
Read: Deepwater Riser Design, Fatigue Life and Standards Study Report; TA&R Project Number 572...	
Read: Drilling Riser Management In Deepwater Environments, Madhu Hariharan, Ricky Thethi, 2H...	
Supplemental: API 17A Annex A A.10, A.11	
Supplemental: SHE - Part IV Subsea Umbilicals, Risers, and Flow lines Chapters 25, 26	
Supplemental: OTC 23161 - Subsea Well Intervention Vessel and Systems	
Watch: Risers Part 1-5 Videos	
Watch: Subsea E&A Subsea Landing String Assembly Video	
Participate: Synchronous Weekly Class Meeting	
Solve: Scenario 4	
Module 4: Flow Assurance and Operability	
Read: Flow Assurance Considerations in Subsea Production Systems	
Read: World Oil Recommended Practices for Hydrate Control and Remediation, Steven Cochran	
Supplemental: Subsea Engineering Handbook – Part II Flow Assurance and Sys Eng, Chapters 12-18	
Watch: Flow Assurance Parts 1 - 9 Videos	
Participate: Synchronous Weekly Class Meeting	
Solve: Scenario 5	

Module 5: Deepwater Pipeline Design	
Watch: Pipeline Design Parts 1 - 4 Videos	
Read: SEH – Part IV Subsea Umbilicals, Risers, and Flowlines Chapter 27 Subsea Pipelines	
Read: US Code of Federal Regulations: 30CFR250, Subpart J, specifically § 250.1001 - § 250.1007	
Read: Red Hawk project drawings – included in eCampus	
Supplemental: S.K. Rich, A.G. Alleyne, System Design for Buried, High Temperature and Pressure Pipelines	
Watch: SAGE Profile 3D - Subsea Pipeline Analysis Software Video	
Watch: J Lay Virtual Tour Video	
Supplemental: Popular Videos - Ormen Lange	
Watch: Ultimate Engineering: Super Pipeline Construction of Ormen Lange Natural Gas Pipeline Video	
Participate: Synchronous Weekly Class Meeting	
Solve: Scenario 6	
Module 6: Subsea Equipment: Components and Design Considerations I	
Read: API 17TR13 Sections 1 – 7, 14	
Read: RP 17A Annex A A.4	
Read: Subsea Solutions Oilfield Review Article, Winter 2000, Schlumberger	
Supplemental: SEH – Pt. I Subsea Prod Sys, Ch. 11 Subsea Equip RBI; Pt. III Subsea Struct and Equip, Ch. 19 - 23	
Interact: Subsea Trees 1 & 2 / Prepared by Cameron & One Subsea	
Participate: Synchronous Weekly Class Meeting	
Solve: Scenario 7	
Module 7: Subsea Equipment: Components and Design Considerations II	
Read: API 17TR13 Section 11	
Supplemental: SEH - Part I Subsea Production Systems, Chapter 11 Subsea Equipment RBI; Part III	
Supplemental: Subsea Structures and Equipment, Chapters 19 - 23	
Interact: Subsea Mainfolds / Prepared by Cameron & One Subsea	
Interact: Connectors and Well/Flowline Tie-in Jumpers / Prepared by Cameron & One Subsea	
Watch: ROV Orientation Video	
Participate: Synchronous Weekly Class Meeting	
Assessment: Mid-term Exam	
Solve: Scenario 8	
Module 8: Subsea Materials	
Read: API 17TR13 Section 11	
Supplemental: SEH - Part I Subsea Production Systems, Chapter 11 Subsea Equipment RBI; Part III	
Supplemental: Subsea Structures and Equipment, Chapters 19 - 23	
Interact: Subsea Mainfolds / Prepared by Cameron & One Subsea	
Interact: Connectors and Well/Flowline Tie-in Jumpers / Prepared by Cameron & One Subsea	
Watch: Subsea Materials Parts 1 & 2 Video	
Participate: Synchronous Weekly Class Meeting	
Solve: Scenario 9	
Module 9: Subsea Controls, Umbilicals, Distribution System Part I	
Read: API 17A A.8, A.9 & ISO 1219-1:2012	
Supplemental: API 17 E Umbilicals, API 17 F Controls & API 17 V Safety Systems	
Watch: Subsea Controls Parts 1, 2 and 3 Videos	

Interact: Introduction to Control Systems / Prepared by Cameron & One Subsea	
Interact: Subsea Control Equipment / Prepared by Cameron & One Subsea	
Interact: Subsea Control Modules / Prepared by Cameron & One Subsea	
Participate: Synchronous Weekly Class Meeting	
Solve: Scenario 10	
Module 10: Subsea Controls, Umbilicals, Distribution System Part II	
Read: API 17A A.8, A.9 & ISO 1219-1:2012	
Supplemental: API 17 E Umbilicals, API 17 F Controls, API 17 V Safety Systems	
SHE - Pt. I Subsea Prod Systems, Ch. 3,7,8; Pt. IV Umbilicals, Risers, and Flowlines, Ch. 24 Subsea Umbilical Systems	
Interact: Subsea Distribution Assemblies / Prepared by Cameron & One Subsea	
Interact: Hydraulic Flying Leads / Prepared by Cameron & One Subsea	
Interact: Stab Plates / Prepared by Cameron & One Subsea	
Interact: Topside Umbilical Termination Assembly / Prepared by Cameron & One Subsea	
Interact: Subsea Instrumentation / Prepared by Cameron & One Subsea	
Watch: Subsea Controls Parts 1, 2 and 3 Videos	
Participate: Synchronous Weekly Class Meeting	
Solve: Scenario 11	
Module 11: Subsea Operations	
Read: SEH – Pt. I Subsea Production Systems, Chapters 5, 9, 10	
Watch: Subsea Control System Operations Modules (Lucas)	
Watch: Subsea Modes of Operation	
Watch: Subsea Maintenance Operations	
Watch: Subsea operations – Third Party Devices	
Watch: Subsea Control System Diagnostics	
Watch: Subsea Production Surveillance	
Interact: Master Control / Prepared by Cameron & One Subsea	
Interact: Hydraulic Power Unit / Prepared by Cameron & One Subsea	
Supplemental Interaction: Electrical Power Unit / Prepared by Cameron & One Subsea	
Participate: Synchronous Weekly Class Meeting	
Solve: Scenario 12	
Answer: Quiz 2	
Module 12: Overview of the Class Project and Final Exam	
Participate: Project Overview and Final Exam Review	
Module 13: Class Project and Final Exam	
Read: Final Project Instructions and Supporting Files	
Submit: Final Project	
Assessment: Final Exam	

Course Policies

Attendance Policy:

The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused or unexcused absences are located online on the TAMU website. **All students are required to attend the Tuesday Blackboard Collaborate sessions from 7-8pm online.**

Late Work Policy:

LATE WORK is not accepted. This course relies on discussion, interaction, and group work among class members. Therefore, it is essential that work be completed on schedule. At the beginning of every module, you should spend time planning. Read the learning modules in eCampus very carefully. Please do not wait until the last day to do the work. Punctuality is especially important when assignments impact your classmates. If your schedule impacts others, notify them and me and make alternative arrangements. Obviously unforeseen events arise and may prevent you from accomplishing a task on time. This may result in the deduction of a point or two from your grade, but if this is a rare occurrence and your work for this class it otherwise excellent, it should make no difference in your final grade for the course. It is only when work is frequently late and/or quality of the work is consistently below standard that your final grade will suffer. In those rare circumstances where an emergency takes you away from the course for an extended period of time, contact your instructor right away to make arrangements.

Grades of "INCOMPLETE" will be given only for certifiable medical reasons or in other extraordinary circumstances arranged in advance. If you are planning to be away from your usual location (travel, vacation, etc.) during this course, consider dropping the course or discuss your situation with me and we can see if you will be disadvantaged by your mobility or impacting others' work.

Course Copyright Statement:

The materials used within this course are copyrighted. These materials include, but are not limited to, the syllabi, quizzes, exams, lab problems, online handouts, course videos, etc. Because these materials are copyrights, you do not have the right to copy or distribute these materials, unless permission is expressly granted.

Incomplete Grade:

Grades of "INCOMPLETE" will be given only for certifiable medical reasons or in other extraordinary circumstances arranged in advance. If you are planning to be away from your usual location (travel, vacation, etc.) during this course, consider dropping the course or discuss your situation with me and we can see if you will be disadvantaged by your mobility or impacting others' work.

Communication Expectations:

The best way to contact the instructor and graduate assistant for this course is via email (see contact information at the top of the syllabus). Students should expect a response from the instructor or graduate assistant no later than 48 hours after an email is sent or voicemail is left.

Course assignments, projects, and other assessments will be graded no later than 7 days after the due dates posted within the syllabus and eCampus calendar. If dates need to be adjusted based on unforeseen circumstances, an announcement will be sent from eCampus.

Netiquette Expectations:

Netiquette is network etiquette. Netiquette covers both common courtesy online and the informal when communication with other online. TAMU Instructional Technology Services provides some general netiquette rules that students and faculty are expected to follow within this course. For more information on netiquette, please visit
http://its.tamu.edu/Distance_Education/Netiquette_Aggie_Honor_Code.php

Institutional Policies

Americans with Disabilities Act (ADA) Policy Statement:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu.

This course uses Blackboard Learn as its online platform. To know more about its accessibility standards please to their website. http://www.blackboard.com/Platforms/Learn/Resources/Accessibility.aspx

If you find that course content or software are not accessible, please contact your course instructor or disability services so that appropriate accommodations to the learning environment can be made.

Academic Integrity Statement and Policy:

For many years Aggies have followed a Code of Honor, which is stated in this very simple verse:

"An Aggie does not lie, cheat or steal, or tolerate those who do."

The Aggie Code of Honor is an effort to unify the aims of all Texas A&M men and women toward a high code of ethics and personal dignity. For most, living under this code will be no problem, as it asks nothing of a person that is beyond reason. It only calls for honesty and integrity, characteristics that Aggies have always exemplified. The Aggie Code of Honor functions as a symbol to all Aggies, promoting understanding and loyalty to truth and confidence in each other.

For more information, please visit, http://student-rules.tamu.edu/aggiecode and http://aggiehonor.tamu.edu/

Statement of Plagiarism:

All materials generated for this class (which may include but are not limited to syllabi and in-class materials) are copyrighted. You do not have the right to copy such materials unless the instructor expressly grants permission. As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writing, etc. which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have permission of that person. Plagiarism is one of the worst academic violations, for the plagiarist destroys trust among others. If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, under the section "Scholastic Dishonesty."

Export Control Statement:

United States export control laws regulate the release of goods and technologies that affect U.S. national security or foreign policy interests. Distance education students and course content MUST comply with these U.S. export control laws. If TAMU indicates that you are attempting to access course content from an IP address associated with a country currently subject to economic and trade sanction, your TAMU NetID account will be terminated and you will be contacted by the TAMU Export Control Office and the Office of Identity Management. For additional visit, https://vpr.tamu.edu/resources/export-controls/resources.

Course Changes

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

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Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Biomedical Engineering
3. Course prefix, number and complete title of course: BMEN 604- FDA Good Laboratory and Clinical Practices

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: BMEN 430 or BMEN 630 and graduate classification, or approval of instructor. To: Graduate classification or approval of instructor.
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: BMEN 404
8. ☐ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
BMEN	604	FDA GOOD LAB/CLINIC PRACT

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	0.00		3.00	1405010006	0450	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
						-	0 0 3 6 3 2	

Approval recommended by:

Kristen Maitland 10/15/15
Department Head or Program Chair *(Type Name & Sign)* Date

V E Taylor 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* *(if cross-listed course)* Date

V E Taylor 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 08/14

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Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional
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Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Biomedical Engineering
3. Course prefix, number and complete title of course: BMEN 608- Optical Diagnostic and Monitoring Principles

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: MATH 308; PHYS 208. To: BMEN 625 or approval of instructor
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course:
8. ☐ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:
   Optical Diagnostic and Monitoring Principles. Principles of optical spectroscopy, including absorption, fluorescence and scattering spectroscopy; emphasis on understanding how light interacts with biological samples and how these interactions can be optically measured, quantified and used for medical diagnosis and sensing. Prerequisites: MATH 308; PHYS 208.
10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):
    BIOPHOTONICS II: Photon transport in tissue; photon scattering and absorption; Mie scattering; Monte Carlo; optical spectroscopy, including absorption, fluorescence, and Raman scattering; multiphoton processes; and plasmonics.
11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
BMEN	608	OPT DIAG MONITOR PRIN

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	0.00		3.00	1405010006	0450	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
BMEN	608	BIOPHOTONICS II

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	0.00	0.00	3.00	1405010006	0450	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Kristen Maitland [signature] 11/5/15
Department Head or Program Chair *(Type Name & Sign)* Date

V E Taylor 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Valerie E. Taylor 11/19/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 08/14

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

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Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Biomedical Engineering
3. Course prefix, number and complete title of course: BMEN 631 - Thermodynamics of Biomolecular Systems

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: BMEN 240, PHYS 208, and MATH 308 To: Graduate classification or approval of instructor
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: BMEN 431
8. ☐ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:
THERMODYNAMICS OF BIOMOLECULAR SYSTEMS - Introduces equilibrium and non-equilibrium statistical mechanics and applies them to understand various biomolecular systems; including ensemble theory, reaction kinetics, non-linear dynamics, and stochastic processes; with applied examples such as enzyme-ligand binding kinetics, conformational dynamic of proteins and nucleic acids, population dynamics, and noise in biological signals.
10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):
BIOENGINEERING THERMODYNAMICS - Biothermodynamics; quantitative framework for describing materials behavior and processes as they relate to the properties and interactions of microscopic constituents; application to bioengineering and biomedicine problems.
11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
BMEN	631	THERMODYN BIOMOLECULAR SYS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	0.00	0.00	3.00	1405010006	0450	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
BMEN	631	BIOENGR THERMODYNAMICS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	0.00	0.00	3.00	1405010006	0450	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Kristen Maitland [signature] 11/5/15
Department Head or Program Chair *(Type Name & Sign)* Date

[signature] 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

[signature] 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 08/14

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional
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Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Biomedical Engineering
3. Course prefix, number and complete title of course: BMEN 641- Numerical Methods in Biomedical Engineering

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: BMEN 207, BIOL 213 and VTPP 435; graduate classification or approval of instructor. To: Graduate classification or approval of instructor.
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: BMEN 471
8. ☐ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
BMEN	670	Numerical Methods in Biomedica

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	0.00		3.00	1405010006	0450	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
						-	0 0 3 6 3 2	

Approval recommended by:

Kristen Maitland 10/15/15
Department Head or Program Chair *(Type Name & Sign)* Date

11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* *(if cross-listed course)* Date

11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional
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Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Biomedical Engineering
3. Course prefix, number and complete title of course: BMEN 650 - Biomedical Optics Laboratory

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: MATH 308; PHYS 208 To: Graduate classification or approval of instructor.
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: BMEN 402
8. ☐ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
BMEN	650	BIOMEDICAL OPTICS LAB

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
2.00	3.00	0.00	3.00	1405010006	0450	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
						-	0 0 3 6 3 2	

Approval recommended by:

Kristen Maitland [signature] 11/5/15
Department Head or Program Chair *(Type Name & Sign)* Date

[signature] 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

[signature] 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

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Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Biomedical Engineering
3. Course prefix, number and complete title of course: BMEN 652- Cell Mechanobiology

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: BMEN 282/CHEN 282. To: Graduate classification or approval of instructor.
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: BMEN 451
8. ☐ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
BMEN	651	CELL MECHANOBIOLOGY

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	0.00		3.00	1405010006	0450	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
						-	0 0 3 6 3 2	

Approval recommended by:

Kristen Maitland 10/15/15
Department Head or Program Chair *(Type Name & Sign)* Date

V E Taylor 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

V E Taylor 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.

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Texas A&M University
Departmental Request for a Change in Course
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Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Biomedical Engineering
3. Course prefix, number and complete title of course: BMEN 661- Cardiac Mechanics

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: BMEN 240 and BMEN 602; MEMA 467; or equivalents. To: Graduate classification or approval of instructor.
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: BMEN 461
8. ☐ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
BMEN	661	CARDIAC MECHANICS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	0.00		3.00	1405010006	0450	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
						-	0 0 3 6 3 2	

Approval recommended by:

Kristen Maitland 10/15/15
Department Head or Program Chair *(Type Name & Sign)* Date

V E Taylor 11/14/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

V E Taylor 11/14/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 08/14

Texas A&M University
Departmental Request for a Change in Course
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Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Biomedical Engineering
3. Course prefix, number and complete title of course: BMEN 663- Soft Tissue Mechanics and Finite Element Methods

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: BMEN 240 or equivalent. To: Graduate classification or approval of instructor.
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: BMEN 463
8. ☐ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:
10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):
11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
BMEN	663	SOFT TISSUE MECHANICS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	0.00		3.00	1405010006	0450	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
						-	0 0 3 6 3 2	

Approval recommended by:

Kristen Maitland 10/15/15
Department Head or Program Chair *(Type Name & Sign)* Date

V E Taylor 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

V E Taylor 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date Effective Date

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Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Biomedical Engineering
3. Course prefix, number and complete title of course: BMEN 682- Polymeric Biomaterials

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: BMEN 342, or approval of instructor. To: Graduate classification or approval of instructor.
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: BMEN 482
8. ☐ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
BMEN	682	POLYMERIC BIOMATERIALS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	0.00		3.00	1405010006	0450	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
						-	0 0 3 6 3 2	

Approval recommended by:

Kristen Maitland 10/15/15
Department Head or Program Chair *(Type Name & Sign)* Date

V E Taylor 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

V E Taylor 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.

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OCT 22 2015

GRADUATE STUDIES

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

Form Instructions

1. Course request type: ☐ Undergraduate ☒ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Education for Healthcare Professionals
3. Course prefix, number and complete title of course: EDHP 504: Teaching Practicum

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ______ To: ______
   b. Withdrawal (reason): ______
   c. Cross-list with: ______

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☐ No
6. If grade type is changing for existing course, indicate the new grade type: ☒ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ______
8. ☐ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
EDHP	504	TEACHING PRAC

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
		1-2	1-2	1313270014	1935	0 0 3 6 3 2	5

b. Change to:

Prefix	Course #	Title (excluding punctuation)

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
						-	0 0 3 6 3 2	5

Approval recommended by:

Va G. Wnl 10/13/15
Department Head or Program Chair *(Type Name & Sign)* Date

Paul E Ogden, MD
~~Chair, College Review Committee~~ HSC LEO Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Regina Bentley 10/13/15
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 08/14

Texas A&M University
Departmental Request for a Change in Course
Undergraduate • Graduate • Professional
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OCT 22 2015
GRADUATE STUDIES

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional (DDS, MD, JD, PharmD, DVM)
2. Request submitted by (Department or Program Name): Select or Type Department/Program Name
3. Course prefix, number and complete title of course: EDHP 505: Thesis

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ______ To: ______
   b. Withdrawal (reason): ______
   c. Cross-list with: ______

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. Attach a course syllabus.
5. Is this an existing core curriculum course? ☐ Yes ☐ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ______
8. ☐ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
EDHP	505	PROJECT/THESIS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
1-3		1-3		1313270014	1935	0 0 3 6 3 2	5

b. Change to:

Prefix	Course #	Title (excluding punctuation)
EDHP	505	THESIS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
		3.00	3.00	1313270014	1935	15 - 16	0 0 3 6 3 2	5

Approval recommended by:

Van G. Wilson VAN WILSON 10/2/15 — Department Head or Program Chair (Type Name & Sign) — Date

Paul E. Ogden, M.D. — Chair, College Review Committee HSC CFO — 10/5/15 — Date

______ Department Head or Program Chair (Type Name & Sign) (If cross-listed course) — Date

Regina Bentley — Dean of College — 10-2-15 — Date

Submitted to Coordinating Board by: ______ Chair, GC or UCC — Date

Associate Director, Curricular Services — Date — Effective Date

Texas A&M University
Departmental Request for a Change in Course
Undergraduate • Graduate • Professional
• Submit original form and attachments •

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OCT 22 2015
GRADUATE STUDIES

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional (DDS, MD, JD, PharmD, DVM)
2. Request submitted by (Department or Program Name): Education for Healthcare Professionals
3. Course prefix, number and complete title of course: EDHP 506: PROJECT

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ______ To: ______
   b. Withdrawal (reason): ______
   c. Cross-list with: ______

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☐ No
6. If grade type is changing for existing course, indicate the new grade type: ☒ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ______
8. ☐ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

    This course will guide students through the process of conducting a clinical or educational research project. Coursework will include development of a proposal from topic and title selection to citing the significance of the project, reviewing related literature, explaining the methodology and conducting research to the degree appropriate. The culminating action will be an oral presentation.

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
EDHP	506	PROJECT/THESIS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code						Level
1-3			1-3	1313270014	1935	0	0	3	6	3	2	5

b. Change to:

Prefix	Course #	Title (excluding punctuation)
EDHP	506	PROJECT

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year			FICE Code					
		3.00	3.00	1313270014	1935	15	-	16	0	0	3	6	3	2

Level: 5

Approval recommended by:

Va G. Walin 10/13/15 — Department Head or Program Chair (Type Name & Sign) — Date

Paul E. Ogden, MD — ~~Chair, College Review Committee~~ HSC UED — Date

Department Head or Program Chair (Type Name & Sign) (if cross-listed course) — Date

Regina Bentley — Dean of College — 10/13/15 Date

Submitted to Coordinating Board by:

Chair, GC or UCC — Date

Associate Director, Curricular Services — Date — Effective Date

After separating EDHP 505: Thesis and the EDHP 506: Project course we realized the course description did not aptly illustrate what the EDHP 506: Project course will actually entail. The new course description for the EDHP 506: Project course should now clearly depict the course.

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional
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GRADUATE STUDIES

Form Instructions

1. Course request type: ☐ Undergraduate ☒ Graduate ☐ First Professional (DDS, MD, JD, PharmD, DVM)
2. Request submitted by *(Department or Program Name)*: Mays Business School Master of Science in Business
3. Course prefix, number and complete title of course: FINC 705 Corporate Finance

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ______ To: ______
   b. Withdrawal (reason): ______
   c. Cross-list with: ______

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☒ No
6. If grade type is changing for existing course, indicate the new grade type: ☒ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ______
8. ☒ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description: FINC 705. Corporate Finance. Investment and financing decisions in corporations; principles, techniques, and applications in corporate finance; time value of money; risk and return; capital budgeting; role of debt and equity; discounted cash flow valuation, capital structure, and payout policy.
10. Complete proposed course title and proposed catalog course description (not to exceed 50 words): FINC 705. Corporate Financial Decisions. Investment and financing decisions in corporations; principles, techniques, and applications in corporate finance; time value of money; risk and return; capital budgeting; role of debt and equity; discounted cash flow valuation, capital structure, and payout policy.
11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
FINC	705	CORPORATE FINANCE

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
2.00			2.00	5208010016	1110	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
FINC	705	CORPORATE FINANCIAL DECISIONS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
2.00			2.00	5208010016	1110	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

R J [signature] 10/16/15 — Department Head or Program Chair *(Type Name & Sign)* — Date

Bala Shetty [signature] 10/20/15 — Chair, College Review Committee — Date

Bala Shetty [signature] 10/20/15 — Department Head or Program Chair *(Type Name & Sign)* *(if cross-listed course)* — Date

[signature] 10/20/15 — Dean of College — Date

Submitted to Coordinating Board by:

______ Chair, GC or UCC — Date

______ Associate Director, Curricular Services — Date — Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 08/14

10/21/2015

Please find the attached form "Departmental Request for a Change in Course" submitted in relation to a 700 level course setup in conjunction with the new MS Business degree plan. Course code 705 "Corporate Finance" was inadvertently duplicated through passage of the new course process earlier this year (2015).

This accidental duplication has now been identified and resolution is being sought through submission of this form. The new and corrected course name for the new MS Business curriculum is FINC 705 "Corporate Financial Decisions."

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

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NOV 12 2015
GRADUATE STUDIES

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Geography
3. Course prefix, number and complete title of course: GEOG 651 Remote Sensing for Geographical Analysis

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ______ To: ______
   b. Withdrawal (reason): ______
   c. Cross-list with: ______

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: GEOG 361
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
GEOG	651	REMOTE SENSING GEOG ANL

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	0.00		3.00	45070100	1250	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
GEOG	651	REMOTE SENSING GEOG ANL

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	1.00		3.00		1250	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Department Head or Program Chair *(Type Name & Sign)*	Date	Chair, College Review Committee	Date 10/15/2015
Department Head or Program Chair *(Type Name & Sign)* *(if cross-listed course)*	Date	Dean of College	Date 10/15/2015

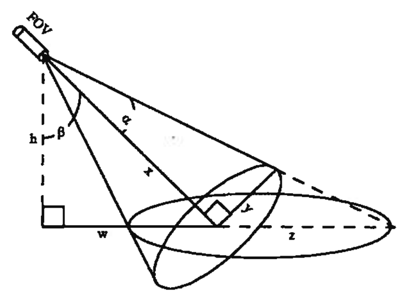
Submitted to Coordinating Board by:

Chair, GC or UCC ______ Date

Associate Director, Curricular Services ______ Date ______ Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 08/14

Syllabus: Remote Sensing for Geographical Analysis
GEOG 651
Fall 2015
Department of Geography
Texas A&M University



Time: TR 02:20 pm-03:35 pm (Sect. 600)
Room: CSA 303
Prerequisite: Graduate classification
Credit Hours: 3

Instructor: Dr. Anthony M. Filippi, Associate Professor, 3147 TAMU, Department of Geography, Texas A&M University
Office: 707B Eller O&M Bldg.
Office Hours: TR 3:45-5:15 pm and by appointment
Phone: (979) 845-5744
Fax: (979) 862-4487
Email: filippi@tamu.edu

Course Description

Catalog Description: "Provides an introduction to remote sensing fundamentals. Discussion of past, present and planned earth-observing sensors as well as technical issues involved in the collection, processing and interpretation of remote sensing images with emphasis on application to geographic problems, including geomorphology, hydrology and coastal oceanography. Prerequisite: Graduate classification."

This course covers various fundamental and some more advanced remote-sensing topics. The nature and physics of the interaction of electromagnetic radiation (EMR) with various Earth surface materials and the intervening atmosphere will be emphasized, along with a discussion of remote-sensor systems for Earth-observation. Students will also become proficient with fundamental remote-sensing digital image processing operations using a state-of-the-art remote-sensing software package.

The lecture meeting time may be apportioned to both lecture/seminar and lab issues. The time devoted to each component may vary week-by-week as required.

Learning Objectives

The material covered in this course is aligned with learning objectives in the Geographic Information Science & Technology Body of Knowledge, which was produced by the University Consortium for Geographic Information Science (UCGIS) and published by the Association of American Geographers (AAG).

The primary learning objectives of this course are as follows:

--Students will be able to articulate the fundamental knowledge base of how electromagnetic radiation (EMR) interacts with various Earth surface materials and the intervening atmosphere, and how these EMR interactions affect the facilitation of remote sensing. Thus, students will be able to describe for which remote-sensing purposes different wavelength regions of the electromagnetic spectrum are useful, as well as which wavelength regions are not useful for certain remote-sensing analyses.

--Following from the objective above, students will be able to explain the concept of spectral signatures and why they are important in the field of remote sensing.

--Students will be able to conceptually describe the various types of resolution that are important in remote sensing (i.e., spatial, spectral, radiometric, and temporal resolution), as well as how such resolutions affect selection of the most appropriate data source(s) (i.e., from which sensor(s)) for a given remote-sensing objective.

--Students will be able to describe the historical development of the field of remote sensing.

--Students will be able to explain the rudimentary elements of manual/visual image analysis/interpretation, and they will be able to effectively interpret remote-sensor images.

--Students will be able to make quantitative measurements of features/objects/entities in remote-sensor images.

--Students will be able to explain and perform fundamental digital image-processing procedures.

Required Texts:

1) Jensen, J. R., 2007, *Remote Sensing of the Environment: An Earth Resource Perspective*, 2nd Ed., Upper Saddle River, NJ: Prentice Hall, 592 pp., ISBN 0-13-188950-8.

2) Schott, J. R., 2007, *Remote Sensing: The Image Chain Approach*, 2nd Ed., New York: Oxford University Press, 688 pp., ISBN13: 978-0-19-517817-3, ISBN10: 0-19-517817-3.

Recommended Readings (Optional):
The Remote Sensing Core Curriculum: http://www.r-s-c-c.org/
Remote Sensing Tutorials: http://landsat.gsfc.nasa.gov/education/tutorials.html

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Grading Policy

Grades are assigned based on student performance on two (2) exams, laboratory exercises, and a final paper/project and presentation. Examinations will be based on the material from the lectures, textbooks and other readings, and the laboratory exercises. Make-up exams will only be available for University excused absences. Excused absences are covered in the Texas A&M University Student Rules (http://student-rules.tamu.edu), Section 7.1. If you know *a priori* (i.e., ahead of time) that you will be unable to take an exam on the scheduled date, consult the instructor prior to the exam to make alternative arrangements. An unexcused absence from an exam will yield a score of zero for that exam. Further information regarding the laboratory exercises is given below. Requirements for the final paper/project and associated presentation will be forthcoming. For each paper/project, a 10-minute presentation to the class will be required near the end of the semester. The weights for the grading schedule are as follows:

1) Midterm Exam:	25%
2) Final Exam:	30%
3) Laboratory Exercises:	25% of total grade for the course
4) Final Project/Paper:	20%

Grades will be assigned according to following scale:

A (≥90%); B (80-89%); C (70-79%); D (60-69%); and F (<60%)

Attendance

The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. As the lectures will often contain material that is not explicitly covered in the textbook, it is particularly in your interest to attend class. If you miss an exam for a University-approved reason, follow the procedures listed in Section 7.5 of the Student Rules to have your absence excused.

Please familiarize yourself with these procedures. University rules related to excused and unexcused absences are located on-line at http://student-rules.tamu.edu/rule07 (see Student Rule 7).

Laboratory Exercises

Students will work on assigned laboratory exercises in the Dept. of Geography GIS Labs, located in **Teague B009A and B009C**, as well as the other student-computing labs in the Department. There will be approximately 9-10 laboratory assignments, though due to the structure of the course, there is not a separate laboratory meeting time for this course. The laboratory exercises are intended to introduce fundamental remote-sensing concepts in a practical environment, including image interpretation and digital image processing, and they are designed to reinforce the lecture material. The functionality of the ENVI (The Environment for Visualizing Images) remote-sensing digital image processing software package will be emphasized. ENVI software (http://www.exelisvis.com/ProductsServices/ENVIProducts/ENVI.aspx) is available on all computers in the Dept. of Geography GIS lab rooms (Teague B009A and B009C). In general, approximately each week a laboratory assignment will be assigned and due the following week in class (unless specified otherwise). Scores for late labs will be deducted 10% per day they are late. If there are questions regarding the laboratory exercises, students may consult with the TA, as this course is stacked with GEOG 361:

Eric Guenther
Office: 803B Eller O&M Bldg.
Office Hours: W: 3:00-4:00 pm; Thurs: 10:00 am-12:00 pm (noon); and by appointment
Phone: 979-845-0543; **Email:** ericg9@tamu.edu

Tentative Lecture Schedule*:

Week	Topic
01	Course Introduction and Introduction to Remote Sensing; Electromagnetic Radiation Principles (Jensen, Chpt 1, 2; Schott, Chpt 1)
02	EMR Principles (continued); History of Aerial Photography and Aerial Platforms (Jensen Chpt 2, 3; Schott, Chpt 2, 3, 4) [Specific pages in Schott: Chpt 2: pp. 23-33 and pp. 47-56; Chpt 3: Sect. 3.1-3.2 (pp. 57-79); Sect. 3.3.3 (p. 85); and Sect. 3.4-3.5 (pp. 93-109); and Chpt 4: Sect. 4.1-4.3 (pp. 111-134)]
03	Aerial Photography—Vantage Point, Cameras, Filters, and Film; Visual/Manual Image Interpretation (Jensen, Chpt 4 and 5)
04	Photogrammetry (Jensen, Chpt 6)
05	Photogrammetry (continued) (Jensen, Chpt 6); Multispectral Remote-Sensing Systems (Jensen, Chpt 7; Schott, Chpt 5)
06	Multispectral Remote-Sensing Systems (continued) (Jensen, Chpt 7; Schott, Chpt 5); Geometric Correction (Lecture notes)

07	<u>**Midterm Exam**</u> and Geometric Correction (continued) (Lecture notes)
08	Thermal Infrared (TIR) Remote Sensing, Thermal Image Modeling (Jensen, Chpt 8; Schott, Chpt 14)
09	Active and Passive Microwave RS, and LIDAR (Jensen, Chpt 9 and 10)
10	Remote Sensing of Vegetation (Jensen, Chpt 11)
11	Remote Sensing of Water (Jensen, Chpt 12)
12	Urban Remote Sensing (Jensen, Chpt 13); Remote Sensing of Soils, Minerals, and Geology/Geomorphology (Jensen, Chpt 14)
13	Image Classification (Lecture notes; Schott, Chpt 9); *No lecture class meeting on Thursday 11/26/15 due to Thanksgiving Holiday*
14	Field Spectrometry (Jensen, Chpt 15)
15	**December 08, 2015: Final project/paper presentations; Final Projects/Papers Due;** Review for Final Exam
16	<u>**Final Exam**</u>

** This is a tentative list of topics. I reserve the right to make changes to the course schedule at any time.*

<u>Exam Dates</u>

Midterm Exam:	**Tuesday, October 13 (in class)**
Final Exam:	**Wednesday, December 16, 1-3 pm**

<u>Other Important Dates</u>

Thanksgiving Holiday	November 26-27 (Thursday-Friday), 2015 (no classes)
Reading day	December 10 (Thursday), 2015 (no classes)

Tentative Laboratory Topical List*:

Week 2: Introduction to RS Computing Environment; ENVI Software Overview (no lab assignment)
Week 3: Measurement and Analysis of Target Reflectance
Week 5: Image Interpretation and Analysis of Aerial and Satellite Data
Week 6: Remote-Sensing Images on the Internet
Week 7: No lab assignment (week of midterm exam)
Week 8: Geometric Correction of Remotely-Sensed Imagery
Week 9: Thermal Infrared (TIR) Image Interpretation
Week 10: Analysis and Interpretation of Radar Imagery
Week 11: Remote Sensing of Vegetation
Week 13: Remote Sensing of Water Resources
Week 14: Image Classification

** This is a tentative list of topics. I reserve the right to make changes to the course/lab schedule at any time.*

Email and eCampus

All Texas A&M students should use their TAMU email accounts when emailing the instructor. I may also send out class announcements via the TAMU email system as well. It is your responsibility to check your TAMU email account regularly. In addition, course materials will be made available on the eCampus site for this course, as well as the Dept. of Geography class server. The TAMU web address for eCampus access is:
http://ecampus.tamu.edu/
For information regarding how to access resources on eCampus, please visit the eCampus Student Help documentation at:
http://ecampus.tamu.edu/Help/Student-Help

Student Support

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

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Copyright and Plagiarism Policies

The materials used in this course are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the *Texas A&M University Student Rules*, http://student-rules.tamu.edu, under the section "Scholastic Dishonesty." For the Academic Integrity Statement and Policy and additional information, please visit: http://aggiehonor.tamu.edu
"An Aggie does not lie, cheat, or steal, or tolerate those who do."

Syllabus: Remote Sensing in Geosciences
GEOG 361
Fall 2015
Department of Geography
Texas A&M University

Time: TR 02:20 pm-03:35 pm
Rooms: CSA 303 (sect. 501 and 502) and CSA 302 (sect. 503)
Prerequisite: GEOG 332 or approval of instructor
Credit Hours: 4

Instructor: Dr. Anthony M. Filippi, Associate Professor, 3147 TAMU, Department of Geography, Texas A&M University
Office: 707B Eller O&M Bldg.
Office Hours: TR 3:45-5:15 pm and by appointment
Phone: (979) 845-5744
Fax: (979) 862-4487
Email: filippi@tamu.edu

Teaching Assistant/Lab Instructor:
Eric Guenther (sect. 501, 502, and 503)
Office: 803B Eller O&M Bldg.
Office Hours: W: 3:00-4:00 pm; Thurs: 10:00 am-12:00 pm (noon); and by appointment
Phone: 979-845-0543; **Email:** ericg9@tamu.edu

Laboratory Schedule:

Time (Section 501): R 03:55 pm-05:55 pm; **Lab Room:** TEAG B009A
Time (Section 502): W 12:40 pm-02:40 pm; **Lab Room:** TEAG B009C
Time (Section 503): M 04:10 pm-06:10 pm; **Lab Room:** TEAG B009C

Location: Department of Geography GIS Laboratory (Teague B009 suite)

Course Description

Catalog Description: "Introduction to the principles, techniques and applications of remote sensing technology in geosciences including the analysis and interpretation of airborne and spaceborne remote sensing data for studying key earth system processes. Prerequisite: GEOG 332 or approval of instructor."

This course provides and introduction to various fundamental remote sensing topics. The nature and physics of the interaction of electromagnetic radiation (EMR) with various Earth surface materials and the intervening atmosphere will be emphasized, along with a discussion of remote sensor systems for Earth-observation. Students will also become proficient with fundamental remote sensing digital image processing operations using a state-of-the-art remote sensing software package.

Learning Objectives

The material covered in this course is aligned with learning objectives in the Geographic Information Science & Technology Body of Knowledge, which was produced by the University Consortium for Geographic Information Science (UCGIS) and published by the Association of American Geographers (AAG).

The primary learning objectives of this course are as follows:

--Students will be able to articulate the fundamental knowledge base of how electromagnetic radiation (EMR) interacts with various Earth surface materials and the intervening atmosphere, and how these EMR interactions affect the facilitation of remote sensing. Thus, students will be able to describe for which remote-sensing purposes different wavelength regions of the electromagnetic spectrum are useful, as well as which wavelength regions are not useful for certain remote-sensing analyses.

--Following from the objective above, students will be able to explain the concept of spectral signatures and why they are important in the field of remote sensing.

--Students will be able to conceptually describe the various types of resolution that are important in remote sensing (i.e., spatial, spectral, radiometric, and temporal resolution), as well as how such resolutions affect selection of the most appropriate data source(s) (i.e., from which sensor(s)) for a given remote-sensing objective.

--Students will be able to describe the historical development of the field of remote sensing.

--Students will be able to explain the rudimentary elements of manual/visual image analysis/interpretation, and they will be able to effectively interpret remote-sensor images.

--Students will be able to make quantitative measurements of features/objects/entities in remote-sensor images.

--Students will be able to explain and perform fundamental digital image-processing procedures.

Required Text:

Jensen, J. R., 2007, *Remote Sensing of the Environment: An Earth Resource Perspective*, 2nd Ed., Upper Saddle River, NJ: Prentice Hall, 592 pp., ISBN 0-13-188950-8.

Recommended Readings (Optional):
The Remote Sensing Core Curriculum: http://www.r-s-c-c.org/
Remote Sensing Tutorials: http://landsat.gsfc.nasa.gov/education/tutorials.html

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Grading Policy

This course includes both lecture and laboratory components. The lecture material complements the course readings. Grades are assigned based on student performance on two (2) exams and assigned laboratory exercises. Examinations will be based on the material from the lectures, the textbook and other readings, and the laboratory exercises. Make-up exams will only be available for University excused absences. Excused absences are covered in the Texas A&M University Student Rules (http://student-rules.tamu.edu), Section 7.1. If you know *a priori* (i.e., ahead of time) that you will be unable to take an exam on the scheduled date, consult the instructor prior to the exam to make alternative arrangements. An unexcused absence from an exam will yield a score of zero for that exam. Further information regarding the laboratory exercises is given below. The weights for the grading schedule are as follows:

1) Midterm Exam:	30%
2) Final Exam:	30%
3) Laboratory Exercises:	40% of total grade for the course

Grades will be assigned according to following scale:

A (≥90%); B (80-89%); C (70-79%); D (60-69%); and F (<60%)

Attendance

The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. As the lectures will often contain material that is not explicitly covered in the textbook, it is particularly in your interest to attend class. If you miss an exam for a University-approved reason, follow the procedures listed in Section 7.5 of the Student Rules to have your absence excused. Please familiarize yourself with these procedures. University rules related to excused and unexcused absences are located on-line at http://student-rules.tamu.edu/rule07 (see Student Rule 7).

Laboratory Sections

Students will receive a separate syllabus for the laboratory section of the course. For the laboratory sections, students will meet and work on assigned laboratory exercises in the Dept. of Geography GIS Labs, located in **Teague B009A and B009C**. There will be approximately 9-10 laboratory assignments throughout the semester. The laboratory exercises are intended to introduce fundamental remote sensing concepts in a practical environment, including image interpretation and basic digital image processing, and they are designed to reinforce the lecture material. The functionality of the ENVI (The Environment for Visualizing Images) remote-sensing digital image processing software package will be emphasized. ENVI software (http://www.exelisvis.com/ProductsServices/ENVIProducts/ENVI.aspx) is available on all computers in the Dept. of Geography GIS lab rooms (Teague B009A and B009C). The teaching assistant will introduce the lab exercise during the scheduled laboratory session and will be available for additional assistance during his/her office hours (and by appointment). Laboratory assignment due dates and policies will be provided by the teaching assistant in lab. In general, approximately each week a laboratory exercise will be assigned and due the following week in class (unless specified otherwise). Scores for late labs will be deducted 10% per day they are late.

Tentative Lecture Schedule*:

Week	Topic
01	Course Introduction and Introduction to Remote Sensing; Electromagnetic Radiation Principles (Jensen, Chpt 1, 2)
02	EMR Principles (continued); History of Aerial Photography and Aerial Platforms (Jensen Chpt 2, 3)
03	Aerial Photography—Vantage Point, Cameras, Filters, and Film; Visual/Manual Image Interpretation (Jensen, Chpt 4 and 5)
04	Photogrammetry (Jensen, Chpt 6)
05	Photogrammetry (continued) (Jensen, Chpt 6); Multispectral Remote-Sensing Systems (Jensen, Chpt 7)
06	Multispectral Remote-Sensing Systems (continued) (Jensen, Chpt 7); Geometric Correction (Lecture notes)
07	**Midterm Exam** and Geometric Correction (continued) (Lecture notes)
08	Thermal Infrared (TIR) Remote Sensing, Thermal Image Modeling (Jensen, Chpt 8)
09	Active and Passive Microwave RS, and LIDAR (Jensen, Chpt 9 and 10)
10	Remote Sensing of Vegetation (Jensen, Chpt 11)

11	Remote Sensing of Water (Jensen, Chpt 12)
12	Urban Remote Sensing (Jensen, Chpt 13); Remote Sensing of Soils, Minerals, and Geology/Geomorphology (Jensen, Chpt 14)
13	Image Classification (Lecture notes); *No lab meetings the week of 11/23/15 due to Thanksgiving Holiday; No lecture class meeting on Thursday 11/26/15*
14	Field Spectrometry (Jensen, Chpt 15)
15	**December 08, 2015:** GEOG 651 graduate student final project/paper presentations; Review for Final Exam
16	**Final Exam**

** This is a tentative list of topics. I reserve the right to make changes to the course schedule at any time.*

Exam Dates

Midterm Exam:	**Tuesday, October 13 (in class)**
Final Exam:	**Wednesday, December 16, 1-3 pm**

Other Important Dates

Thanksgiving Holiday	November 26-27 (Thursday-Friday), 2015 (no classes)
Reading day	December 10 (Thursday), 2015 (no classes)

Tentative Laboratory Topical List*:

Week 1: First lab meetings (no lab assignment)
Week 2: Introduction to RS Computing Environment; ENVI Software Overview (no lab assignment)
Week 3: Measurement and Analysis of Target Reflectance
Week 5: Image Interpretation and Analysis of Aerial and Satellite Data
Week 6: Remote-Sensing Images on the Internet
Week 7: No lab meetings (week of midterm exam)
Week 8: Geometric Correction of Remotely-Sensed Imagery
Week 9: Thermal Infrared (TIR) Image Interpretation
Week 10: Analysis and Interpretation of Radar Imagery
Week 11: Remote Sensing of Vegetation
Week 13: Remote Sensing of Water Resources
Week 14: Image Classification

** This is a tentative list of topics. I reserve the right to make changes to the course/lab schedule at any time.*

Email and eCampus

All Texas A&M students should use their TAMU email accounts when emailing the instructor. I may also send out class announcements via the TAMU email system as well. It is your responsibility to check your TAMU email account regularly. In addition, course materials will be made available on the eCampus site for this course, as well as the Dept. of Geography class server. The TAMU web address for eCampus access is:
http://ecampus.tamu.edu/
For information regarding how to access resources on eCampus, please visit the eCampus Student Help documentation at:
http://ecampus.tamu.edu/Help/Student-Help

Student Support

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

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Copyright and Plagiarism Policies

The materials used in this course are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the *Texas A&M University Student Rules*, http://student-rules.tamu.edu, under the section "Scholastic Dishonesty." For the Academic Integrity Statement and Policy and additional information, please visit: http://aggiehonor.tamu.edu
"An Aggie does not lie, cheat, or steal, or tolerate those who do."

GEOSCIENCES

DEPARTMENT OF GEOGRAPHY

TEXAS A&M UNIVERSITY

Andrew Klein
Professor

October 16, 2015

TO: **Roxanna Russell**

FROM: **Andrew Klein**

RE: **GEOG Course Changes – How graduate versions differ from undergraduate versions**

For staffing and other issues, many of the Geography Department's courses in Geographic Information Science & Technology are taught as stacked undergraduate/graduate courses. In all cases, care has been taken to ensure adequate differentiation of the two versions of the course. This memo summarizes the differences for the following courses

1. GEOG 651/GEOG 361
2. GEOG 660/GEOG 390
3. GEOG 676/GEOG 392

1. GEOG 651/GEOG 361

The main difference between GEOG 651 and GEOG 361 is that the graduate students in GEOG 651 need to do a final project/paper, as well as an in-class presentation of that work, in addition to all of the requirements that GEOG 361 students need to meet. Associated with this additional assignment for GEOG 651 students, the weights for the different components of the respective courses of course differ. For GEOG 361, the weights are as follows: 1) Midterm Exam: 30%; 2) Final Exam: 30%; 3) Laboratory Exercises: 40%. And for GEOG 651, the weights are as follows: 1) Midterm Exam: 25%; 2) Final Exam: 30%; 3) Laboratory Exercises: 25%; 4) Final Project/Paper: 20%. Furthermore, GEOG 651 students are also assigned some additional readings from a more advanced remote-sensing textbook (i.e., the Schott (2007) book); these readings are not assigned to the GEOG 361 students.

2. GEOG 660/GEOG 390

The graduate version of the class GEOG 660 – Applications in GIS – requires all graduate students to complete an independent project and write it up as a research paper following the format of the *International Journal of Geographic Information Science*. This is not simply a literature-based exercise, it requires students to formalize a research question answerable using GIS which they submit as an abstract, locate GIS data sources that will form the basis of the research (also submitted for a grade) and finally completion of a research paper. In

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.147 TAMU
College Station, TX 77843-3147

Tel. 979.845.5219 Fax: 979.862.4487
klein@geog.tamu.edu
http://geography.tamu.edu

addition, graduate students are provided some leeway on two labs required by the undergraduates as it is felt that graduate students may not need as much formalized instruction as undergraduate with some of the simpler GIS techniques as they should be more self-sufficient in learning GIS software.

3. GEOG 676/GEOG 392

The graduate version has a greater grading emphasis on the semester projection while the undergraduate version has a larger emphasis on the individual labs. Each graduate student is expected to lead one of the research teams while undergraduates must only participate on a team.

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

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NOV 09 2015
GRADUATE STUDIES

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional (DDS, MD, JD, PharmD, DVM)
2. Request submitted by *(Department or Program Name)*: Department of Geography
3. Course prefix, number and complete title of course: GEOG 659 GeoDatabases

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ______ . To: ______
   b. Withdrawal (reason): ______
   c. Cross-list with: ______

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ______
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
GEOG	659	GEODATABASES

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	2.00		4.00	45070206	1250	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
GEOG	659	GEODATABASES

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	1.00		3.00		1250	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

David Cairns 10/27/15

Department Head or Program Chair *(Type Name & Sign)* Date

Chair, College Review Committee 10/15/2015 Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Dean of College 10/15/2015 Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 08/14

Geodatabases

GEOG 659

Instructor
Dr. Daniel Goldberg
Office: O&M 707F
Tel: 979-845-7141
Email: daniel.goldberg@tamu.edu
Office Hours: TBD
and by appointment

Teaching Assistants
TBD
Sections 500
Office: TBD
Email: TBD
Office Hours: TBD
Office Hours: TBD

Meeting Time and Locations

Lecture	Labs
Time: TBD	500 – TBD
Room: TBD	Room: TBD

Class web site

Updates to the lecture and lab syllabi as well as other course materials will be made available on the course website. It can be accessed on ELearning at http://ecampus.tamu.edu.

Course Description

This class is an introduction to spatial data models, spatial database design and management, and the use of spatial databases and models within Geographic Information Systems. This lab-oriented course covers basic data modeling, techniques and best practices for designing spatial databases, and the application in spatial databases in the GIS analysis and modeling. This course introduces students to database setup, management, and utilization in the development data-rich GIS applications and services.

Email

All Texas A&M students should use their Texas A&M University email accounts when emailing the instructor and teaching assistants. I may also send out class announcements via the University email system as well. It is your responsibility to check your official TAMU email account regularly.

Learning Outcomes

This course is designed to introduce students to the basics of data modeling within the context of industry-standard spatial database systems. Through hands-on experience, students will learn how to convert a real-world problem into components that can be represented within a spatial database. Students will learn to setup, administer, and utilize industry-standard database platforms such as Microsoft SQL Server in order to design, implement, operationalize, and deploy a Geographic Information System (GIS) data-driven solution to a real-world problem. This course will provide students with a solid foundation in design, population, and maintenance of spatial databases as well as a basic knowledge of how to utilize these data models in GIS applications.

The course will start with an introduction to fundamental data modeling techniques inside and outside a GIS including Entity-Relationship (ER) diagrams and the "Normal Forms" of well-designed databases. The course will next cover hands-on installation of industry-standard spatial database platforms such as SQL Server and the use of these systems within commercial GIS packages such as ArcGIS. Students will learn and employ introductory structure query language (SQL) to access and manipulate data from spatial databases as they obtain the skill necessary to integrate spatial data models and databases within GIS projects. The course will include a lecture component where theoretical issues are covered and lab-based exercises where students have the opportunity to practice setting up, managing, and implementing these techniques and technologies.

At the end of this class, each student will be able to:

1) Design well-formed simple database models, using appropriate design techniques, and be able to implement such designs using spatial relational database management systems (RDBMS);
2) Setup and administer industry-standard database servers;
3) Use SQL to establish, connect to, and interrogate spatial databases;
4) Use ArcGIS to create, connect to, populate, and utilize simple geodatabases;
5) Critically assess the limitations of conventional database structures as a means of storing spatial data;
6) Critically assess current advances in database design for geographical phenomena; and
7) Develop data models and accompanying spatial RDBMS implementations necessary for managing spatial data in real-world scenarios.
8) Lead a team of developers in the execution of a customer-driven database project.

GIS Software

This course will utilize the ArcGIS™ suite of software developed by ESRI including ArcServer. Installable copies may be obtained from the instructor or teaching assistants.

Database Software

This course will utilize the Microsoft SQL Server™ suite of software. Installable copies may be downloaded from the Microsoft Dream Spark program available to TAMU students.

Development Software

This course will utilize the SQL programming language which can be developed with basic text editing software as well as within Microsoft SQL Server.

Lecture Texts

Required Lecture Texts

Required: Yeung A, Hall G, 2007. **Spatial Database Systems: Design, Implementation and Project Management**. 1st ed, Springer. 554 pp.

Required: Zeiler M, 2010. **Modeling Our World**. 2nd ed, Esri Press. 308 pp.

Additional readings and materials will be drawn from websites, handouts, and online resources.

Class Attendance

The university views class attendance as the responsibility of the individual student. Information on University attendance rules can be found at http://student-rules.tamu.edu/rule07. As described below, a portion of each student's grade is based on in-class participation. This will be judged by the instructor as regular attendance and active engagement on a consistent basis that contributes to the class in some manner.

Lab attendance is not required, but considered essential for successful completion of the course.

Grading

Your grade in this class will be based as described below:

A. **Lecture**	**30%**	
Midterm 1		10%
Midterm 2		10%
Final Exam		10%
B. **Lab**	**20%**	
Exercises		20%
B. **Homework**	**5%**	
Exercises		5%
C. **Project**	**40%**	
Project Proposal		10%
Project Status Report 1		2.5%
Project Status Report 2		2.5%
Final Project		25%
D. **Participation**	**5%**	
Class Participation		5%

The grading scale for this course is as follows:

≥90% A, 80-89% B, 70-79% C, 60-69% D, <60% F

An average performance in the class will earn a satisfactory grade.

Makeups

Makeups for the Exam and other work will be allowed only for University excused absences and will be administered in compliance with university rules. Excused absences are covered in the Texas A&M University Student Rules (http://student-rules.tamu.edu)

Cellular Telephones

As a courtesy to the instructor and other students please turn off all cellular telephones before class.

Labs

Labs are an important and integral portion of the course. There is simply no way to learn about spatial database setup, programming, or maintenance without spending considerable time in lab working on with these data and services. While the scheduled lab time is two hours, labs will typically require time outside of the scheduled lab hours to complete.

Labs will be due at the beginning of the following lab unless otherwise indicated. Scores for late labs will be deducted 10% per day until they are turned in, up to one week. After one week late, labs will not be accepted for credit. It is your responsibility for keeping up with lab assignments. You should talk to your Teaching Assistant and or the instructor BEFORE late labs become a problem.

Final Project

Throughout the semester, graduate students lead a team of up to 4 undergraduate students will work in teams of up to 4 to apply the spatial database concepts learned in lectures with the hands-on experience gained in labs to develop a data model and database implementation for a "real-world" problem using spatial databases. Graduate students will be responsible for identifying a "customer" who needs a GIS program developed to extend or automate a commercial GIS platform (e.g., ArcGIS). Graduate students will work with the customer to identify the requirements for the system, supervise the undergraduate team members, and assist in the development of the final product.

Proposal Pitches

Each graduate student will present a 5 minute presentation of their idea for a project to the class. This will pitch will include enough details to recruit undergraduate students to work on the grad student's project. Undergraduate students will choose project teams based on their willingness to work on the project pitched by the graduate student. Graduate students who receive an insufficient number of students to complete their project will work on another graduate student's project.

Project Proposal

Each student group will submit a 1-page synopsis of the proposed topic and present a 5 minute description. This synopsis will include the problem the group will attempt to address including a set of requirements, the methods and data that will be used to accomplish their goals, and a development roadmap. The graduate student will be responsible for communicating with the "customer" to ensure that the project can be completed within the timeframe and expertise of the project team, and that the end product will responsive to the needs of the "customer".

Project Status Reports

Each student group will present two short presentations during the semester that outline project progress. Students will be graded based on progress toward project completion.

Project Deliverables

Each student group will: a) design a data model sufficient for implementing a spatial database for their real-world problem; b) implement the data model within a spatial database system; c) populate the spatial data model and utilize it within ArcGIS or another GIS; c) deliver a report summarizing the problem they were trying to address, the tools, methods, and data used to accomplish their goals, and reflections on how well their implementation meets the requirements set forth; and d) demonstrate a hands-on working version of their prototype implementation to the class during a project presentation.

Grading

Each student will be graded on the quality of the team project. In addition, each student's grade will be based in part on a score they receive from their teammates evaluating their contribution to the overall project. Students are advised to consult with the teaching assistant and/or professor in advance if issues of team member performance becomes an issue.

Student Support

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room B118 of Cain Hall. The phone number is 845-1637.

Services for Students with Disabilities

Room B118 of Cain Hall, 845-1637 or on the web at http://disability.tamu.edu/

There are numerous other student support organizations on campus including

Student Counseling Service

Cain Hall, 845-4427, http://scs.tamu.edu
Student Counseling Helpline 5:00pm-8:00am: 845-2700

University Writing Center

Suite 1.214 of the Evans Library, 458-1455, http://writingcenter.tamu.edu/

Scholastic Dishonesty

It is our hope that academic dishonesty will not be a problem in this class. Texas A&M does, however, have a *Scholastic Dishonesty* policy to which both students and faculty must comply. If you have any questions about the University's Scholastic Dishonesty policy please review the Student Rules or see me. The Aggie Honor program is the new program that will handle all cases of academic dishonesty. http://www.tamu.edu/aggiehonor

All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, http://student-rules.tamu.edu, under the section "Scholastic Dishonesty."

"Aggies don't lie, cheat, or steal, nor tolerate those that do"

A tentative course schedule follows on the next page.

Course Schedule

Week	Lecture Topics	Exams
1	Introduction to the Class & Spatial Databases	
2	Data Modeling	
3	Data Modeling & Geodatabases	
4	ER Diagrams	**PROPOSAL PITCHES**
5	Database Normal Forms	**PROPOSAL PRESENTATIONS**
6	Structured Query Language (SQL)	**MIDTERM 1**
7	MS SQL Server	**PROPOSAL STATUS REPORT I**

I reserve the right to make changes to the course schedule

Course Schedule Cont.

Week	Lecture Topics	Exams
8	Indexing & Performance	
9	Enterprise Spatial Databases	
10	Service Oriented Architectures	MIDTERM 2
11	Publishing & Consuming Spatial Data	PROPOSAL STATUS REPORT II
12	Standards & Metadata	
13	Versioning & Maintenance	NO CLASS (THANKSGIVING)
14	Legal Issues, Trends, and the Future of Spatial Databases	PROJECT PRESENTATIONS & REPORT
TBD		FINAL EXAM

I reserve the right to make changes to the course schedule

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

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NOV 12 2015
GRADUATE STUDIES

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional (DDS, MD, JD, PharmD, DVM)
2. Request submitted by *(Department or Program Name)*: Department of Geography
3. Course prefix, number and complete title of course: GEOG 660 Applications in GIS

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: GEOG 390; STAT 651 and STAT 652 To: Graduate classification
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☐ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: GEOG 390
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:
   Integrates spatial analysis and modeling with GIS for environmental and socio-economic applications
10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):
   Basic concepts of design, planning and implementation of geographic information systems.
11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
GEOG	660	APPLICATIONS IN GIS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	0.00		3.00	11040100	1250	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
GEOG	660	APPLICATIONS IN GIS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	1.00		3.00		1250	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Department Head or Program Chair *(Type Name & Sign)*	Date	Chair, College Review Committee	Date 10/15/2015
Department Head or Program Chair *(Type Name & Sign)* *(if cross-listed course)*	Date	Dean of College	Date 10/15/2015
Submitted to Coordinating Board by:		Chair, GC or UCC	Date
Associate Director, Curricular Services		Date	Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.

TEXAS A&M UNIVERSITY SYLLABUS

Applications in GIS

GEOG 660

Instructor

Dr. Andrew G. Klein
Office: O&M 707D
Email: klein@tamu.edu
Tel: 979-845-5219
Office Hours
Tues and Thur 1:30 – 3:30
or by appointment

Teaching Assistants

Ms. Iliyana Dobreva
Sections 501, 502 & 503
Office: O&M 807
Email: iliyanad@tamu.edu
Office Hours: Wed 12:00 – 3:00*

Mr. Panshu Zhao
Sections: 504, 505, & 506
Office: O&M 807
Email: rochesterzhao@tamu.edu
Office Hours: Wed 1:40 – 2:40 Thur 1:30 --3 3:30*

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Course Description

This class is an introduction to Geographic Information Systems (GIS). This lab-oriented course covers the guiding principles behind the various facets of GIS including spatial data types, database development and management, map projections, spatial analysis, and cartographic production.

Meeting Time and Locations

Lecture

Tuesday and Thursday 3:55-5:10
Halbouty 101

While there is no scheduled you are encouraged to attend one of the labs scheduled for GEOG 390. There may not be a computer available to you in all sections which are listed to the left

Labs

501 – Mon 5:45 – 7:45 Teague 009 A
502 – Tue 08:30 – 10:50 Teague 009A
503 – Mon 11:30 – 1:30 Teague 009A
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Class eCampus Site

There are an extensive web-based materials associated with this class. Updates to the syllabus as well as other course materials will be made available on course eCampus site. I strongly urge you to use the resources made available to you.

GIS Software

This course will utilize the ArcGIS™ suite of software developed by ESRI including both ArcGIS Desktop and ArcGIS online.

Textbooks and Readings

Lecture Text

Bolstad, P. 2012. **GIS Fundamentals: A First Text on Geographic Information Systems.** 4th ed. Ann Arbor: XanEdu. 688 pp. ISBN: 9780971764736.

Lab Manual

Price, M. 2016. **Mastering ArcGIS**. 7th ed. New York. McGraw-Hill. ISBN: 9780078095146

Additional Readings will be drawn from the following and other sources

The *National Center for Geographic Information & Analysis (NCGIA) Core Curriculum in GIScience* available at http://www.ncgia.ucsb.edu/giscc/

The *ESRI Virtual Campus* which can be found at http://campus.esri.com/.

The Geographers Craft web site developed by Peter Dana found at http://www.colorado.edu/geography/gcraft/contents.html

An excellent introductory GPS website is provided by *Trimble Navigation* and can be found at http://www.trimble.com/gps/

The TAMU library has some good tutorial on common GIS tasks as well at http://guides.library.tamu.edu/adding_xy_data_arcmap

Class Attendance

The university views class attendance as the responsibility of the individual student. However, as stated in the student rules (http://student-rules.tamu.edu/rule07), students are expected to attend class and to complete all assignments. It has been my experience that failure to attend class, especially labs, is a major cause of poor performance in the class.

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As a courtesy to the instructor and other students please turn off all cellular telephones before the class begins. I find it extremely impolite to be interrupted by a cellular telephone when I am lecturing.

Email

All Texas A&M students should use their university-associated email accounts when emailing the instructor and teaching assistants. I may also send out class announcements via the university's email system as well. It is your responsibility to check your email account regularly.

Grading

Your grade in this class will be based on equally on the lecture and labs as described below. *Dates and times of examinations are listed on the class schedule at the end of the syllabus. The 3rd examination will be given online via eCampus during the week of December 7th.*

A. Lecture	**450 pts**
Exam 1	150 pts
Exam 2	150 pts
Exam 3	150 pts
B. Lab	**400 pts**
C. Individual Project Research Paper	**150 pts**

A major portion of the course grade is a written research paper describing your independent project. The paper will be written in a style and length appropriate for a GISci journal. The papers will follow the format of *the International Journal Geographic Information Science*. The due dates are listed in the course schedule at the end of the syllabus.

A breakdown of the grading of the research papers presented below. Detailed grading rubrics for each graded component will be provided during the course of the semester and will provide explicit grading schema for each assignment.

1. ***Abstract*** — 15 pts

   Each student will prepare a 250 word abstract detailing you intended research project.

2. ***Data Sources*** — 30 pts

   Each student will prepare a comprehensive initial list of the data sources identified for the project. This will help me make sure you have identified suitable and sufficient sources to undertake your proposed research.

3. ***Final Paper*** — 105 pts

   Each student will compose a final draft of the manuscript presented as a camera-ready manuscript using a provided Word template.

D. Attend GIS Day Events — **10 pts extra credit**

Each student can earn 1% extra credit by electronically providing to the instructor a link to a source to GIS data available online. In addition to the link, a short description of the type of GIS data available from the site should be provided and what audience would be interested in this data. Selected examples will be presented in class and provided as links on the class web site. ***Please provide evidence of attendance by November 27th.***

It the past my grading scheme has approximately followed these cutoffs.
≥90% A, 80-89% B, 70-79% C, 60-69% D, <60% F

An average performance in the class will earn a satisfactory grade

Makeups for the Exam will be allowed only for University excused absences and will be administered in compliance with university rules. Excused absences are covered in the Texas A&M University Student Rules (http://student-rules.tamu.edu)

Labs

Labs are an important and integral portion of the course. There is simply no way to learn about GISci (Geographic Information Science) without spending considerable time in lab working with on GIS problems. While the scheduled lab time is two hours, labs will typically require time outside of the scheduled lab hours to complete.

It is my expectation that students will attend the full lab session unless your TA instructs differently. This is your scheduled time when the TAs are available to assist with the course. If you do not take advantage of this lab time, it is not reasonable to expect the TAs to assist outside of their scheduled office hours. So please use time in lab to your advantage.

In general, labs will be due one week after they are assigned. Scores for late labs will be deducted 10% per day they are late. Labs turned in one week after the due date will receive no credit. *However, each student will be allowed to turn one lab in late without penalty.*

In past years, failure to complete labs in a timely manner has been the primary cause for poor performance in this class. It is your responsibility for keeping up with lab assignments. You should talk to your Teaching Assistant and or the instructor BEFORE late labs become a problem.

Learning Objectives

The content of this GIS course is aligned with the Learning Objectives set forth in the ***Geographic Information Science & Technology Body of Knowledge.*** This is a comprehensive document that *"specifies what aspiring geospatial professionals need to know and be able to do."* It was developed by the University Consortium for Geographic Information Science (UCGIS). For more information visit http://www.ucgis.org/priorities/education/modelcurriculaproject.asp.

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In general, it is my expectation that at the end of the class each student will be able to:

1) Explain the basic properties of vector and raster GIS data models and list examples of each type in common use in the GIS community;
2) Define what is meant by a map projection, describe why they are important in GIS and be able to select an appropriate map projection depending on need;
3) Apply appropriate basic GIS analytical techniques within industry-standard GIS software to solve spatial problems; and
4) Prepare maps that utilize basic cartographic principles to effectively convey the results of GIS analysis to varied audiences.

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It is my hope that academic dishonesty will not be a problem in this class. Texas A&M does, however, have a *Scholastic Dishonesty* policy to which both students and faculty must comply. If you have any questions about the University's Scholastic Dishonesty policy please review the Student Rules or see me. The Aggie Honor program is the new program that will handle all cases of academic dishonesty. http://www.tamu.edu/aggiehonor

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As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even is you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, http://student-rules.tamu.edu, under the section "Scholastic Dishonesty."

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Student Support

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room B118 of Cain Hall. The phone number is 845-1637.

Services for Students with Disabilities
Room B118 of Cain Hall, 845-1637 or on the web at http://disability.tamu.edu/

There are numerous other student support organizations on campus including

Center for Academic Excellence and Academic Assistance Clearinghouse
525 Blocker, 845-2724, http://www.tamu.edu/cae

Student Counseling Service
Cain Hall, 845-4427, http://scs.tamu.edu
Student Counseling Helpline 5:00pm-8:00am: 845-2700

University Writing Center
Suite 1.214 of the Evans Library, 458-1455, http://writing.tamu.edu

Please do not hesitate to ask me if you have any problems or if you are having any trouble in the class, see me before it becomes a *problem.*

Course Schedule

Week	Lecture and Lab Topics	Readings *optional readings are in italics*
1 September 1 & 3 **An Introduction to Geographic Information Systems**	Introduction to the Class GIS Basics The Nature of Geography Inquiry	**Bolstad** Chapter 1 & 15 **NCGIA** *What is GIS?* *http://www.ncgia.ucsb.edu/giscc/units/u002/* *Asking Geographic Questions* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u007/*
	Getting to know GIS using ArcGIS and ArcGIS online Lab 1: Online Mapping with ArcGIS	**Mastering ArcGIS** Introduction & Chapters 1 & 2
2 September 8 & 10 **The Map as a Geographic Information Model**	Map Scale Map Abstraction and Scale The Shape of the Earth Latitude/Longitude Geographic Coordinate Systems	**Bolstad** Chapter 3 **NCGIA** *Maps as Representations of the World* *Position on the Earth* *http://www.ncgia.ucsb.edu/giscc/units/u012/* *The Shape of the Earth* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u015/u015_f.html* *Latitude and Longitude* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u014/u014_f.html*
	Displaying Data in ArcGIS Lab 2: Texas Highway Map	**Mastering ArcGIS** Chapters 2 & 4 *By the start of the 3rd lab, my expectation is that you can successfully navigate around in ArcGIS and the lab instructors can focus on teaching GISsci concepts rather than ArcGIS button pushing*
3 September 15 & 17 **Cartography for GIS**	Basic Cartography Concepts **Abstract Due Sept. 17th**	**Bolstad** Chapter 4 pp. 131-140 & 164-177 plus handouts
	Employing Good Cartographic Design in ArcGIS Optional Lab 2b: Texas Highway Map - Revisited	**Mastering ArcGIS** Chapter 5

4 September 22 & 24 **Map Projections Theory and Applications**	Datums Map Projections Coordinate Transformations	**Bolstad** Chapter 3 **NCGIA** Coordinate System Overview http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u013/u013_f.html **The Geographer's Craft** Coordinate Systems Geographic Datums Map Projections all at… http://www.colorado.edu/geography/gcraft/notes/coordsys/coordsys_f.html
	Map projections in ArcGIS Lab 3: Nunavut Mapping	**Mastering ArcGIS** Chapter 3
5 September 29 & October 1 **GIS Data Models** ***Vector***	A brief raster/vector comparison Fundamentals of vector data models Common vector models in use today Map Digitization Guest Lecture from the Map Library on how to Georeference a scanned map	**Bolstad** Chapter 2 **NCGIA** *Fundamentals of Data Storage* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u037/* *TINS* *http://www.ncgia.ucsb.edu/giscc/units/u056/* **NCGIA** *Handling Uncertainty* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u187/u187_f.html* *Detecting and Evaluating Errors* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u099/u099_f.html*
	Georeferencing in ArcGIS Lab 4: Georeferencing an aerial photograph	**Bolstad** Chapter 4 pp 140-164 Georeferencing Handout and TAMU online tutorial http://guides.library.tamu.edu/georeferencing_arcmap

6 October 6 & 8 **GIS Data Models** ***Raster***	Fundamentals of raster data models Representing Continuous Fields Common raster models in use today Digital Elevation Models Raster Imagery Statistical Surfaces **Exam 1 will be on October 8th** **Data Sources due on October 6th**	**Bolstad** Chapters 2 & 7 **NCGIA** *Representing Fields* *http://www.ncgia.ucsb.edu/giscc/units/u054/* *Rasters* *http://www.ncgia.ucsb.edu/giscc/units/u055/*
	Digitizing and Editing a Map Lab 5: Ecoregions of Texas	**Bolstad** Chapter 4 pp 140-164 14 pp. 565-580 **Mastering ArcGIS** Chapters 7 & 12
7 October 13 & 15 **GIS Databases and Attribute Queries**	An Introduction to Relational Database Theory Attribute Queries	**Bolstad** Chapter 8 **NCGIA** *Information Organization* *http://www.ncgia.ucsb.edu/giscc/units/u051/* *Non Spatial Database Models* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u045* **Bolstad** Chapter 9 pp. 347-358 **NCGIA**
	☺ No Lab for Graduate Students ☺	
8 October 20 & 22 **Basic Spatial Analysis**	Basic Spatial Analysis *Exploratory Data Analysis* *Flowcharting and Modelbuilder* *Spatial Selection* *Set and Boolean Algebra* *Classification/Reclassification* *Buffering* *Cartographic Overlay* *Network Analysis* *Dasymetric Mapping*	**Bolstad** Chapter 9 **NCGIA** *Exploratory Data Analysis* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u128/u128_f.html* *The Polygon Overlay Option* *http://www.ncgia.ucsb.edu/giscc/units/u186/*
	Spatial Joins and Queries Lab 6: Hydrocarbons at McMurdo Station II	**Mastering ArcGIS** Chapters 6 & 8 What is Geoprocessing? http://video.esri.com/watch/634/what-is-geoprocessing_question_

<table>
<tr><td rowspan="2">9
October 27 & 29

Spatial Analysis</td><td>Spatial Analysis
Cartographic Overlay
Network Analysis
Dasymetric Mapping</td><td>Bolstad
Chapter 9</td></tr>
<tr><td>The Cartographic Overlay Process

Lab 7: Site Selection in College Station</td><td>Mastering ArcGIS
Chapter 10
ModelBuilder – Getting Started
http://video.esri.com/watch/1817/modelbuilder-_dash_-getting-started</td></tr>
<tr><td rowspan="2">10
November 3 & 5

Raster Analysis</td><td>Basic Raster Analysis
Map Algebra
Raster Overlay
Local, Focal, Zonal and Global Functions</td><td>Bolstad
Chapter 10</td></tr>
<tr><td>Lab 8: An Introduction to Python programming and ArcGIS</td><td>Handouts
and
Free ESRI online training
Python for Everyone</td></tr>
<tr><td rowspan="2">11
November 10 & 12

Terrain Analysis and Visualization</td><td>Terrain Analysis
Slope/Aspect
Viewsheds
Hydrologic Functions
Exam 2 will be November 10th</td><td>Bolstad
Chapter 11</td></tr>
<tr><td>Lab 9: Raster Processing using Python</td><td>Mastering ArcGIS
Chapter 11</td></tr>
<tr><td rowspan="2">12
November 17 & 19

Spatial Analysis and Modeling</td><td>Cartographic Modeling
Simple Spatial Models
Stochastic Models
Process-based Models
Spatio-Temporal Models</td><td>Bolstad
Chapter 13</td></tr>
<tr><td>Developing a Cartographic Model
Lab 10: Cartographic Modeling</td><td>Mastering ArcGIS
Chapter 10</td></tr>
<tr><td rowspan="2">13
November 24

Spatial Estimation and Interpolation</td><td>Interpolation
Kriging
Hotspots</td><td>Bolstad
Chapter 12
NCGIA
http://www.ncgia.ucsb.edu/giscc/units/u130/</td></tr>
<tr><td colspan="2">☺ No Lab ☺</td></tr>
<tr><td rowspan="2">14
December 1 & 3

Wrap Up</td><td>Future Directions in GISci

Final Report Due December 4th</td><td>TBD</td></tr>
<tr><td colspan="2">☺ No Lab ☺</td></tr>
<tr><td>December 8th</td><td colspan="2">Class Wrap Up
Exam 3 will be administered online the week of December 7th</td></tr>
</table>

I reserve the right to make changes to the course schedule

TEXAS A&M UNIVERSITY

SYLLABUS

Principles of GIS

GEOG 390

Instructor

Dr. Andrew G. Klein
Office: O&M 707D
Email: klein@tamu.edu
Tel: 979-845-5219
Office Hours
Tues and Thur 1:30 – 3:30
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Course Description

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A. Lecture		**50%**
Exam 1	150 pts	
Exam 2	150 pts	
Exam 3	200 pts	
B. Lab		**50%**
Exercises	420 pts	
Lab Final	80 pts	

C. GIS Data Source — **10 pts** extra credit

Each student can earn 1% extra credit by electronically providing to the instructor a link to a source to GIS data available online. In addition to the link, a short description of the type of GIS data available from the site should be provided and what audience would be interested in this data. Selected examples will be presented in class and provided as links on the class web site. ***All Data Sources are due by December 4th***.

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Course Schedule

Week	Lecture and Lab Topics	Readings *optional readings are in italics*
1 September 1 & 3 **An Introduction to Geographic Information Systems**	Introduction to the Class GIS Basics The Nature of Geography Inquiry	**Bolstad** Chapter 1 & 15 **NCGIA** *What is GIS?* *http://www.ncgia.ucsb.edu/giscc/units/u002/* *Asking Geographic Questions* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u007/*
	Getting to know GIS using ArcGIS and ArcGIS online Lab 1: Online Mapping with ArcGIS	**Mastering ArcGIS** Introduction & Chapters 1 & 2
2 September 8 & 10 **The Map as a Geographic Information Model**	Map Scale Map Abstraction and Scale The Shape of the Earth Latitude/Longitude Geographic Coordinate Systems	**Bolstad** Chapter 3 **NCGIA** *Maps as Representations of the World* *Position on the Earth* *http://www.ncgia.ucsb.edu/giscc/units/u012/* *The Shape of the Earth* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u015/u015_f.html* *Latitude and Longitude* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u014/u014_f.html*
	Displaying Data in ArcGIS Lab 2: Texas Highway Map	**Mastering ArcGIS** Chapters 2 & 4 *By the start of the 3rd lab, my expectation is that you can successfully navigate around in ArcGIS and the lab instructors can focus on teaching GISsci concepts rather than ArcGIS button pushing*
3 September 15 & 17 **Cartography for GIS**	Basic Cartography Concepts	**Bolstad** Chapter 4 pp. 131-140 & 164-177 plus handouts
	Employing Good Cartographic Design in ArcGIS Lab 3: Texas Highway Map - Revisited	**Mastering ArcGIS** Chapter 5

4 September 22 & 24 **Map Projections Theory and Applications**	Datums Map Projections Coordinate Transformations	**Bolstad** Chapter 3 **NCGIA** Coordinate System Overview http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u013/u013_f.html **The Geographer's Craft** Coordinate Systems Geographic Datums Map Projections all at... http://www.colorado.edu/geography/gcraft/notes/coordsys/coordsys_f.html
	Map projections in ArcGIS Lab 4: Nunavut Mapping	**Mastering ArcGIS** Chapter 3
5 September 29 & October 1 **GIS Data Models *Vector***	A brief raster/vector comparison Fundamentals of vector data models Common vector models in use today Map Digitization Guest Lecture from the Map Library on how to Georeference a scanned map	**Bolstad** Chapter 2 **NCGIA** *Fundamentals of Data Storage* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u037/* *TINS* *http://www.ncgia.ucsb.edu/giscc/units/u056/* **NCGIA** *Handling Uncertainty* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u187/u187_f.html* *Detecting and Evaluating Errors* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u099/u099_f.html*
	Georeferencing in ArcGIS Lab 5: Georeferencing an aerial photograph	**Bolstad** Chapter 4 pp 140-164 Georeferencing Handout and TAMU online tutorial http://guides.library.tamu.edu/georeferencing_arcmap

6 October 6 & 8 **GIS Data Models** ***Raster***	Fundamentals of raster data models Representing Continuous Fields Common raster models in use today Digital Elevation Models Raster Imagery Statistical Surfaces **Exam 1 will be on October 8th**	**Bolstad** Chapters 2 & 7 **NCGIA** *Representing Fields* *http://www.ncgia.ucsb.edu/giscc/units/u054/* *Rasters* *http://www.ncgia.ucsb.edu/giscc/units/u055/*
	Digitizing and Editing a Map Lab 6: Ecoregions of Texas	**Bolstad** Chapter 4 pp 140-164 14 pp. 565-580 **Mastering ArcGIS** Chapters 7 & 12
7 October 13 & 15 **GIS Databases and Attribute Queries**	An Introduction to Relational Database Theory Attribute Queries	**Bolstad** Chapter 8 **NCGIA** *Information Organization* *http://www.ncgia.ucsb.edu/giscc/units/u051/* *Non Spatial Database Models* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u045* **Bolstad** Chapter 9 pp. 347-358 **NCGIA**
	Attribute Tables and Queries Lab 7: Hydrocarbons at McMurdo Station I	**Mastering ArcGIS** Chapters 6 & 8 *Having fun with tables and reports* *http://video.esri.com/watch/1920/fundamentals-having-fun-with-tables-and-reports*
8 October 20 & 22 **Basic Spatial Analysis**	Basic Spatial Analysis *Exploratory Data Analysis* *Flowcharting and Modelbuilder* *Spatial Selection* *Set and Boolean Algebra* *Classification/Reclassification* *Buffering* *Cartographic Overlay* *Network Analysis* *Dasymetric Mapping*	**Bolstad** Chapter 9 **NCGIA** *Exploratory Data Analysis* *http://www.ncgia.ucsb.edu/education/curricula/giscc/units/u128/u128_f.html* *The Polygon Overlay Option* *http://www.ncgia.ucsb.edu/giscc/units/u186/*
	Spatial Joins and Queries Lab 8: Hydrocarbons at McMurdo Station II	**Mastering ArcGIS** Chapters 6 & 8 What is Geoprocessing? http://video.esri.com/watch/634/what-is-geoprocessing_question

9 October 27 & 29 **Spatial Analysis**	Spatial Analysis *Cartographic Overlay* *Network Analysis* *Dasymetric Mapping*	**Bolstad** Chapter 9
	The Cartographic Overlay Process Lab 9: Site Selection in College Station	**Mastering ArcGIS** Chapter 10 ModelBuilder – Getting Started http://video.esri.com/watch/1817/modelbuilder - dash -getting-started
10 November 3 & 5 **Raster Analysis**	Basic Raster Analysis *Map Algebra* *Raster Overlay* *Local, Focal, Zonal and Global Functions*	**Bolstad** Chapter 10
	Lab 10: An Introduction to Python programming and ArcGIS	Handouts and Free ESRI online training Python for Everyone
11 November 10 & 12 **Terrain Analysis and Visualization**	Terrain Analysis *Slope/Aspect* *Viewsheds* *Hydrologic Functions* **Exam 2 will be November 10th**	**Bolstad** Chapter 11
	Lab 11: Raster Processing using Python	**Mastering ArcGIS** Chapter 11
12 November 17 & 19 **Spatial Analysis and Modeling**	Cartographic Modeling Simple Spatial Models Stochastic Models Process-based Models Spatio-Temporal Models	**Bolstad** Chapter 13
	Developing a Cartographic Model Lab 12: Cartographic Modeling	**Mastering ArcGIS** Chapter 10
13 November 24 **Spatial Estimation and Interpolation**	Interpolation Kriging Hotspots	**Bolstad** Chapter 12 **NCGIA** *http://www.ncgia.ucsb.edu/giscc/units/u130/*
	☺ No Lab ☺	
14 December 1 & 3 **Wrap Up**	Future Directions in GISci	TBD
	FINAL LAB EXAMINATION	
December 8th	Class Wrap Up **Exam 3 will be administered online the week of December 7th**	

I reserve the right to make changes to the course schedule

GEOSCIENCES

DEPARTMENT OF GEOGRAPHY

Andrew Klein
Professor

TEXAS A&M UNIVERSITY

RECEIVED
NOV 12 2015
GRADUATE STUDIES

October 16, 2015

TO: **Roxanna Russell**

FROM: **Andrew Klein**

RE: **GEOG Course Changes – How graduate versions differ from undergraduate versions**

For staffing and other issues, many of the Geography Department's courses in Geographic Information Science & Technology are taught as stacked undergraduate/graduate courses. In all cases, care has been taken to ensure adequate differentiation of the two versions of the course. This memo summarizes the differences for the following courses

1. GEOG 651/GEOG 361
2. GEOG 660/GEOG 390
3. GEOG 676/GEOG 392

1. GEOG 651/GEOG 361

The main difference between GEOG 651 and GEOG 361 is that the graduate students in GEOG 651 need to do a final project/paper, as well as an in-class presentation of that work, in addition to all of the requirements that GEOG 361 students need to meet. Associated with this additional assignment for GEOG 651 students, the weights for the different components of the respective courses of course differ. For GEOG 361, the weights are as follows: 1) Midterm Exam: 30%; 2) Final Exam: 30%; 3) Laboratory Exercises: 40%. And for GEOG 651, the weights are as follows: 1) Midterm Exam: 25%; 2) Final Exam: 30%; 3) Laboratory Exercises: 25%; 4) Final Project/Paper: 20%. Furthermore, GEOG 651 students are also assigned some additional readings from a more advanced remote-sensing textbook (i.e., the Schott (2007) book); these readings are not assigned to the GEOG 361 students.

2. GEOG 660/GEOG 390

The graduate version of the class GEOG 660 – Applications in GIS – requires all graduate students to complete an independent project and write it up as a research paper following the format of the *International Journal of Geographic Information Science*. This is not simply a literature-based exercise, it requires students to formalize a research question answerable using GIS which they submit as an abstract, locate GIS data sources that will form the basis of the research (also submitted for a grade) and finally completion of a research paper. In

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3147 TAMU
College Station, TX 77843-3147

Tel. 979.845.5219 Fax: 979.862.4487
klein@geog.tamu.edu
http://geography.tamu.edu

addition, graduate students are provided some leeway on two labs required by the undergraduates as it is felt that graduate students may not need as much formalized instruction as undergraduate with some of the simpler GIS techniques as they should be more self-sufficient in learning GIS software.

3. GEOG 676/GEOG 392

The graduate version has a greater grading emphasis on the semester projection while the undergraduate version has a larger emphasis on the individual labs. Each graduate student is expected to lead one of the research teams while undergraduates must only participate on a team.

RECEIVED

NOV 09 2015

GRADUATE STUDIES

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Geography
3. Course prefix, number and complete title of course: GEOG 661 Digital Image Processing and Analysis

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: GEOG 332 To: GEOG 651 or equivalent or approval of instructor
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course:
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:
   Principles of georectifying, processing, manipulating and interpreting data collected by nonphotographic sensors concentrating on solid earth resources using Thematic Mapper with supplemental data from the SPOT satellite.
10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):
    Principles of georectifying, processing, manipulating and interpreting data collected by nonphotographic sensors concentrating on solid earth resources
11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
GEOG	661	DIG IMAGE PROC & ANALY

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	0.00		3.00	45070200	1250	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
GEOG	661	DIG IMAGE PROC & ANALY

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	1.00		3.00		1250	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

David Cairns 10/27/15
Department Head or Program Chair *(Type Name & Sign)* Date

10/15/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

10/15/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 08/14

TEXAS A&M UNIVERSITY SYLLABUS

Digital Image Processing

GEOG 661

Instructor

Dr. Andrew Klein

Office: O&M 707D
Tel: 845.5219
Email: klein@geog.tamu.edu
Office Hours: Tues & Thurs 13:30-15:30
and by appointment

Course Description

This class is an introduction to the processes involved in the processing, manipulation, and interpretation of digital remotely sensed images. Topics covered include radiometric correction, image rectification, spectral and spatial image enhancement and classification.

Meeting Time and Location

Monday 6-9 pm CSA 303

Class Website

There is an extensive website associated with this class. Updates to the syllabus as well as other laboratory and course materials will be made available on the course website. Students are strongly urged to use these resources.

http://geography.tamu.edu/class/aklein/geog661

Textbooks and Readings

Jensen, John R. 2005. ***Introductory Image Processing: A Remote Sensing Perspective*** 3rd ed. Prentice Hall Series in Geographic Information Science. Upper Saddle River: Prentice Hall. 526 pp.

Richards, John A. and Xiuping Jia. 1999. ***Remote Sensing Digital Image Analysis: An Introduction*** (4th ed). Berlin: Springer-Verlag. doi: 10.1007/3-540-29711-1. Available online for Texas A&M Students at http://www.springerlink.com/content/xp3t30/

Links to additional readings and resources will be available through the course website.

Class Attendance

The university views class attendance as the responsibility of the individual student. However, in this course individual participation is important and will account for a significant portion of the course grade. For information, please view Section 7 of the student rules: http://student-rules.tamu.edu.

If you miss a class for any reason, it is your responsibility to find out what material was covered in your absence.

Mobile Devices

As a courtesy to the instructor and other students please turn off all cellular telephones before the class begins. Interrupting a class because your cell phone goes off is extremely impolite. As a courtesy to other students no texting will be allowed during class.

Computers

Computer use for class purposes, such as taking notes and viewing lecture materials, is allowed during lectures. However, use of a computer for other purposes (e.g., Facebook, email, online gaming) is prohibited as these activities can be extremely distracting to your fellow Aggies. If you are using a computer during class, please sit in the back row if at all possible. This avoids people behind you being distracted by your activities.

Email

All Texas A&M students should use their neo email accounts when emailing the instructor and teaching assistants. We may also send out class announcements via the neo email system as well. It is your responsibility to check your neo email account regularly.

Lab Software

The image processing software used in the course are the **ENVI 4.X or 5.X & IDL 8.X** software packages. In addition some portions of the lab will require use of a spreadsheet (e.g., Microsoft Excel or OpenOffice) in order that students may more fully explore the computations behind various digital image processing operations.

Information on ENVI can be found at http://www.exelisvis.com/language/en-us/productsservices/envi.aspx and software guides and tutorials are also available

Grading

Student performance in the class will be assessed through examinations that cover the material presented in the lecture portion of the examination and laboratory exercises intended to provide students with practical hands on experience.

A. Exams		**50%**
1. Midterm 1	15%	
2. Midterm 2	15%	
3. Final	20%	

The dates for all exams are listed in the course schedule. Makeups for examinations will be allowed only for University excused absences which are covered in section 7 of the Texas A&M University Student Rules (http://student-rules.tamu.edu)

B. Lab Exercises	**50%**

Students are encouraged to turn in all labs. However, I reserve the right to reduce the credit given for labs turned in later than one week past the due date

Grading Scheme

It the past the grading scheme has followed these cutoffs.

≥90% A, 80-89% B, 70-79% C, 60-69% D, <60% F

An average performance in the class will earn a satisfactory grade

Copyright and Plagiarism Policy

All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules: http://student-rules.tamu.edu/, under the section "Scholastic Dishonesty."

Aggie Honor Code

The Honor Code, based on the long-standing affirmation that An Aggie does not lie, cheat, or steal or tolerate those who do, is fundamental to the value of the A&M experience.

Know the ***Aggie Code of Honor:***
"Aggies don't lie, cheat, or steal, nor tolerate those that do"

http://aggiehonor.tamu.edu

Student Support

Student Support

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room B118 of Cain Hall. The phone number is 845-1637.

Services for Students with Disabilities

Room B118 of Cain Hall, 845-1637 or on the web at http://disability.tamu.edu/

There are numerous other student support organizations on campus including

Center for Academic Excellence and Academic Assistance Clearinghouse

525 Blocker, 845-2724, http://www.tamu.edu/cae

Student Counseling Service

Cain Hall, 845-4427, http://scs.tamu.edu
Student Counseling Helpline 5:00pm-8:00am: 845-2700

University Writing Center

Suite 1.214 of the Evans Library, 458-1455, http://writing.tamu.edu

Please do not hesitate to ask me if you have any problems or if you are having any trouble in the class, see me before it becomes a *problem.*

Learning Outcomes

1. Students will be able to explain how electromagnetic energy enables information to be gathered from objects at a distance and how EMR interacts with surface materials and the atmosphere to produce the signal received at a sensor
2. Students will be able to explain the theory and concepts behind radiometric and geometric preprocessing of remotely sensed images including atmospheric correction and orthorectification and will be able to select and apply appropriate image preprocessing techniques to standard image sources.
3. Students will be able describe the statistical properties of a digital image and use an image's statistical properties to apply appropriate spectral image enhancement techniques to single and multiband images to facilitate qualitative and quantitative analysis.
4. Students will be able to enhance digital images using techniques that operate in the spatial and frequency domains.
5. Students will be select and perform an appropriate image classification technique and able to assess the accuracy of the performed image classification.
6. Students will be able to explain the term hyperspectral remote sensing and be able to successfully preprocess and analyze hyperspectral images.

Course Schedule

Week	Lecture Topic	Required Readings Additional readings will be posted on website	Lab Topic
1 January 13th	**Review of Electromagnetic Radiation Theory** and **Spectral Signatures and BRDF**	Jensen Ch. 1 & 6 pp 175-194 Richards and Jia Ch. 1 *if you feel your remote sensing background could be strengthen read Jensen Ch 2 &3*	Plank Functions and Wavelength Frequency Relationships *Extra credit*
January 20th	☺ No Class Martin Luther King Holiday ☺		
2 January 27th	**The Digital Image** Characteristics of Digital Images Sampling Issues Sampling Issues Image Quantization Data Formats	Jensen Ch. 4 & 5 Richards and Jia Ch. 1	Spatial Sampling
3 February 3rd	**Radiometric Image Preprocessing** Image noise Atmospheric Correction	Jensen Ch. 6. Richards and Jia Ch. 4	Atmospheric Correction
4 February 10th	**Geometric Image Correction** Image Distortions Image Rectification Techniques	Jensen Ch. 7 Richards and Jia Ch. 2	Image Rectification Techniques
5 February 17th	**Geometric Image Correction** Map Projections Image Matching and Interpolation Techniques ***Exam 1***	Same as previous week	No Lab
6 February 24th	***Spectral Image Enhancement*** Univariate Statistics and Image Histogram Multivariate Statistics and Image Scattergrams Univariate Image Enhancement	Jensen Ch. 4, 5 & 8 pp. 255-275 Richards and Jia Ch. 3 & 4.	Image statistics and enhancement of satellite imagery for visual interpretation
7 March 3rd	**Multivariate Image Enhancement** Band Math Principal Components Kauth-Thomas Tasseled Cap	Jensen Ch. 8 pp. 255-275; 296-322 Richards and Jia Ch. 6	Spectral enhancements for vegetation remote sensing

	Transformation		
Week	**Lecture Topic**	**Required Readings Additional readings will be posted on website**	**Lab Topic**
March 10th	☺ SPRING BREAK ☺		
8 March 17th	**Spatial Image Enhancement** Spatial Convolution Filtering Edge and Line Enhancement and Detection Convolution applied to DEMs Texture Analysis	Jensen Ch. 8 pp. 276-287; 322-329 Richards and Jia Ch. 5	Image enhancement in the spatial and frequency domains
9 March 24th	**Spatial Image Enhancement** Operations in the Frequency Domain Fourier Transform Wavelets ***Exam 2***	Jensen Ch. 8 pp. 287-295. Richards and Jia Ch. 7	No Lab
10 March 31st	**Image Classification** Classification Schemes Training Site Selection Supervised Classifiers	Jensen Ch. 9 pp 337-379 Richards and Jia Ch. 8	Supervised image classification
11 April 7th	**Image Classification** Unsupervised Classification Neural Networks Fuzzy Classification	Jensen Ch. 9 pp. 379-393 & Ch. 10 Richards and Jia Ch. 8, 9 & 10	Unsupervised image classification
12 April 14th	**Image Classification** Object Oriented Classification	Jensen Ch. 9 pp. 393-401	Object oriented image classification
13 April 21st	**Image Classification** Accuracy Assessment	Jensen Ch. 13 Richards and Jia Ch 11	Classification accuracy assessment
14 April 28th	**Hyperspectral Remote Sensing**	Jensen Ch. 11 Richards and Jia Ch 13	Hyperspectral remote sensing
Final Exam	Friday May 2nd 7:30-9:30 AM		

I reserve the right to make changes to the course schedule due to unforeseen circumstances

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

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GRADUATE STUDIES

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional (DDS, MD, JD, PharmD, DVM)
2. Request submitted by *(Department or Program Name)*: Department of Geography
3. Course prefix, number and complete title of course: GEOG 662 GIS in Land and Property Management

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: Enrollment in Master of Land Economics and Real Estate; approval of instructor To: GEOG 660 or equivalent or approval of instructor
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course:
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

Introduction to concepts of design, planning and implementation of GISs related to commercial real estate development; case studies for land and property management; laboratory exercises in practical applications for real estate.

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

Introduction to concepts of design, planning and implementation of geographic information systems (GISs) for land and property management applications, including those pertaining to rural land and agricultural property, as well as urban and residential land uses and cadastral surveying.

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
GEOG	662	GIS IN LAND & PROP MGMNT

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
2.00	2.00		3.00	45070100	1250	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
GEOG	662	GIS IN LAND & PROP MGMNT

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	1.00		3.00		1250	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

10/27/15

Department Head or Program Chair *(Type Name & Sign)* Date

10/15/2015

Chair, College Review Committee Date

10/15/2015

Department Head or Program Chair *(Type Name & Sign)* *(if cross-listed course)* Date

Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.

GIS in Land and Property Management
GEOG 662
Semester TBA 20xx
Texas A&M University

Time: TBA
Room: TBA
Prerequisite: GEOG 660 or equivalent or approval of instructor
Credit Hours: 3

Instructor: Dr. Anthony M. Filippi, Associate Professor, 3147 TAMU, Department of Geography, Texas A&M University
Office: 707B Eller O&M Bldg.
Office Hours: TBA
Phone: (979) 845-5744
Fax: (979) 862-4487
Email: filippi@tamu.edu

Course Description

Catalog Description: "Introduction to concepts of design, planning and implementation of geographic information systems (GISs) for land and property management applications, including those pertaining to rural land and agricultural property, as well as urban and residential land uses and cadastral surveying."

This course introduces students to the concepts and tools of geographic information systems (GISs), including GIS design, planning, and implementation, as they relate to land and property management. Laboratory assignments will provide hands-on experience with GIS software and practical application.

Learning Objectives

The material covered in this course is aligned with learning objectives in the Geographic Information Science & Technology Body of Knowledge, which was produced by the University Consortium for Geographic Information Science (UCGIS) and published by the Association of American Geographers (AAG).

The primary learning objectives of this course are as follows:

--Students will be able to articulate the fundamental knowledge base associated with cadastral surveying and GIS, and they will be able to construct and utilize cadastral spatial databases.

--Students will be able to conceptually describe real estate markets and submarkets, as well as urban land use and land value theories, and they will be able to articulate how such theoretical knowledge is applicable to land and property management.

--Students will be able to explain land registration, property marketing, and conveyancing processes, as well as describe use of land information systems.

--Students will be able to describe how GIS can be employed for and various types of property management, including small and large properties, properties involving facilities; and rural and urban lands.

--Students will be able to explain how GIS is utilized for property/real estate market analysis for various land/property types, including residential, office/industrial, and retail properties. Additionally, students will be able to conduct these types of analyses using GIS tools and appropriate spatial/spatio-temporal data sources.

--Students will be able to explain information management issues associated with GIS applications in land and property management, as well as GIS implementation issues.

--Students will be able to describe common geographic errors performed by land and property analysts, so as to ideally avoid such errors in the future.

GIS Software

We will primarily use the ArcGIS™ (version 10.x) software package, but other GIS environments will be briefly introduced, as students may encounter various other GISs in the workplace. The ArcGIS™ 10.x and ArcGIS Business Analyst software will be available for student use in the Department of Geography GIS laboratory. ArcGIS™ is also available on Open Access Lab (OAL) computers throughout campus and the University Libraries.

Required Texts:

1) Ralphs, M. P., and Wyatt, P. 2003. *GIS in Land and Property Management.* 1st Ed. London, New York: Spon Press/Taylor & Francis. ISBN-13: 978-0415240659; ISBN-10: 0415240654.

2) Thrall, G. I. 2002. *Business Geography and New Real Estate Market Analysis*. New York: Oxford University Press. ISBN 0-19-507636-2.

Grading Policy

This course includes lectures, laboratory assignments, exams, and a final project. The course readings complement the lecture material. Grades are assigned based on student performance on two (2) exams, the laboratory exercises, and a final project paper. Examinations will primarily be based on the material from the lectures and the required readings. Make-up exams will only be available for University excused absences. Excused absences are covered in the Texas A&M University Student Rules (http://student-rules.tamu.edu), Section 7.1. If you know *a priori* (i.e., ahead of time) that you will be unable to take an exam on the scheduled date, consult the instructor prior to the exam to make alternative arrangements. An unexcused absence from an exam will yield a score of zero for that exam. Further information regarding the laboratory exercises is given below. The final project will enable students to apply concepts learned in lecture and the laboratory exercises to a real-world problem; specific requirements for the final project paper will be forthcoming. The weights for the grading schedule are as follows:

<u>Deliverables</u>

1) Exam 1:	20%
2) Exam 2:	20%
3) Laboratory Exercises:	35%
4) Final project:	25%

Grades will be assigned according to following scale:
A (≥90%); B (80-89%); C (70-79%); D (60-69%); and F (<60%)

Additional comments regarding selected components/deliverables are given below:

Laboratory Exercises / Due Dates

There will be eight (8) laboratory assignments, though due to the structure of the course, there is not a separate laboratory meeting time for this course. The laboratory exercises are intended to introduce the student to GIS concepts—particularly as they relate to land and property management—in a practical environment, as well as to GIS software functionality. Lab exercises will be discussed/assigned in class. Lab reports will be due at the beginning of the class period the week after the lab exercise is assigned. A paper copy of each lab report must be turned-in by the due date. Late reports will be assessed a 10% penalty for each day they are overdue.

To complete the laboratory assignments, students may utilize the Dept. of Geography GIS Labs (Teague B009A and B009C) at any time during regular hours (8 am-5 pm, Monday-Friday) whenever there is not a scheduled class meeting in a given lab room, and as space permits. Lab teaching schedules will be posted next to the lab doors. Both GIS Labs are equipped with all the necessary GIS software.

Attendance

The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. As the lectures will often contain material that is not explicitly covered in the textbook, it is particularly in your interest to attend class. If you miss an exam for a University-approved reason, follow the procedures listed in Section 7.5 of the Student Rules to have your absence excused. Please familiarize yourself with these procedures. University rules related to excused and unexcused absences are located on-line at http://student-rules.tamu.edu/rule07 (see Student Rule 7).

Tentative Lecture Schedule*:

WEEK	TOPIC	TENTATIVE READINGS / ASSIGNMENTS
1	Introduction, definitions, and course procedures; GIS overview	Ralphs and Wyatt, Chpt 1; Thrall, Chpt 1
2	Cadastral GIS/surveying; Case studies: GIS applications in land and property management	Ralphs and Wyatt, Chpt 2, 3; lecture notes
3	Real estate markets and submarkets; Urban land use and land value theories	Thrall, Chpt 2, 3
4	Land registration and land information systems; property marketing and conveyancing	Ralphs and Wyatt, Chpt 4
5	GIS and property management (i.e., local authority property management; large landowners; facilities management; rural land management)	Ralphs and Wyatt, Chpt 5
6	GIS and development and urban applications	Ralphs and Wyatt, Chpt 6
7	**Midterm Exam;** Retail and financial market research	Ralphs and Wyatt, Chpt 7
8	Retail and financial market research (continued)	Ralphs and Wyatt, Chpt 7
9	GIS and property/real estate market analysis	Ralphs and Wyatt, Chpt 8; Thrall, Chpt 4
10	GIS and housing and residential communities	Thrall, Chpt 5
11	GIS and office/industrial property	Thrall, Chpt 6
12	GIS and retail property/space	Thrall, Chpt 7

13	Information management issues in GIS applications in land and property management; GIS implementation issues (e.g., project-led vs. corporate; national land and property; organizational GIS)	Ralphs and Wyatt, Chpt 9, 10
14	Common geographic errors of land and property analysts to avoid; future issues	lecture notes; Ralphs and Wyatt, Chpt 11

** This is a tentative list of topics. I reserve the right to make changes to the course schedule at any time.*

Exam Dates
Midterm Exam: **TBA**
Final Exam: **TBA**

Exams will be given in the lecture room.

Final Project Paper Due Date
[This date will be specified for a given semester.] A 10% per day penalty will be assessed for late papers.

Other Important Dates
[Any important dates regarding a given semester will be noted.]

Tentative Laboratory Assignment Topical List*:
Week 2: Introduction to GIS Computing Environment; GIS Software Overview (*No lab assignment*)
Week 3: Cadastral GIS
Week 4: Land registration and land information systems
Week 5: GIS and property management
Week 6: GIS and development and urban applications
Week 7: *No lab assignment* (week of midterm exam)
Week 9: GIS and property/real estate market analysis
Week 10: GIS and housing and residential communities
Week 11: GIS and office/industrial property
Week 12: GIS and retail property/space

** This is a tentative list of topics. I reserve the right to make changes to the course/lab assignment schedule at any time.*

Email and eCampus

All Texas A&M students should use their TAMU email accounts when emailing the instructor. I may also send out class announcements via the TAMU email system as well.

It is your responsibility to check your TAMU email account regularly. In addition, course materials will be made available on the eCampus site for this course, as well as the Dept. of Geography class server. The TAMU web address for eCampus access is:
http://ecampus.tamu.edu/
For information regarding how to access resources on eCampus, please visit the eCampus Student Help documentation at:
http://ecampus.tamu.edu/Help/Student-Help

Student Support

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

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Copyright and Plagiarism Policies

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As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the *Texas A&M University Student Rules*, http://student-rules.tamu.edu, under the section "Scholastic Dishonesty." For the Academic Integrity Statement and Policy and additional information, please visit: http://aggiehonor.tamu.edu
"An Aggie does not lie, cheat, or steal, or tolerate those who do."

RECEIVED

NOV 09 2015

GRADUATE STUDIES

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Geography
3. Course prefix, number and complete title of course: GEOG 665 GIS-Based Spatial Analysis and Modeling

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: GEOG 390; STAT 651 or equivalent; approval of instructor To: GEOG 660 or equivalent or approval of instructor
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course:
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:
10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):
11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
GEOG	665	GIS MODELLING

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	0.00		3.00	45070200	1250	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
GEOG	665	GIS MODELLING

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	1.00		3.00		1250	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

10/27/15
Department Head or Program Chair *(Type Name & Sign)* Date

10/15/2016
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

10/15/2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

GIS-Based Spatial Analysis and Modeling
GEOG 665
Spring 201x
Texas A&M University

Time: TR 12:45 pm-02:00 pm (Sect. 600); **Room:** HECC 202
Prerequisites: GEOG 660 or equivalent or approval of instructor
Credit Hours: 3

Instructor
Dr. Anthony M. Filippi, Associate Professor, 3147 TAMU, Department of Geography, Texas A&M University
Office: 707B O&M Bldg.
Office Hours: T 4:30-5:00 PM, R 2:30-5:00 PM, and by appointment
Phone: 979-845-5744; **Fax:** (979) 862-4487
Email: filippi@tamu.edu

COURSE DESCRIPTION

Catalog Description: "Investigates methodology of integrating various spatial analysis and modeling techniques with GIS for environmental/socio-economic applications; practical applications; theoretical/technical aspects of related issues in detail. Prerequisites: GEOG 660 or equivalent or approval of instructor."

This course covers how to address spatial and spatio-temporal problems by employing GIS-based analysis and modeling. The emphasis will be on the theoretical and conceptual underpinnings, with practical reinforcement and extension through laboratory exercises and a project. Students will therefore be able to apply GIS-modeling concepts to real-world problems. In the process, exposure to different GIS-modeling environments will be afforded. For practical considerations, raster GIS modeling will be the focus of this course. Given the prerequisite for this course, operationally, basic GIS knowledge is assumed.

Class meeting time for the course may be apportioned to lecture, seminar, final project, and/or lab issues, as needed.

LEARNING OBJECTIVES

The material covered in this course is aligned with learning objectives in the Geographic Information Science & Technology Body of Knowledge, which was produced by the University Consortium for Geographic Information Science (UCGIS) and published by the Association of American Geographers (AAG).

The primary learning objectives of this course are as follows:

--Students will be able to conceptually explain the various GIS model types and describe the circumstances under which each should be used.

--Students will be able to describe and utilize map algebra/cartographic modeling operators for addressing spatial problems.

--Students will be able to articulate/discuss the advantages and disadvantages of various forms of GIS-based modeling.

--Students will be able to articulate how GIS-based modeling and spatial analyses are conducted, and they will be able to perform such analyses.

--Students will be able to develop and implement a GIS-based model to address spatial or spatio-temporal problem.

--Students will be able to synthesize technical and application domain knowledge, and interpret the results, to address a spatial or spatio-temporal problem.

TEXT AND SUPPLEMENTARY MATERIALS

Required Text:
DeMers, M. N. 2002. ***GIS Modeling in Raster***. New York: John Wiley & Sons, 203 p.

Recommended Ancillary Text (Optional):
Tomlin, C. D., 1990, ***Geographic Information Systems and Cartographic Modeling***. Englewood Cliffs, NJ: Prentice-Hall, 249 p. (**Note:** this is out-of-print)

There will also be various handouts and assigned journal articles/readings throughout the semester. The articles should be read prior to the relevant class period, as there will be in-class student presentations and discussions concerning the articles.

STUDENT EVALUATION/GRADING POLICY

This course includes a lecture component, seminar-style journal article-discussion sessions, laboratory exercises, and a final project. The course readings complement the lecture material. Grades are assigned based on student performance on one (1) exam, the laboratory exercises, the final project and presentation, and class participation. The examination will be based on the material from the lectures, textbook, other readings, and to a lesser extent, the laboratory exercises. Make-up exams will only be available for University-excused absences. Excused absences are covered in the Texas A&M University Student Rules (http://student-rules.tamu.edu), Section 7.1. If you know *a priori* (i.e., ahead of time) that you will be unable to take an exam on the scheduled date, consult the instructor prior to the exam to make alternative arrangements. An unexcused absence from an exam will yield a score of zero for that exam. Requirements for the final project and presentation will be forthcoming. Class participation will be assessed according to the student's contribution to the discussion of journal articles and other readings; presentation of articles/readings to the class when assigned; and contributions to general discussions. Students will be assigned to present/co-present one (1) journal article/reading to the class. The grade concerning the presentation of the final project will be included in the final-project grade. The weights for the grading schedule are as follows:

Deliverables/Course Components	
1) Midterm Exam:	30%
2) Laboratory Exercises:	25%
3) Final project and presentation:	35%
4) Class Participation:	10%

Grades will be assigned according to following scale:

A (≥90%); B (80-89%); C (70-79%); D (60-69%); and F (<60%)

Additional comments regarding selected components/deliverables are given below:

EXAMS. There is one (1) exam in this course—a mid-term exam—that will cover the lectures, labs, and reading materials.

LABS. There will be five (5) laboratory assignments, though due to the structure of the course, there is not a separate laboratory meeting time for this course. ESRI ArcGIS 10.x and other GIS software packages will be employed, which are available in the Dept. of Geography GIS Labs located in **Teague B009A and B009C**, as well as the other student-computing labs in the department. The laboratories will reinforce and complement lecture/discussion materials. Laboratory assignments will be due in class one week from the date assigned. Late assignments will be assessed a 10% penalty for each day they are overdue. Discussion of laboratory assignments will occur during a portion of some class periods, though labs will require time outside of class to complete. Students may utilize the Dept. of Geography GIS Labs (Teague B009A and B009C) at any time during regular hours (8 am-5 pm, Monday-Friday) when there is not a laboratory class meeting in a given lab room, and as space permits. Lab teaching schedules will be posted next to the lab doors. Both GIS Labs are equipped with ArcGIS and other GIS/remote-sensing software.

FINAL PROJECT. Students will complete a final project, due near the end of the semester. The goal is to design and conduct a project that employs GIS-based modeling to address a geographic/spatial/spatio-temporal conceptual problem. Each student/group will give a ~15-minute presentation (plus time for questions/discussion) on the project to the class toward the end of the semester. Specific guidelines regarding project requirements will be issued.

ATTENDANCE

Class attendance is the responsibility of the individual student. Since the lectures/class meetings will often contain material that is not included in the textbook, it is particularly in your interest to attend class. In addition, some class sessions will entail a seminar-type format, including presentation and discussion of articles, which contribute to the class participation grade. If you miss an *exam* for a University-approved reason, follow the procedures listed in Section 7.5 of the student rules to have your absence excused. Please familiarize yourself with these procedures.

TENTATIVE SCHEDULE*

WEEK	TOPIC	TENTATIVE READINGS / ASSIGNMENTS
1	Introduction to the course, Data Models, GIS modeling, GIS Coupling, and Model Complexity	"Analytical Modeling in GIS" (Heywood et al., 1998) slides; DeMers (2002), Chpt. 1
2	Raster models, Continuous Fields; Vector-to-Raster Conversion; Spatial Interpolation	DeMers (2002), Chpt. 2; Burrough and McDonnell (1998)**, pp. 113-118; Handout/Lecture notes
3	Map Algebra, Boolean Operators, Overview of Cartographic Modeling Operators (Local/Focal/Zonal/Global), Detailed discussion of Local Operations	DeMers (2002), Chpt. 3 and pp. 58-80 in Chpt. 4; Berry (1987)[†]; Handouts/Lecture notes
4	Local Operations (continued) Capability/Suitability Modeling	Tomlin (1991)[§]; Berry (1987); Handouts/Lecture notes
5	Neighborhood/Focal Operations; Hydrologic Modeling	Burrough and McDonnell (1998), pp. 190-198; DeMers (2002), Chpt. 4 (pp. 81-93); Article Set 1
6	Hydrologic Modeling (continued)	Article Set 2
7	Zonal Operations	Lecture notes
8	GIS model types; model conceptualization, formulation, flowcharting, implementation; model verification, validation; **Midterm Exam (March 12)**	DeMers (2002), Chpt. 5, 6, 7, 9; Giudici (2002) (in Article Set 3)
9	**Spring Break (March 16-20)— No class**	
10	Temporal (Diffusion) Models; Land-Change Modeling	Lecture notes; Article Set 3
11	Land-Change Modeling (continued)	Article Set 3
12	Introduction to ModelBuilder; Integration of remote sensing and GIS modeling; Vector GIS modeling; **Student Final Project Presentations**	Lecture notes; Article Set 3
13	**Student Final Project Presentations (continued)**	
14	AAG Conference – **No class** 04/21/2015 and 04/23/2015	Work on final projects
15	**Final Project Papers Due (April 30); Student Final Project Presentations (continued)**	

** This is a tentative list of topics. I reserve the right to make changes to the course schedule at any time.*

Final Project Paper Due Date: Thursday, April 30, 2015

** Reference information for the Burrough and McDonnell (1998) reading:

Burrough, P. A., and McDonnell, R. A., 1998, *Principals of Geographical Information Systems*. New York: Oxford University Press, 333 p.

§ Reference information for the Tomlin (1991) reading:

Tomlin, C. D., 1991, Cartographic Modeling, in *Geographic Information Systems: Principles and Applications*. D. J. Maguire, M. F. Goodchild, and D. W. Rhind (Eds.), 1st Ed., Vol. 1: Principles, Harlow, UK: Longman, pp. 361-374. (Text available at the following URL: http://www.wiley.com/legacy/wileychi/gis/Volume1/BB1v1_ch23.pdf). Table of contents available at: http://www.wiley.com/legacy/wileychi/gis/volumes.html).

† Reference information for the Berry (1987) reading:

Berry, J. K. 1987. Fundamental operations in computer-assisted map analysis. *International Journal of Geographical Information Systems* 1(2): 119-136.

Other Readings

Article Set 1 (Hydrologic Modeling I):

Lovejoy, S. B., 1997, Watershed management for water quality protection: Are GIS and simulation models THE answer? *Journal of Soil and Water Conservation* March-April, p. 103.

Brown, D. G., Bian, L., and Walsh, S. J., 1993, Response of a distributed watershed erosion model to variations in input data aggregation levels, *Computers and Geosciences* 19(4), 499-509.

Mashriqui, H. S., and Cruise, J. F., 1997, Sediment yield modeling by group response units, *Journal of Water Resources Planning and Management* 123(2): 95-104.

Tim, U. S. and Jolly, R., 1994, Evaluating agricultural nonpoint-source pollution using integrated geographic information systems and hydrologic/water quality model, *J. Environ. Qual.*, 23:25-35.

Article Set 2 (Hydrologic Modeling II):

Zacharias, I., Dimitriou, E., and Koussouris, T. 2004. Quantifying land-use alterations and associated hydrologic impacts at a wetland area by using remote sensing and modeling techniques. *Environmental Modeling & Assessment* 9(1): 23-32.

Jayakrishnan, R., Srinivasan, R., Santhi, C., and Arnold, J. G. 2005. Advances in the application of the SWAT model for water resources management. *Hydrological Processes* 19(3): 749-762.

Castillo, C. R., Güneralp, İ., and Güneralp, B. 2014. Influences of changes in developed land and precipitation on hydrology of a coastal Texas watershed. *Applied Geography* 47: 154–167, doi: 10.1016/j.apgeog.2013.12.009.

Article Set 3 (Miscellaneous):

[Urbanization / Land-Change Modeling]

Seto, K. C., Güneralp, B., and Hutyra, L. R. 2012. Global forecasts of urban expansion to 2030 and impacts on biodiversity and carbon pools. *Proceedings of the National Academy of Sciences of the United States of America* 109(40): 16083-16088. http://www.pnas.org/content/109/40/16083.full.pdf?with-ds=yes

Güneralp, B., Reilly, M., and Seto, K. C. 2012. Capturing multiscalar feedbacks in urban land change: a coupled system dynamics spatial logistic approach. *Environment and Planning B* 39(5): 858-879.

[Population Modeling]

McKee, J. J., Rose, A. N., Bright, E. A., Huynh, T., Bhaduri, B. L. 2015. Locally adaptive, spatially explicit projection of US population for 2030 and 2050. *Proceedings of the National Academy of Sciences of the United States of America* 112(5): 1344–1349. www.pnas.org/cgi/doi/10.1073/pnas.1405713112
Supporting Information available at:
http://www.pnas.org/content/suppl/2015/01/15/1405713112.DCSupplemental/pnas.201405713SI.pdf

[Hazard Modeling]

Cova, T. J., and Church, R. L. 1997. Modelling community evacuation vulnerability using GIS, *Int. J. Geographical Information Science* 8:763-784.

Chakraborty, J., and Armstrong, M. P. 1997. Exploring the use of buffer analysis for the identification of impacted areas in environmental equity assessment, *Cartography and Geographic Information Systems* 24(3): 145-157.

[Disease Modeling]

Perez, L., and Dragicevic, S. 2009. An agent-based approach for modeling dynamics of contagious disease spread. *International Journal of Health Geographics* 8:50. doi:10.1186/1476-072X-8-50

[Archaeology]

Ebert, D. 2004. Applications of Archaeological GIS. *Canadian Journal of Archaeology / Journal Canadien d'Archéologie* 28(2): 319-341.

[Model Calibration and Validation]

Giudici, M. 2002. Development, calibration, and validation of physical models, in *Geographic Information Systems and Environmental Modeling*, K. C. Clarke, B. O. Parks, and M. P. Crane (Eds), Upper Saddle River, NJ: Prentice-Hall, pp. 110-121.

Other Important Dates

March 16-20	Spring Break
April 3	Friday. Reading day, no classes.
May 5	Tuesday. Last day of spring semester classes; Redefined day, students attend **Friday** classes; Prep Day, classes meet. No regular course exams.
May 6	Wednesday. Reading day, no classes.

Tentative Laboratory Topical List*:

Week 2: Introduction to GIS Computing Environment; GIS Software Overview (*No lab assignment*)
Week 3: GIS Coupling
Week 4: Suitability/Capability Modeling
Week 5: Focal Operations
Week 7: *No lab assignment* (week of midterm exam)
Week 10: Diffusion Modeling in Space and Time
Week 11: Land-Use/Land-Cover Change Analysis and Modeling using the IDRISI Land Change Modeler

** This is a tentative list of topics. I reserve the right to make changes to the course/laboratory assignment schedule at any time.*

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For information regarding how to access resources on eCampus, please visit the eCampus Student Help documentation at:
http://ecampus.tamu.edu/Help/Student-Help

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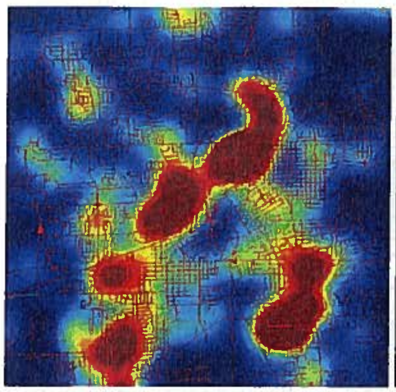
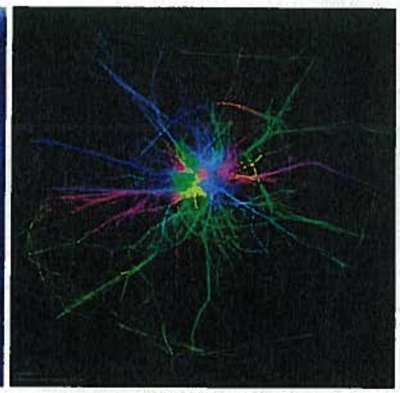
"An Aggie does not lie, cheat, or steal, or tolerate those who do."

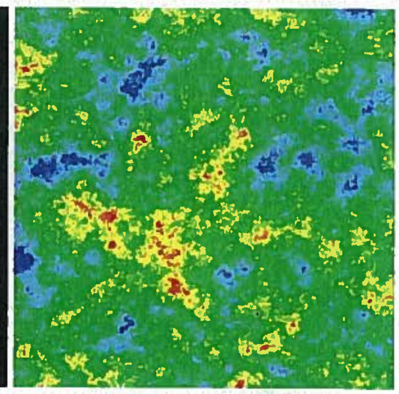
Geographic Information Science and Technology
Department of Geography, Texas A & M University

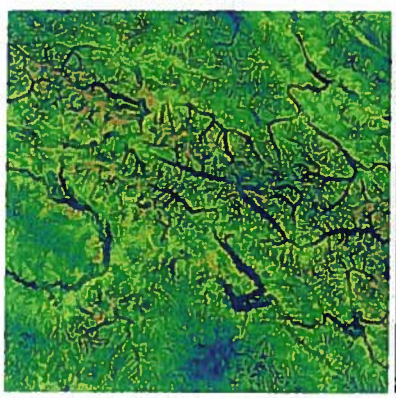
Geography 665 - 3 Hrs

Spatial Analysis and Modeling

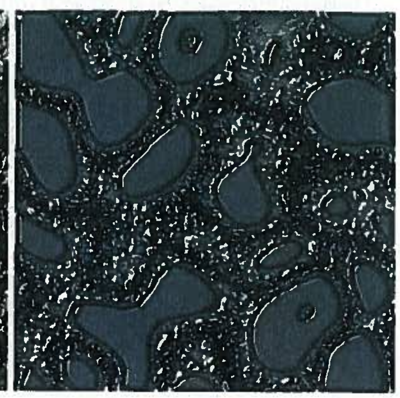

Point Pattern Analysis


Network Analysis

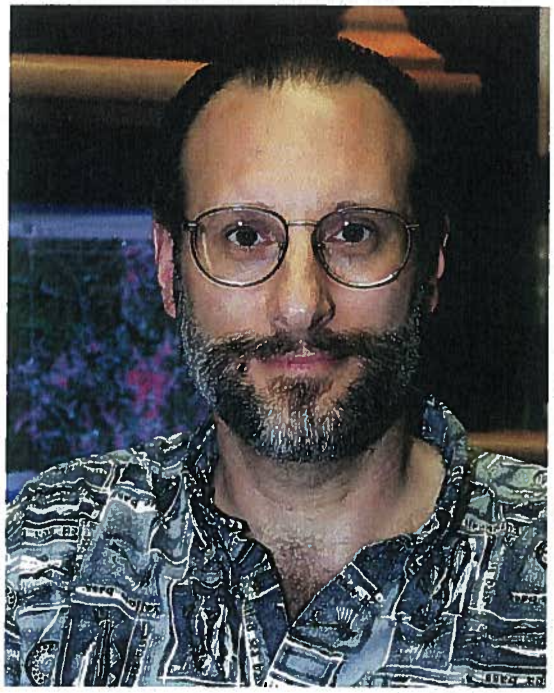

Variogram Analysis


Surface Analysis


Deterministic Modeling


CA Modeling

1 Course Instructor



Dr. Michael P. Bishop
Office: O+M 707E
Phone: (979) 845-7998
Email: michael.bishop@tamu.edu
Skype: mpbishop

Schedule, 2014

	Monday	Tuesday	Wednesday	Thursday	Friday
8:00 am					
9:00 am					
10:00 am					
11:00 am					
12:00 am					
1:00 pm		Geog. 665 HECC 202		Geog. 665 HECC 202	
2:00 pm		Office Hours O+M 707E		Office Hours O+M 707E	
3:00 pm			Dept. Meetings O+M 712		
4:00 pm					
5:00 pm					

2 Course Materials

- Bishop, M.P., 2014 . Review and research articles will be made available to students.

3 Copyright Policy Statement

All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, project assignments, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts or data, unless permission is explicitly granted.

4 Attendance Policy

The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located on-line at http://student-rules.tamu.edu/rule07.

5 Lectures and Reading

Lectures and discussion will be associated with each topic covered in the course. In addition, students will be responsible for finding literature outside of class using library resources, and reading review and research articles to prepare for each meeting session. Lecture and discussion material frequently consists of information not found in general introductory and intermediate level GIScience, remote sensing, and terrain analysis textbooks. Consequently, it is essential that students attend all lecture/seminar sessions and read assigned articles before class. This also facilitates classroom participation and student questions. Students not able to attend lecture should contact the professor and/or a student regarding presented information, as this information is necessary to complete project assignments. Students will also be involved in classroom discussions and debate.

Cell-phones and pagers should be turned off in the classroom, as they disrupt students and the professor. Students are required to ask questions and participate in classroom discussions and debate. This must be done with special attention to language and respect for others. Students will be asked to leave the classroom if they disrupt the class. Tape-recording of lectures will not be allowed except in accommodation of a student disability per Student Disability Services advisement.

6 Student Projects

There will be two major projects that students must complete during the course of the semester. These are designed to provide students with hands-on training and problem-solving experience in spatial analysis and modeling techniques and approaches. Students can use any GIS, image processing, statistical or spatial analysis software (e.g., GRASS, ArcGIS, Imagine, Envi, SAGA, R, SPSS, FragStats) that enables spatial analysis and modeling for project completion. Students will write a detailed paper on each project characterizing the nature of the problem, issues and concepts, methodology, results, discussion and conclusions. The semester projects are based upon addressing a problem the student is interested in. Potential application topics include all areas of Earth and social science, as well as applied planning and management issues and problems. Once a topic and the appropriate spatial data to address a problem have been identified and acquired, two analysis components (projects) must be performed:

1. Spatial analysis and information extraction. Each student will engage in a variety of spatial analysis approaches to extract spatial information that can be used to address the problem and facilitate subsequent spatial modeling efforts. Students must conduct different forms of point pattern, network, surface, and scale-dependent analyses to generate unique information from spatial data. The emphasis is on justifying the use of the spatial analysis approach and the algorithm, as well as on the accuracy of the final product. In this way, students will receive practical exposure to different spatial analysis approaches and learn the difference between GIS empiricism and science-based spatial analysis.

2. Spatial modeling. Each student will select a form of spatial modeling that is most suitable to predict a spatial outcome. In general, this may include empirical, stochastic, or deterministic modeling (or hybrid modeling). Examples include spatially weighted regression, suitability site modeling, physics-based numerical modeling, and more advanced geocomputation modeling approaches including analytical reasoning and cellular automata. Modeling outcomes include identifying the most favorable location for a landfill, school, home, or energy facility. Modeling can also be used to identify archeological sites, natural resources, and environmental degradation. Model prediction is also required for urban expansion, wildlife habitat mapping, environmental exposure assessment, hazards assessment and many other physical and social-science applications. Each student must also perform model sensitivity and error and uncertainty analyses.

Regardless of the application problem, each student will identify the most suitable forms of data and incorporate satellite imagery, topographic information, and vector-based GIS layers. Utilization of a variety of spatial analysis approaches will permit the production of unique information to assist in problem solving. Finally, exposure to modeling approaches will permit predictive capabilities that represents a more rigorous attempt to solve a problem. Collectively, the two semester projects will provide students with real-world problem-solving experience.

6.1 Project Papers

Each project must result in the production of a paper. Students must follow an approved paper outline that includes all sections, subsections, and subsubsections. The length of the paper will be left to the discretion of the student and should be single spaced, with no graphics inserted in the test. High quality graphics are required but should follow the references. Students will email a WORD document to the professor. Handwritten work will not be accepted. Late papers will not be accepted unless a student has an excused absence. The first project paper will be due around mid-term, and the final project will be due two weeks before final examinations.

6.2 Student Examinations

There will be no student examinations.

7 Student Evaluation and Grading

Assignments	Total Points	Percentage
Project 1: Spatial Analysis	500	50
Project 2: Spatial Modeling	500	50
Total Points	1000	100.0

Students will be graded based upon fulfilling project criteria, project performance, and their ability to effectively communicate project results in written form. Project papers will be graded on overall quality of work and student effort. Final grades will be determined by relative ranking of cumulative point scores. This usually equates to a scale of 90-100%(A), 80-89%(B), 70-79%(C), 60-69%(D), and $\leq$59%(F).

Academic dishonesty is regarded as a serious offense by the University, the Department of Geography, and the faculty. Academic dishonesty will result in a course grade of failure, regardless of the form of dishonesty. These include, but are not limited to, copying of laboratory assignments, copying of exam answers, plagiarism and use of Internet materials (not referenced) in papers.

8 Academic Integrity Statement and Policy

All students should be aware of the Aggie Honor Code and refer to the Honor Council Rules and Procedures on the web at http://aggiehonor.tamu.edu.

"An Aggie does not lie, cheat or steal, or tolerate those who do."

9 Student Issues and Questions

Students are encouraged to meet with the professor to discuss their progress in the class. This includes questions regarding any aspect of the course. Students are expected to meet with the professor during scheduled office hours or by appointment. Do not wait until the end of the semester for an evaluation.

Students with disabilities are expected to discuss their situation with the professor as it relates to the course and individual performance issues. Approved accommodations, as defined by disability services, will be followed to assist the student in completing the course.

10 Americans with Disabilities Act (ADA) Policy Statement

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu.

11 Course Description and Prerequisites

Geography 665 is a graduate level course designed to introduce students to the field of GIS-based spatial analysis and modeling, It reviews the fundamental principles of geographic information systems and characterizes basic types of GIS-based analysis. The course primarily focuses on the theory and concepts of spatial analysis and modeling. It introduces various approaches to spatial analysis including point-pattern analysis, network analysis, statistical analysis, semi-variogram analysis, and object-oriented analysis. Spatial modeling approaches include statistical, physics-based and geocomputational methods. Students will learn about spatial analysis and modeling as it relates to information extraction from remotely sensed data, digital elevation models, and typical GIS layers. Students are expected to have the equivalent of GEOG 361 (Remote Sensing in Geosciences), GEOG 390 (Principles of GIS), or approval of the instructor.

12 Course Objectives

This course is designed to provide graduate students exposure to spatial analysis and modeling. Students will receive an understanding of how spatial analysis and modeling can be used to extract information from individual GIS layers and entire GIS databases. Specifically, the course will emphasize various topics categorized as principles of geographic information systems, theoretical and conceptual issues, point pattern analysis, spatial analysis, spatial statistical analysis, and spatial modeling. It emphasizes mastering the theoretical and fundamental issues associated with extracting spatial information that can be used to address scientific research and applied problems in a variety of disciplines. Students will receive exposure to the latest issues, information technologies, and application perspectives. Lectures, classroom discussions, reading assignments, and applied projects, will provide students with hands-on and problem-solving experience.

12.1 Learning Outcomes

At the end of the course, the student will be able to:

1. Describe the complex issues and concepts associated with spatial analysis and modeling.
2. Conduct spatial analysis on various forms of vector data.

3. Conduct spatial analysis on various forms of raster data.
4. Describe how semi-variogram analysis can be used to assess scale-dependence and anisotropy.
5. Describe how object-oriented analysis can be used in mapping and modeling.
6. Define the advantages and disadvantages of various forms of spatial analysis.
7. Define the advantages and disadvantages of various forms of spatial modeling.
8. Develop and implement a spatial model to solve a problem.
9. Synthesize technical and application domain knowledge to address mapping problems.
10. Compose their own original writing.
11. Interpret results within the context of a problem.
12. Apply technical skills to solve a problem.

13 Schedule

Week	Course Topic	Reading
1	Introduction and GIS	Article(s) to be assigned.
2	Theory and Concepts	Article(s) to be assigned.
3	Theory and Concepts	Article(s) to be assigned.
4	Spatial Data Manipulation	Article(s) to be assigned.
5	Spatial Data Manipulation	Article(s) to be assigned.
6	Spatial Data Analysis	Article(s) to be assigned.
7	Spatial Data Analysis	Article(s) to be assigned.
8	Spatial Data Analysis	Article(s) to be assigned.
9	Spatial Statistical Analysis	Article(s) to be assigned.
10	Spatial Statistical Analysis	Article(s) to be assigned.
11	Spatial Statistical Analysis	Article(s) to be assigned.
12	Spatial Modeling	Article(s) to be assigned.
13	Spatial Modeling	Article(s) to be assigned.
14	Spatial Modeling	Article(s) to be assigned.

14 Topical Outline

14.1 Principles of GIS

14.1.1 GIST and GIS

14.1.2 Nature of Geospatial Data

- Attributes
- Locational component
- Temporal component
- Metadata
- Scale and representation

14.1.3 Data Input and Storage

14.1.4 Database Development and Management

14.1.5 Data Manipulation

14.1.6 Data Analysis and Modeling

- Visual interpretation
- Measurement
- Classification
- Spatial overlay
- Spatial analysis
- Spatial modeling

14.1.7 Display and Geovisualization

14.2 Spatial Analysis and Modeling

14.2.1 What is Spatial Analysis

14.2.2 What is Spatial Modeling

14.2.3 Role of Pattern Recognition

14.3 Theory and Concepts

14.3.1 Representation

- Dimensions
- Spatial concepts
- Temporal concepts
- Process concepts
- Human conceptualization
- Fuzzy membership and representation
- Semantic modeling
- Data modeling

14.3.2 Indeterminant Boundaries

14.3.3 Scale

- Cartographic
- Measurement
- Observational
- Operational
- Computational
- Scale dependence and independence
- Hierarchical organization

14.3.4 Anisotropy

14.3.5 Homogeneity

14.3.6 Heterogeneity

14.3.7 Error and Uncertainty

14.3.8 Spatial Auto-Correlation

14.3.9 Complexity

14.3.10 Spatial Non-Stationarity

14.3.11 Spatial Variation and Patterns

14.4 Spatial Data Manipulation

14.4.1 Map Algebra

- Arithmetic operators
- Relational operators
- Boolean operators
- Bitwise operators
- Combinatorial operators
- Logical operators
- Accumulative operators
- Assignment operators
- Functions

14.4.2 Spatial Query

14.4.3 Spatial Overlay

14.4.4 Buffering

14.4.5 Projection Transformations

14.4.6 Measurement-Scale Transformations

14.4.7 Clumping and Seiving

14.5 Spatial Data Analysis

14.5.1 Point-Pattern Analysis

14.5.2 Network Analysis

14.5.3 Spatial Statistics

- Global
- Local (cell by cell)
- Zonal (regions)
- Feature Based
- Altitude Based

14.5.4 Texture Analysis

14.5.5 Spatial Auto-Correlation

14.5.6 Fractal Analysis

14.5.7 Surface Analysis

14.5.8 Multi-Resolution Analysis

14.5.9 Spatial Similarity of Multi-Scale variation

14.5.10 Object-Oriented Analysis

- Segmentation
- Object parameters

- Spatial topological analysis

14.6 Spatial Statistical Analysis

14.6.1 Semi-Variogram Analysis

14.6.2 Semi-Variogram Model Fitting

- Circular Model
- Spherical Model
- Penta-spherical Model
- Exponential Model
- Gaussian Model
- Cubic model
- Periodicity

14.6.3 Scale-Dependent Anisotropic Analysis

14.6.4 Scale-Dependent Self-Similarity

14.7 Spatial Modeling

14.7.1 Spatial Modeling Approaches

- Empirical statistical modeling
- Statistical Stochastic modeling
- Physics-based numerical modeling
- Geocomputational modeling

14.7.2 Types of Models

- Conceptual models
- Descriptive models
- Prescriptive models
- Methodological models

- Empirical models
- Stochastic models
- Deterministic models
- AI models
- Agent-based models

14.7.3 Spatial Interpolation

- Triangulation
- Linear Interpolation
- Bilinear Interpolation
- Inverse Distance Weighted
- Kriging

14.7.4 Geographically Weighted Regression (GWR)

14.7.5 Suitability Site Modeling

14.7.6 Cellular Automata

14.7.7 Analytical Reasoning

14.7.8 Spatio-Temporal Models

14.7.9 Model Coupling

14.7.10 Model Evaluation

- Sensitivity analysis
- Calibration
- Verification
- Validation
- Acceptability

15 Books

For the latest in spatial analysis textbooks, go to the following publishers Websites and search using the appropriate key phrases.

htpp://www.crcpress.com

htpp://www.elsevier.com

htpp://www.wiley.com

htpp://www.springer.com

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

RECEIVED
NOV 12 2015
GRADUATE STUDIES

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Geography
3. Course prefix, number and complete title of course: GEOG 676 GIS Programming

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   - a. Prerequisite(s): From: ______ To: ______
   - b. Withdrawal (reason): ______
   - c. Cross-list with: ______

   Cross-listed courses require the signature of both department heads.

   - d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   - e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☐ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: GEOG 392
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:
10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):
11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
GEOG	676	GIS PROGRAMMING

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	2.00		4.00	45070206	1250	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
GEOG	676	GIS PROGRAMMING

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	1.00		3.00		1250	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Department Head or Program Chair *(Type Name & Sign)* Date

Chair, College Review Committee 10/15/2015 Date

Department Head or Program Chair *(Type Name & Sign)* *(if cross-listed course)* Date

Dean of College 10/15/2015 Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.

GIS Programming

GEOG 676

Instructor
Dr. Daniel Goldberg
Office: O&M 707F
Tel: 979-845-7141
Email: daniel.goldberg@tamu.edu
Office Hours: TBD
and by appointment

Teaching Assistants
TBD
Sections 500
Office: TBD
Email: TBD
Office Hours: TBD
Office Hours: TBD

Meeting Time and Locations

Lecture	Labs
Time: TBD	500 – TBD
Room: TBD	Room: TBD

Class web site

Updates to the lecture and lab syllabi as well as other course materials will be made available on the course website. It can be accessed on ELearning at http://elearning.tamu.edu.

Course Description

This class is an introduction to programming in general and an introduction to programming for Geographic Information Systems (GIS) in particular. This project-oriented course covers the guiding principles behind programming syntax and data structures, and how to apply these techniques to the development of custom standalone GIS programs and the integration of these into commercial GIS platforms. The course also includes an applied section where the student will identify a real-world "customer" and lead a team of undergraduates to complete a project.

Learning Outcomes

This course is designed to introduce students to the basics of programming with modern programming languages in the context of development for and with GIS. Students will learn how to apply this knowledge to develop custom GIS applications and extensions that solve real-world problems. This course will provide students with a solid foundation in fundamental programming techniques and the knowledge to apply these techniques within GIS programming domains.

The course will start with an introduction to fundamental programming structures and techniques and quickly advance to programming issues related to developing for GIS platforms including integration of their code into industry standard GIS platforms to extend the capabilities of these systems.

The course will include a lecture component where theoretical issues are covered and lab-based exercises where students have the opportunity to practice implementing these techniques in various programming languages including Python and C#.

This course will also include identification of and interaction with a real-world "customer" who needs GIS programming. Students will learn software project management skills while leading a team of undergraduate students and have the opportunity to interact with a real-world "customer" to experience the identification and translation of customer requirements into application development.

At the end of this class, each student will be able to:

1) Identify a set of requirements for the development of a software system;
2) Implement standalone programming projects in Python and C# to solve GIS problems;
3) Integrate custom code into ArcGIS that customizes, automates, and extents its functionality;
4) Programmatically access GIS data and use these data in GIS modeling, computation, visualization, and analysis;
5) Conceptualize, design, plan, implement, and document a custom GIS programming solution to a real-world problem; and
6) Lead a team of developers in the execution of a customer-driven programming project.

Textbooks and Readings

Lecture Texts

__Required:__ Allen D, 2014. **GIS Tutorial for Python Scripting**. 1st ed. Redlands, CA, Esri Press. 288 pp.

__Optional:__ Watson K, Hammer JV, Reid J, Skinner M, Kemper D, Nagel C, 2012. **Beginning Visual C# 2012 Programming**. 1st ed. Hoboken, NJ, Wiley. 912 pp.

Additional readings and materials will be drawn from websites, handouts, and online resources.

GIS Software

This course will utilize the ArcGIS™ suite of software developed by ESRI. Installable copies may be obtained from the instructor or teaching assistants.

Development Software

This course will utilize the Python which is installed with ArcGIS. This course will also utilize Visual Studio 2012 which can be downloaded as a student education version from Microsoft.

Class Attendance

The university views class attendance as the responsibility of the individual student. Information on University attendance rules can be found at http://student-rules.tamu.edu/rule07. As described below, a portion of each student's grade is based on in-class participation. This will be judged by the instructor as regular attendance and active engagement on a consistent basis that contributes to the class in some manner.

Lab attendance is not required, but considered essential for successful completion of the course.

Cellular Telephones

As a courtesy to the instructor and other students please turn off all cellular telephones before the class begins.

Email

All Texas A&M students should use their Texas A&M University email accounts when emailing the instructor and teaching assistants. I may also send out class announcements via the University email system as well. It is your responsibility to check your official TAMU email account regularly.

Grading

Your grade in this class will be based as described below:

A. **Lecture**	**30%**	
Midterm 1		10%
Midterm 2		10%
Final Exam		10%
B. **Lab**	**20%**	
Exercises		20%
B. **Homework**	**5%**	
Exercises		5%
C. **Project**	**40%**	
Project Proposal		10%
Project Status Report 1		2.5%
Project Status Report 2		2.5%
Final Project		25%
D. **Participation**	**5%**	
Class Participation		5%

Grading Scale

The grading scale for this course is as follows:

≥90% A, 80-89% B, 70-79% C, 60-69% D, <60% F

An average performance in the class will earn a satisfactory grade.

Makeups for the Exam will be allowed only for University excused absences and will be administered in compliance with university rules. Excused absences are covered in the Texas A&M University Student Rules (http://student-rules.tamu.edu)

Final Project

Throughout the semester, graduate students lead a team of up to 4 undergraduate students to apply the GIS programming concepts learned in lectures with the hands-on experience gained in labs to solve a "real-world" problem using GIS programming. Graduate students will be responsible for identifying a "customer" who needs a GIS program developed to extend or automate a commercial GIS platform (e.g., ArcGIS). Graduate students will work with the customer to identify the requirements for the system, supervise the undergraduate team members, and assist in the successful development of the final product.

Proposal Pitches

Each graduate student will present a 5 minute presentation of their idea for a project to the class. This will pitch will include enough details to recruit undergraduate students to work on the grad student's project. Undergraduate students will choose project teams based on their willingness to work on the project pitched by the graduate student. Graduate students who receive an insufficient number of students to complete their project will work on another graduate student's project.

Project Proposal

Each student group will submit a 1-page synopsis of the proposed topic and present a 5 minute description. This synopsis will include the problem the group will attempt to address including a set of requirements, the methods and data that will be used to accomplish their goals, and a development roadmap. The graduate student will be responsible for communicating with the "customer" to ensure that the project can be completed within the timeframe and expertise of the project team, and that the end product will responsive to the needs of the "customer".

Project Status Reports

Each student group will present two short presentations during the semester that outline project progress. Students will be graded based on progress toward project completion.

Project Deliverables

Each student group will a) deliver their project code and necessary data as an installable program; b) deliver a report summarizing the problem they were trying to address, the tools and data used to accomplish their goals, and reflections on how well their implementation meets the requirements set forth; and c) demonstrate a hands-on working version of their prototype to the class during a project presentation.

Project Grading

Each graduate student will be graded on the quality of the team project. In addition, each graduate student will provide a score for each of the team members that reflects each team member's contribution to the overall project. Students are advised to consult with the teaching assistant and/or professor in advance if issues of team member performance becomes an issue.

Labs

Labs are an important and integral portion of the course. There is simply no way to learn about GIS programming without spending considerable time in lab working on GIS programming problems. While the scheduled lab time is two hours, labs will typically require time outside of the scheduled lab hours to complete.

Labs will be due at the beginning of the following lab unless otherwise indicated. Scores for late labs will be deducted 10% per day until they are turned in, up to one week. After one week late, labs will not be accepted for credit. It is your responsibility for keeping up with lab assignments. You should talk to your Teaching Assistant and or the instructor BEFORE late labs become a problem.

Scholastic Dishonesty

It is our hope that academic dishonesty will not be a problem in this class. Texas A&M does, however, have a *Scholastic Dishonesty* policy to which both students and faculty must comply. If you have any questions about the University's Scholastic Dishonesty policy please review the Student Rules or see me. The Aggie Honor program is the new program that will handle all cases of academic dishonesty. http://www.tamu.edu/aggiehonor

All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even is you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, http://student-rules.tamu.edu, under the section "Scholastic Dishonesty."

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Student Support

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room B118 of Cain Hall. The phone number is 845-1637.

Student Resources

Services for Students with Disabilities

Room B118 of Cain Hall, 845-1637 or on the web at http://disability.tamu.edu/

There are numerous other student support organizations on campus including

Student Counseling Service

Cain Hall, 845-4427, http://scs.tamu.edu

Student Counseling Helpline 5:00pm-8:00am: 845-2700

University Writing Center

Suite 1.214 of the Evans Library, 458-1455, http://writingcenter.tamu.edu/

Course Schedule follows on the next page

Course Schedule

Week	Lecture Topics	Exams
1	Introduction to the Class & GIS Programming	
2	Programming Environments	
3	Syntax & Data Structures	
4	Controls & Functions	PROPOSAL PITCHES
5	Object Oriented Programming	PROPOSAL PRESENTATIONS
6	Object Oriented Programming	MIDTERM 1
7	Computing with Data	
		PROPOSAL STATUS REPORT I

I reserve the right to make changes to the course schedule

Course Schedule Cont.

Week	Lecture Topics	Exams
8	Programming for GIS	
9	GIS Automations	
10	GIS Customizations	**MIDTERM 2**
11	GIS Extensions	**PROPOSAL STATUS REPORT II**
12	Consuming & Distributing Code	
13	Principles and Practices of Software Development	**NO CLASS (THANKSGIVING)**
14	Future of GIS Programming	**PROJECT PRESENTATIONS & REPORT**
TBD		**FINAL EXAM**

I reserve the right to make changes to the course schedule

GIS Programming

GEOG 392

Instructor
Dr. Daniel Goldberg
Office: O&M 707F
Tel: 979-845-7141
Email: daniel.goldberg@tamu.edu
Office Hours: TBD
and by appointment

Teaching Assistants
TBD
Sections 500
Office: TBD
Email: TBD
Office Hours: TBD
Office Hours: TBD

Meeting Time and Locations

Lecture	Labs
Time: TBD	500 – TBD
Room: TBD	Room: TBD

Class web site

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Course Description

This class is an introduction to programming in general and an introduction to programming for Geographic Information Systems (GIS) in particular. This lab-oriented course covers the guiding principles behind programming syntax and data structures, and how to apply these techniques to the development of custom standalone GIS programs and the integration of these into commercial GIS platforms.

Learning Outcomes

This course is designed to introduce students to the basics of programming with modern programming languages in the context of development for and with GIS. Students will learn how to apply this knowledge to develop custom GIS applications and extensions that solve real-world problems. This course will provide students with a solid foundation in fundamental programming techniques and the knowledge to apply these techniques within GIS programming domains.

The course will start with an introduction to fundamental programming structures and techniques and quickly advance to programming issues related to developing for GIS platforms including integration of their code into industry standard GIS platforms to extend the capabilities of these systems. The course will include a lecture component where theoretical issues are covered and lab-based exercises where students have the opportunity to practice implementing these techniques in various programming languages including Python and C#.

At the end of this class, each student will be able to:

1) Identify a set of requirements for the development of a software system;
2) Implement standalone programming projects in Python and C# to solve GIS problems;
3) Integrate custom code into ArcGIS that customizes, automates, and extents its functionality;
4) Programmatically access GIS data and use these data in GIS modeling, computation, visualization, and analysis; and
5) Conceptualize, design, plan, implement, and document a custom GIS programming solution to a real-world problem.

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This course will utilize the ArcGIS™ suite of software developed by ESRI. Installable copies may be obtained from the instructor or teaching assistants.

Development Software

This course will utilize the Python which is installed with ArcGIS. This course will also utilize Visual Studio 2012 which can be downloaded as a student education version from Microsoft.

Class Attendance

The university views class attendance as the responsibility of the individual student. Information on University attendance rules can be found at http://student-rules.tamu.edu/rule07. As described below, a portion of each student's grade is based on in-class participation. This will be judged by the instructor as regular attendance and active engagement on a consistent basis that contributes to the class in some manner. **Lab attendance** is required and considered essential for successful completion of the course.

Cellular Telephones

As a courtesy to the instructor and other students please turn off all cellular telephones before the class begins.

Email

All Texas A&M students should use their Texas A&M University email accounts when emailing the instructor and teaching assistants. I may also send out class announcements via the University email system as well. It is your responsibility to check your official TAMU email account regularly.

Grading

Your grade in this class will be based as described below:

A. **Lecture**	**30%**	
Midterm 1		10%
Midterm 2		10%
Final Exam		10%
B. **Lab**	**35%**	
Exercises		35%
C. **Homework**	**10%**	
Exercises		10%
D. **Project**	**20%**	
Project Proposal		5%
Project Status Report 1		2.5%
Project Status Report 2		2.5%
Final Project		10%
E. **Participation**	**5%**	
Class Participation		5%

The grading scale for this course is as follows:
≥90% A, 80-89% B, 70-79% C, 60-69% D, <60% F

An average performance in the class will earn a satisfactory grade.

Makeups for the Exam will be allowed only for University excused absences and will be administered in compliance with university rules. Excused absences are covered in the Texas A&M University Student Rules (http://student-rules.tamu.edu)

Labs

Labs are an important and integral portion of the course. There is simply no way to learn about GIS programming without spending considerable time in lab working on GIS programming problems. While the scheduled lab time is two hours, labs will typically require time outside of the scheduled lab hours to complete.

Labs will be due at the beginning of the following lab unless otherwise indicated. Scores for late labs will be deducted 10% per day until they are turned in, up to one week. After one week late, labs will not be accepted for credit. It is your responsibility for keeping up with lab assignments. You should talk to your Teaching Assistant and or the instructor BEFORE late labs become a problem.

Final Project

Throughout the semester, undergraduate students will work in teams of up to 4 along with one or more graduate students to apply the GIS programming concepts learned in lectures with the hands-on experience gained in labs to solve a "real-world" problem using GIS programming.

Proposal Pitches

Each graduate student will present a 5 minute presentation of their idea for a project to the class. This will pitch will include enough details to recruit undergraduate students to work on the grad student's project. Undergraduate students will choose project teams based on their willingness to work on the project pitched by the graduate student. Graduate students who receive an insufficient number of students to complete their project will work on another graduate student's project.

Project Proposal

Each student group will submit a 1-page synopsis of the proposed topic and present a 5 minute description. This synopsis will include the problem the group will attempt to address including a set of requirements, the methods and data that will be used to accomplish their goals, and a development roadmap for implementing the project.

Project Status Reports

Each student group will present two short presentations during the semester that outline project progress. Students will be graded based on progress toward project completion.

Project Deliverables

Each student group will a) deliver their project code and necessary data as an installable program; b) deliver a report summarizing the problem they were trying to address, the tools and data used to accomplish their goals, and reflections on how well their implementation meets the requirements set forth; and c) demonstrate a hands-on working version of their prototype.

Grading

Each student will be graded on the quality of the team project. In addition, each student's grade will be based in part on a score they receive from their teammates evaluating their contribution to the overall project. Students are advised to consult with the teaching assistant and/or professor in advance if issues of team member performance becomes an issue.

Scholastic Dishonesty

It is our hope that academic dishonesty will not be a problem in this class. Texas A&M does, however, have a *Scholastic Dishonesty* policy to which both students and faculty must comply. If you have any questions about the University's Scholastic Dishonesty policy please review the Student Rules or see me. The Aggie Honor program is the new program that will handle all cases of academic dishonesty. http://www.tamu.edu/aggiehonor

All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even is you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, http://student-rules.tamu.edu, under the section "Scholastic Dishonesty."

"Aggies don't lie, cheat, or steal, nor tolerate those that do"

Student Support

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room B118 of Cain Hall. The phone number is 845-1637.

Services for Students with Disabilities

Room B118 of Cain Hall, 845-1637 or on the web at http://disability.tamu.edu/

There are numerous other student support organizations on campus including

Student Counseling Service

Cain Hall, 845-4427, http://scs.tamu.edu
Student Counseling Helpline 5:00pm-8:00am: 845-2700

University Writing Center

Suite 1.214 of the Evans Library, 458-1455, http://writingcenter.tamu.edu/

Course Schedule

Week	Lecture Topics	Project/Exam
1	Introduction to the Class & GIS Programming	
2	Programming Environments	
3	Syntax & Data Structures	
4	Controls & Functions	**PROPOSAL PITCHES**
5	Object Oriented Programming	**PROPOSAL PRESENTATIONS**
6	Object Oriented Programming	**MIDTERM 1**
7	Computing with Data	**PROPOSAL STATUS REPORT I**
8	Programming for GIS	
9	GIS Automations	
10	GIS Customizations	**MIDTERM 2**
11	GIS Extensions	**PROPOSAL STATUS REPORT II**
12	Consuming & Distributing Code	
13	Principles and Practices of Software Development	
14	Future of GIS Programming	**PROJECT PRESENTATIONS & REPORT**
TBD		**FINAL EXAM**

I reserve the right to make changes to the course schedule

GEOSCIENCES

DEPARTMENT OF GEOGRAPHY

Andrew Klein
Professor

TEXAS A&M UNIVERSITY

RECEIVED
NOV 12 2015
GRADUATE STUDIES

October 16, 2015

TO: **Roxanna Russell**

FROM: **Andrew Klein**

RE: **GEOG Course Changes – How graduate versions differ from undergraduate versions**

For staffing and other issues, many of the Geography Department's courses in Geographic Information Science & Technology are taught as stacked undergraduate/graduate courses. In all cases, care has been taken to ensure adequate differentiation of the two versions of the course. This memo summarizes the differences for the following courses

1. GEOG 651/GEOG 361
2. GEOG 660/GEOG 390
3. GEOG 676/GEOG 392

1. GEOG 651/GEOG 361

The main difference between GEOG 651 and GEOG 361 is that the graduate students in GEOG 651 need to do a final project/paper, as well as an in-class presentation of that work, in addition to all of the requirements that GEOG 361 students need to meet. Associated with this additional assignment for GEOG 651 students, the weights for the different components of the respective courses of course differ. For GEOG 361, the weights are as follows: 1) Midterm Exam: 30%; 2) Final Exam: 30%; 3) Laboratory Exercises: 40%. And for GEOG 651, the weights are as follows: 1) Midterm Exam: 25%; 2) Final Exam: 30%; 3) Laboratory Exercises: 25%; 4) Final Project/Paper: 20%. Furthermore, GEOG 651 students are also assigned some additional readings from a more advanced remote-sensing textbook (i.e., the Schott (2007) book); these readings are not assigned to the GEOG 361 students.

2. GEOG 660/GEOG 390

The graduate version of the class GEOG 660 – Applications in GIS – requires all graduate students to complete an independent project and write it up as a research paper following the format of the *International Journal of Geographic Information Science*. This is not simply a literature-based exercise, it requires students to formalize a research question answerable using GIS which they submit as an abstract, locate GIS data sources that will form the basis of the research (also submitted for a grade) and finally completion of a research paper. In

'ller O&M Building 810
.147 TAMU
College Station, TX 77843-3147

Tel. 979.845.5219 Fax: 979.862.4487
klein@geog.tamu.edu
http://geography.tamu.edu

addition, graduate students are provided some leeway on two labs required by the undergraduates as it is felt that graduate students may not need as much formalized instruction as undergraduate with some of the simpler GIS techniques as they should be more self-sufficient in learning GIS software.

3. GEOG 676/GEOG 392

The graduate version has a greater grading emphasis on the semester projection while the undergraduate version has a larger emphasis on the individual labs. Each graduate student is expected to lead one of the research teams while undergraduates must only participate on a team.

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NOV 09 2015

GRADUATE STUDIES

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Geography
3. Course prefix, number and complete title of course: GEOG 678 WebGIS

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ______ To: ______
   b. Withdrawal (reason): ______
   c. Cross-list with: ______

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ______
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
GEOG	678	WEBGIS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	2.00		4.00	45070206	1250	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
GEOG	678	WEBGIS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	1.00		3.00		1250	16 / 17	0 0 3 6 3 2	6

Approval recommended by:

[signature]	10/27/15	[signature]	10/15/2015
Department Head or Program Chair *(Type Name & Sign)*	Date	Chair, College Review Committee	Date
		[signature]	10/15/2015
Department Head or Program Chair *(Type Name & Sign)* *(if cross-listed course)*	Date	Dean of College	Date

Submitted to Coordinating Board by:

Chair, GC or UCC ______ Date

Associate Director, Curricular Services ______ Date ______ Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.

Curricular Services – 08/14

WebGIS

GEOG 678

Instructor
Dr. Daniel Goldberg
Office: O&M 707F
Tel: 979-845-7141
Email: daniel.goldberg@tamu.edu
Office Hours: TBD
and by appointment

Teaching Assistants
TBD
Sections 500
Office: TBD
Email: TBD
Office Hours: TBD
Office Hours: TBD

Meeting Time and Locations

Lecture
Time: TBD

Room: TBD

Labs
500 – TBD

Room: TBD

Class web site

Updates to the lecture and lab syllabi as well as other course materials will be made available on the course website. It can be accessed on ELearning at http://ecampus.tamu.edu.

Course Description

This class is an introduction to web-based Geographic Information Systems (WebGIS). This lab-oriented course covers server-oriented architectures and their application in creating web-based GIS applications and services. This course introduces students to web server, service, and database setup, management and utilization in the development of data-rich WebGIS applications.

Learning Outcomes

This course is designed to introduce students to the basics of producing, managing, and consuming web-based Geographic Information Systems (WebGIS) in the context of server-oriented architectures (SOA). Through hands-on experience, students will learn to setup, administer, and utilize industry-standard WebGIS platforms including Esri ArcServer and Microsoft SQL Server. This course will provide students with a solid foundation in the installation and use of WebGIS databases and services as well as a basic knowledge of how to utilize these in the development of web maps.

The course will start with an introduction to fundamental Internet architectures used in production-level WebGIS platforms. The course will next cover hands-on installation, publishing, and management of industry-standard WebGIS platforms, services, and data. Finally, students will learn and employ introductory JavaScript programming to integrate their WebGIS databases and services within custom-developed web-based maps using commercially-available and commonly-used web-mapping application programming interfaces (APIs). The course will include a lecture component where theoretical issues are covered and lab-based exercises where students have the opportunity to practice setting up, managing, and implementing these techniques and technologies.

At the end of this class, each student will be able to:

1) Identify a set of requirements for implementing WebGIS servers and services;
2) Setup and administer industry-standard WebGIS servers;
3) Publish and consume data and services to and from WebGIS servers;
4) Programmatically access GIS data and services from WebGIS servers and use these in the production of web-based maps; and
5) Critically assess design and implementation patterns for deploying WebGIS systems within a larger CyberGIS environment;
6) Conceptualize, design, plan, implement, and document a custom WebGIS solution to a real-world problem; and
7) Interact with a real-world client to identify a set of requirements for a WebGIS project and lead a team of students in the design, execution, and evaluation of the project.

Textbooks and Readings

Lecture Texts

Fu P, Sun J, 2010. **Web GIS: Principles and Applications**. 1st ed. Redlands, CA, ESRI Press. 312 pp.

Additional readings and materials will be drawn from websites, handouts, and online resources.

GIS Software

This course will utilize the ArcGIS™ suite of software developed by ESRI including ArcServer and Python. Installable copies may be obtained from the instructor or teaching assistants.

Database Software

This course will utilize the Microsoft SQL Server™ suite of software. Installable copies may be downloaded from the Microsoft Dream Spark program available to TAMU students.

Development Software

This course will utilize the JavaScript, Python, and C# programming languages which can be developed with basic text editing software and/or with Microsoft Visual Studio which can be downloaded for free from DreamSpark

Class Attendance

The university views class attendance as the responsibility of the individual student. Information on University attendance rules can be found at http://student-rules.tamu.edu/rule07. As described below, a portion of each student's grade is based on in-class participation. This will be judged by the instructor as regular attendance and active engagement on a consistent basis that contributes to the class in some manner.

Lab attendance is considered essential for successful completion of the course.

Grading

Your grade in this class will be based equally on the lecture and labs as described below

A. **Lecture**	**30%**	
Midterm 1		10%
Midterm 2		10%
Final Exam		10%
B. **Lab**	**20%**	
Exercises		20%
B. **Homework**	**5%**	
Exercises		5%
C. **Project**	**40%**	
Project Proposal		10%
Project Status Report 1		2.5%
Project Status Report 2		2.5%
Final Project		25%
D. **Participation**	**5%**	
Class Participation		5%

The grading scale for this course is as follows: ≥90% A, 80-89% B, 70-79% C, 60-69% D, <60% F

Final Project

Throughout the semester, undergraduate students will work in teams of up to 2 along with one or more graduate students to apply the WebGIS concepts learned in lectures with the hands-on experience gained in labs to solve a "real-world" problem using WebGIS. Each project will be based on the needs of a "customer" who will provide a project idea. Groups will be expected to meet with the "customer" regularly throughout the semester.

Proposal Pitches

Each graduate student will identify a "customer" who will provide a project idea. Each graduate student will present a 5 minute presentation of their idea for a project to the class. This will pitch will include enough details to recruit undergraduate students to work on the grad student's project. Undergraduate students will choose project teams based on their willingness to work on the project pitched by the graduate student. Graduate students who receive an insufficient number of students to complete their project will work on another graduate student's project.

Project Proposal

Each student group will submit a 1-page synopsis of the proposed topic and present a 5 minute description. This synopsis will include the problem the group will attempt to address including a set of requirements, the methods and data that will be used to accomplish their goals, and a development roadmap for implementing the project.

Project Presentations

Each student group will present their project three times. The first is the project pitch; the second is a project status presentation; the third is the final project presentation.

Project Status Reports

Each student group will present two short presentations during the semester that outline project progress. Students will be graded based on progress toward project completion.

Project Deliverables

Each student group will a) host their project code and necessary data and set of WebGIS services and accompanying online maps, data, and/or services; b) deliver a report summarizing the problem they were trying to address, the tools and data used to accomplish their goals, and reflections on how well their implementation meets the requirements set forth; and c) demonstrate a hands-on working version of their prototype to the class during a project presentation.

Grading

Each student will be graded on the quality of the team project. In addition, each student's grade will be based in part on a score they receive from their teammates evaluating their contribution to the overall project. Students are advised to consult with the teaching assistant and/or professor in advance if issues of team member performance becomes an issue.

Labs

Labs are an important and integral portion of the course. There is simply no way to learn about WebGIS setup, programming, or maintenance without spending considerable time in lab working on with these data and services. While the scheduled lab time is two hours, labs will typically require time outside of the scheduled lab hours to complete.

Labs will be due at the beginning of the following lab unless otherwise indicated. **Late labs will not be accepted for credit.** It is your responsibility for keeping up with lab assignments. You should talk to your Teaching Assistant and or the instructor BEFORE late labs become a problem.

Homework Assignments

Small homework assignments will be assigned each week along with a series of online training documents which supplement the materials presented in class.

Homework assignments will be due as indicated on the homework assignment. **Late homework assignments will not be accepted for credit.** It is your responsibility for keeping up with homework assignments. You should talk to your Teaching Assistant and or the instructor BEFORE late homework assignments become a problem.

Scholastic Dishonesty

It is our hope that academic dishonesty will not be a problem in this class. Texas A&M does, however, have a *Scholastic Dishonesty* policy to which both students and faculty must comply. If you have any questions about the University's Scholastic Dishonesty policy please review the Student Rules or see me. The Aggie Honor program is the new program that will handle all cases of academic dishonesty. http://aggiehonor.tamu.edu

All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

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Student Counseling Helpline 5:00pm-8:00am: 845-2700

University Writing Center

Suite 1.214 of the Evans Library, 458-1455, http://writingcenter.tamu.edu/

Makeups

Makeups for the Exam and other work will be allowed only for University excused absences and will be administered in compliance with university rules. Excused absences are covered in the Texas A&M University Student Rules (http://student-rules.tamu.edu)

Course Schedule (Tentative)

Week	Class Topics	Exam	Project Assignment Due*	Lab	Training	Homework Assignment Due*	Reading
1	Introduction to the Class & WebGIS			Computer Forms	Code Academy HTML I		
	… Continued						Fu & Sun 1 - 2
2	WebGIS Environments & Architechtures			Server Connections & Basic HTML & GitHub	Code Academy Javascript I	HTML	Fu & Sun 3
	… Continued						Fu & Sun 4
3	Languages, Data Structures & Data Types			Advanced HTML	Code Academy Javascript II	Javascript	
	- Proposal Pitches		Proposal Pitches				
4	WebGIS APIs			HTML & Javascript	Google Maps API	Javascript	
	… Continued						
5	Exam Review					Google Maps	
		Midterm I					
6	Exam Solutions, SQL Server & Data Modeling			Javascript, JQuery & Data			
	- Project Proposals		Proposal Presentations				
7	SQL Server & Data Modeling			Data-Driven Web Pages	W3Schools SQL	Javascript	
	… Continued						
8	(Arc)GIS Servers, Services, Mapping & ArcGIS.com			SQL Server Setup & Data Modeling	ArcGIS.com Guides	SQL	Fu & Sun 6 - 7
	… Continued						

I reserve the right to make changes to the course schedule

Course Schedule (Tentative)

Week	Class Topics	Exam	Project Assignment Due*	Lab	Training	Homework Assignment Due*	
9	GeoProcessing Services			ArcServer Setup, Data Publishing & Use	ArcGIS.com Guides	ArcGIS.com	
	Exam Review						
10		**Midterm II**					
	Exam Solutions, ArcGIS Web APIs & Services						
11	ArcGIS Web APIs & Services			GeoProcessing Services Publishing & Use			
	- Project Status Presentations		Status Presentations				
12	- Project Preparation Time			ArcGIS Web APIs			
	- Project Preparation Time						
13	Future of WebGIS						Fu & Sun 5
	… Continued		Final Presentation				
14	**- Project Presentations**		Final Presentation				
	- Project Presentations		Final Presentation				

I reserve the right to make changes to the course schedule

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RECEIVED

NOV 17 2015

GRADUATE STUDIES

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional
• Submit original form and attachments •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Aerospace Engineering
3. Course prefix, number and complete title of course: MEMA 613 - Principles of Composite Materials

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ______ To: ______
   b. Withdrawal (reason): ______
   c. Cross-list with: MSEN 610

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ______
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
MEMA	613	PRINC OF COMPOSITE MTL

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3.00	0.00		3.00	1418010006	0100	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
						-	0 0 3 6 3 2	

Approval recommended by:

Vikram K. Kinra -AERO [signature] 11/06/15
Department Head or Program Chair *(Type Name & Sign)* Date

Prasad Enjeti [signature] 11/17/2015
Chair, College Review Committee Date

Miladin Radovic - MSEN [signature] 11/05/15
Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Prasad Enjeti [signature] 11/17/2015
Dean of College Date

Karen Butler-Purry
Chair, GC or UCC Date

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 08/14

DWIGHT LOOK COLLEGE OF
ENGINEERING

Department of Materials Science & Engineering

TEXAS A&M UNIVERSITY

November 5, 2015

MEMORANDUM

TO: Office of Curricular Services

THROUGH: Vikram K. Kinra
Professor and Director of Graduate Programs
Department of Aerospace Engineering

FROM: Miladin Radovic
Associate Department Head and Graduate Program Director
Department of Materials Science and Engineering

SUBJECT: Approval of Cross-listed Courses

We, the undersigned graduate program directors, confirm that we approve the cross-listing of MEMA 613 and the newly formed MSEN 610.

If you have any questions, please feel free to contact me at mradovic@tamu.edu .

RECEIVED
NOV 09 2015
EASA

3003 TAMU
College Station, TX 77843-3033

Tel. 979.845.0750 Fax. 979.862.6835
engineering.tamu.edu/materials

Supporting Statement for item 4c

The faculty member teaching "Principles of Composite Materials" is jointly appointed in AERO (Aerospace Engineering) and MSEN (Materials Science and Engineering). It is his intention to provide a course available for students in one of both majors.

TEXAS A&M UNIVERSITY

Syllabus

Principles of Composite Materials
MEMA 613/MSEN 610 Spring 2017

Instructor	Dr. Ramesh Talreja, Professor, Department of Aerospace Engineering, and Department of Materials Science and Engineering
Instructor contact	(979) 458-3256; talreja@tamu.edu; 736A HRBB
Text	Book: Analysis and Performance of Fiber Composites, Third Edition, B.D. Agarwal, L. J. Broutman & K. Chandrashekhara, John Wiley, 2006. Selected papers and handout notes
Course Description	Introduction to fiber reinforced composite material systems with emphasis on the fundamental principles; introduction to processing and manufacturing of polymer-, metal- and ceramic-matrix composites; introduction to simple micromechanics estimates of elastic properties; elastic behavior of a unidirectional lamina; laminate plate theory; experimental characterization of composites; emerging composites; damage, fatigue, and failure; selected special topics.
Prerequisite:	Basic courses in mechanics and materials science; graduate classification.
Learning outcomes	Students will become familiar with the fundamental principles underlying composite material systems; they will understand the criteria for selection of composite constituents for given applications; they will learn how to estimate and characterize elastic behavior of composites with multiple fiber orientations; they will understand the basic mechanisms governing failure of composites; they will gain additional knowledge of composites in selected areas through directed studies.
Grading Assignments	The course letter grade will be based on homework assignments, and one term paper. Homework will be assigned typically once a week, due the week after, and will carry 60%; the project term paper will have 40%.
Grading scale	The final weighted average of each student will be calculated based on the indicated grade distribution. The letter grade will be assigned by the following criterion: A>=90; 80=<B< 90; 70 =< C< 80; 60=<D<70; F<60.
Copyrights	The handouts used in this course are copyrighted. By "handouts" we mean all materials generated for this class, which include but are not limited to syllabi, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless the author expressly grants permission.

Topics to be covered		
Week 1		Types of fiber and matrix materials.
Week 2		Processing and manufacturing methods
Week 3		Micromechanics estimates of properties
Week 4		Unidirectional composites; orthotropic solids
Week 5		Laminate plate theory
Week 6		Laminate plate theory – contd.
Week 7		Short-fiber composites
Week 8		Experimental characterization
Week 9		Interlaminar stresses and free-edge effects
Week 10		Nonlinear/time-dependent constitutive relations (plasticity/viscoelasticity/viscoplasticity)
Week 11		Failure – static and fatigue
Week 12		Selected applications – emerging composite systems
Week 13		Selected applications, contd.
Week 14		*Project Term Paper Due*
Americans with Disabilities Act (ADA) Policy Statement	The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu	
Academic Integrity Statement and Policy	"An Aggie does not lie, cheat or steal, or tolerate those who do." For additional information, please visit: http://aggiehonor.tamu.edu. As commonly defined, plagiarism consists of passing off as one's own the ideas, work, writings, etc., that belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules [http://student-rules.tamu.edu/], under the section "Scholastic Dishonesty."	
Attendance policy	The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located on-line at http://student-rules.tamu.edu/rule07 . Please come on time. Silence cell-phones and other electronic distractions.	

Make-up Policy	If an absence is excused, the instructor will either provide the student an opportunity to make up any quiz, exam or other work that contributes to the final grade or provide a satisfactory alternative by a date agreed upon by the student and instructor. If the instructor has a regularly scheduled make up exam, students are expected to attend unless they have a university approved excuse. The make-up work must be completed in a timeframe not to exceed 30 calendar days from the last day of the initial absence. The student is responsible for providing satisfactory evidence to the instructor to substantiate the reason for the absence. Among the reasons absences are considered excused by the university are the following (see Student Rule 7 for details http://student-rules.tamu.edu/rule07). The fact that these are university -excused absences does not relieve the student of responsibility for prior notification and documentation. Failure to notify and/or document properly may result in an unexcused absence. Falsification of documentation is a violation of the Honor Code. 1. Participation in an activity that is required for a class and appears on the university authorized activity list at https://studentactivities.tamu.edu/app/sponsauth/index 2. Death or major illness in a student's immediate family. 3. Illness of a dependent family member. 4. Participation in legal proceedings or administrative procedures that require a student's presence. 5. Religious holy day. NOTE: Prior notification is NOT required. 6. Injury or illness that is too severe or contagious for the student to attend class. i. Injury or illness of three or more class days: Student will provide a medical confirmation note from his or her medical provider within one week of the last date of the absence (see Student Rules 7.1.6.1) ii. Injury or illness of less than three class days: Student will provide one or both of these (at instructor's discretion), within one week of the last date of the absence: a) Texas A&M University Explanatory Statement for Absence from Class form available at http://attendance.tamu.edu or b) Confirmation of visit to a health care professional affirming date and time of visit. 7. Required participation in military duties. 8. Mandatory admission interviews for professional or graduate school that cannot be rescheduled.

	9. Mandatory participation as a student-athlete in NCAA-sanctioned competition. 10. In accordance with Title IX of the Educational Amendments of 1972, Texas A&M University shall treat pregnancy (childbirth, false pregnancy, termination of pregnancy and recovery therefrom) and related conditions as a justification for an excused absence for so long a period of time as is deemed medically necessary by the student's physician. Requests for excused absence related to pregnancy should be directed to the instructor. Other absences may be excused at the discretion of the instructor with prior notification and proper documentation In cases where prior notification is not feasible (e.g., accident or emergency) the student must provide notification by the end of the second working day after the absence, including an explanation of why notice could not be sent prior to the class. Accommodations sought for absences due to the observance of a religious holiday can be sought either prior or after the absence, but not later than two working days after the absence.

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Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Materials Science and Engineering
3. Course prefix, number and complete title of course: MSEN 601, Fundamentals of Materials Science and Engineering

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ____ To: ____
   b. Withdrawal (reason): ____
   c. Cross-list with: ____

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ____
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
MSEN	601	FNDMTL MATLS SCIENCE ENG

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
4.00	0.00	0.00	4.00	4010010002	1864	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
MSEN	601	FNDMTL MATLS SCIENCE ENG

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	0.00	0.00	3.00	4010010003	1864	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Miladin Radovic [signature] 11/05/2015
Department Head or Program Chair *(Type Name & Sign)* Date

Prasad Enjeti [signature: V E Taylor] 11/17/2015
Chair, College Review Committee Date

____
Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Prasad Enjeti [signature: V E Taylor] 11/17/2015
Dean of College Date

Karen Butler-Purry
Chair, GC or UCC Date

Submitted to Coordinating Board by:

____
Associate Director, Curricular Services

____ Date

____ Effective Date

SYLLABUS - Fundamentals of Materials Science and Engineering MSEN 601 - 600
Fall 2016
Credit: (3 – 0)

Instructor Information

Instructor: Xinghang Zhang
Office: ENPH 326
Office Phone: 979-845-2143
E-mail: zhangx@tamu.edu

Location	Time
TBD	TBD

The instructor's office hour: M W 3-4 pm or by appointment, in MEOB 224 (office side)

TA – Zhe Fan

Office hour: 1-2:00 pm on Tuesday and Thursday
Location: Doherty 301 L
Phone: 979-587-2957
Email: vanstart2012@gmail.com

Prerequisite

In general, you need to be a graduate student to register this class.

Course Topics & Calendar

Topics

- Provides graduate students with fundamental materials science knowledge used to perform materials related research and development.
- Investigate processing-microstructure (chemistry) – properties relationship. Briefly we will study chemical bonding, crystal structures and microstructure, defects in solids, theory of dislocations, mechanical properties and strengthening, basic thermodynamics for solid materials, phase diagrams and transformations; nucleation and growth. Enables students to predict microstructures and mechanical properties from phase diagrams.
- Introduces laboratory experimentation and presentation of materials test results.

STUDENT REQUIREMENTS

- Take responsibility for individual learning
- Take responsibility for other individual's learning through participation in team activities

Grading Policy (To be determined)

The table below shows that your grade is 75% individual work and the remainder is team performance. I will assign the teams. Each team will have 3-5 students from hopefully different department. Teams will work cooperatively on team projects and laboratory reports.

Activity	Percent of Grade	Work Component	Dates
Midterm	30	Individual work in a closed book exam. One formula sheet allowed.	**Oct. 13, Thurs. (tentative)**
Final Exam	40	Individual work in a closed book exam. One formula sheet allowed. Exam is comprehensive	**Dec., TBD**
Homework	0	Team work is encouraged.	Spread throughout the semester.
In class quizzes About 4 quizzes.	10	Test for homework, lectures and reading assignment	Spread throughout the semester.
Other team project – term paper	15	Term paper and presentation (A materials science topic presented by the team)	
Report	5	2-3 page document discussing what you have learned from an assignment to be given by the instructor	TBD
TOTAL	100		

Grading scale: 90-100=A, 80-89=B, 70-79 = C, 60-69 = D, < 60 = F.

Midterm Exam (30%)

You will take a one-hour exam in the class during the semester which is worth 20% of your grade. One formula sheet is allowed.

Final Exam (40%)

The final exam will occur at the scheduled final time. The final will be worth 35% of your grade and it will be comprehensive, that is, any topic covered during the semester might appear on the final. YOU MAY NOT TAKE THE FINAL EXAM EARLY. DO NOT PLAN TO TRAVEL UNTIL YOU HAVE COMPLETED THE EXAM. If you do not make arrangements to take the exam late, I will record a grade of zero for the final and assign your course grade. If you have a significant reason for delaying the completion of the course I might agree to give you an incomplete. I must approve this in advance.

The final exam is a closed book and comprehensive test. We allow one formula sheet of 8.5 x 11 inch paper that is 0.001 to 0.010 inches thick for your notes. All notes and images on the sheet must be hand drawn. No machine reproduced images are allowed. You must attach your note sheet to the final exam or we will not grade it.

Homework (0%)
Students are encouraged to work on their homework. However, homework will not be graded.

In class quizzes (10%)
A 15 minute closed book quiz will be given at the beginning of class to test a general understanding of the subject matter of a previous lecture and homework assignment. There will be a total of about 5 quizzes.

Policy for make-up quizzes and exams
There is no make-up exam for midterm or final. In general there will also be no make-up tests for quizzes and labs. Under special circumstances, such as illness or family emergency etc., we may consider a make-up test for quizzes.

Other team project – term paper presentation and report (15%)
Each team will select a topic on materials science from the list suggested by the instructor. A presentation will be 10-15 min long followed by 5 min question and answer. Presentation and term paper will be evaluated and graded. The team can determine the format of presentation. The time of the presentation will spread out during the semester. And the topic will be related to the subject of the course before the presentation time.

Report – (5%)
You will be instructed by the instructor with an assignment. After the assignment a report (2-3 pages) must be submitted to describe what you have learned.

Absences
I handle absences as required by the student rules.

Excused Absences
7.1. The student is responsible for providing satisfactory evidence to the instructor to substantiate the reason for absence. Among the reasons absences are considered excused by the university are the following:

7.1.6 Injury or Illness that is too severe or contagious for the student to attend class.

7.1.6.1 **Injury or illness of three or more days.** For injury or illness that requires a student to be absent from classes for three or more business days (to include classes on Saturday), the student should obtain a medical confirmation note from his or her medical provider. The Student Health Center or an off-campus medical professional can provide a medical confirmation note only if medical professionals are involved in the medical care of the student. The medical confirmation note must contain the date and time of the illness and medical professional's confirmation of needed absence.

7.1.6.2 **Injury or illness less than three days**. Faculty members may require confirmation of student injury or illness that is serious enough for a student to be absent from class for a period less than three business days (to include classes on Saturday). At the discretion of the faculty member and/or academic department standard, as outlined in the course syllabus, illness confirmation may be obtained by one or both of the following methods:

a. Texas A&M University Explanatory Statement for Absence from Class form available at http://attendance.tamu.edu.

b. Confirmation of visit to a health care professional affirming date and time of visit.

7.1.6.3 An absence for a non acute medical service does not constitute an excused absence.

Course Text materials.

I will use some chapters of the following textbooks for this class.

1. Structure and bonding in crystalline materials, by Gregory S. Rohrer, 2001,
ISBN: 0521663792
2. Introduction to dislocations, by D. Hull and D. J. Bacon,
ISBN: 0750646810
3. Mechanical Metallurgy, by George E. Dieter, (1988)
ISBN: 007084187X
4. Phase Transformations in Metals and Alloys, by D. A. Porter and K. E. Easterling,
ISBN: 0412450305
5. Physical Metallurgy Principles, by Robert E. Reed-Hill and Rezar Abbaschian,
ISBN: 0-534-92173-6.
6. Thermodynamics of Solids, by Richard A. Swalin,
ISBN: 0-471-83854-3

For students who have very limited materials science background, please use the following text book as a starting point: Materials Science and Engineering: An Introduction 6th or 8th Edition. William D. Callister, Jr., John Wiley & Sons, Inc.
ISBN: 0471135763 (8th edition)

Material Covered

See the Calendar table below for details.

Calendar (Tentative schedule)

Dates	Subject	Comments
Week 1	Introduction	
Week 1,2	Atomic Structure and Interatomic Bonding	
Week 2,3	Structures of metals and ceramics	
Week 3	Imperfections (defects) in Solids	
Week 3,4,5	Introduction to theory of dislocations Elastic properties of dislocations Dislocation in crystals	
Week 5	Diffusion	
Oct. 7 (Wed)	Review for midterm	
Week 6	Mechanical properties	
Oct. 13 (Thurs) (tentative)	**Midterm exam**	
Week 7	Mechanical properties/strengthening	
Week 7	Solutions for midterm	
Week 8	Strengthening, fracture and failure	
Week 8	Thermodynamics of solid materials	
Week 9	Thermodynamics of solid materials	
Week 10, 11	Phase Diagrams	
Week 12	Nucleation and growth theory	
Week 12	Phase Transformations	
Nov. 25-27	Thanksgiving holidays	No class (Holidays)
Nov. 30, Dec. 2,	Term paper presentation week	
Dec. 6 (Tuesday)	Last day of class: Review for final exam	
Dec. 13	**Final exam (comprehensive)**	

(Tentative)		

Americans with Disabilities Act (ADA) Policy Statement

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Academic Integrity Statement

***Aggie Honor Code:* "An Aggie does not lie, cheat, or steal, or tolerate those who do."**

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the Texas A&M University community from the requirements or the processes of the Honor System. For additional information please visit: www.tamu.edu/aggiehonor/

Supplemental Reading Materials

1. Fundamentals of Ceramics, by Barsoum, Michel W.,
ISBN: 978-0750309028
2. Theory of Dislocations, By John P. Hirth and Jens Lothe (1992)
ISBN: 0894646176
3. Electronic Properties of Materials, Rolf E. Hummel, 3rd edition, (2000)
ISBN: 038795144X

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GRADUATE STUDIES

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Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional
• Submit original form and attachments •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Materials Science and Engineering
3. Course prefix, number and complete title of course: MSEN 602, Advanced Materials Science and Engineering

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ____ To: ____
   b. Withdrawal (reason): ____
   c. Cross-list with: ____

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ____
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:
ADVANCED MATERIALS SCIENCE AND ENGINEERING, Fundamentals of quantum mechanics, physics of solid state, and physical electronics and photonics for advanced materials. Topics will include: basic quantum mechanical problems, quantum basis for structural and physical properties of solids, lattice vibrational effects in solids, free electron model for magnetism in solids, semiconductor materials and devices, nanostructures and mesoscopic phenomena,superconductivity, recent advances in new materials.
10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):
PHYSICS OF MATERIALS, Understanding of modern molecular level description of underlying physico-chemical behavior and properties of materials: such as thermal, mechanical, kinetic (transport), electronic, magnetic and optical properties and provide them with a rational basis for the synthesis, characterization and processing of such materials, materials systems for engineering applications.

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
MSEN	602	ADVNCD MATLS SCIENCE ENG

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
4.00	0.00	0.00	4.00	1418010006	1864	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
MSEN	602	PHYSICS OF MATERIALS

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3.00	0.00	0.00	3.00	1418010006	1864	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Miladin Radovic [signature] 11/15/2015
Department Head or Program Chair *(Type Name & Sign)* Date

Prasad Enjeti [signature] 11/17/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Prasad Enjeti [signature] 11/17/2015
Dean of College Date

Submitted to Coordinating Board by:

Karen Butler-Purry
Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

Supporting Statement for item 4d

Course title and description change were implemented since a portion of the content in the course is being taught in another graduate-level MSEN course. For this reason, the credit hours for the course is being lowered. To reflect those changes, the course content was adjusted to an advanced level.

MSEN 602 Physics of Materials
(3.0 credits)

Spring 2016

Instructor
Dr. Tahir Cagin
MEOB 526
Tel. 979-862-2416
e-mail tcagin@tamu.edu

Textbook
Assigned Textbook:
Physics and Chemistry of Materials by J.I. Gersten and F.W. Smith.
Supplementary textbooks
Introduction to Solid State Physics, C. Kittel
Elementary Solid State Physics, M. A. Omar

Course Objectives: Arm graduate students in science and engineering disciplines with an understanding of modern molecular level description of underlying physico-chemical behavior and properties of materials: such as thermal, mechanical, kinetic (transport), electronic, magnetic and optical properties and provide them with a rational basis for the synthesis, characterization and processing of such materials, materials systems for engineering applications. This advanced materials science and engineering course will cover the classical and quantum mechanics; and statistical mechanics as they are relevant to material properties. Students will be exposed to the scientific background and foundation of the modern materials science through the lectures which focus on the phenomena.

Grading policy

Homeworks and class participation	20%
Midterm exams (2)	50%
Final exam	30%

Grading Scale

A	90 - 100
B	80 – 89
C	70 – 79
D	60 – 69
F	<60

Office Hours:
Faculty: 1 hour / week
TA: 2 hours/week

Homework:
Students will be assigned homework for each chapter covered. (10-12 homeworks)

Midterms:
Each exam will generally consist of problems similar in content and difficulty to the homework; however, they may differ from the homework problems. The entire solution will be graded and partial credit given if merited. Your work must show steps toward the solution; the answer alone is not sufficient.

Course outcome:
Students will

- Identify primitive and conventional cells, Brillouin zones, reciprocal lattice for different lattices
- Understand lattice vibrations: phonons, thermal and dynamic properties of crystals from harmonic/quasiharmonic description of materials
- Understand how electrons are treated, and emergence of band structure, density of states and electronic properties of materials
- Understand relation between different types of band structure and electronic, optical, magnetic and other properties of materials
- Understand the molecular level basis for dielectric, piezoelectric, ferroelectric behavior.
- Understand magnetism, superconductivity and other materials-related phenomena
- Understand the optical properties of materials
- Understand the role of dimensionality and size effects (Nanoscale phenomena)

Course Outline – MSEN 602:

1) Introduction to Physics of Materials — 1 h

2) Classical Mechanics and Quantum Mechanics Preliminaries — 3 h

3) Statistical Mechanics and Quantum Mechanics Preliminaries — 3 h

4) Lattice Vibrations in Materials — 7 h
    a. Vibrations, and Lattice Excitations
    b. Phonons and Thermo-mechanical properties
    c. Phonons and dynamic properties; and lattice thermal transport

5) Electrons and Band Structure (Metals & Semiconductors) — 6 h
    a. Free electron model
    b. Band structure
    c. Electronic Transport

6) Electrons, band structure: Bonding associated function in materials — 4 h
    a. Metals revisited
    b. Ionic Materials – polarization, dielectrics, piezoelectrics

    c. Covalently bonded materials – semiconductors, conductors, and insulators; the range of electronic function in organic materials.

7) Magnetism in materials — 5 h
    a. Origin of magnetism in materials
    b. Types of magnetic behavior
    c. Phase transformations

8) Optical behavior of materials — 5 h
    a. Classical Electromagnetism
    b. Quantum mechanical treatment of optical behavior materials

9) Dimensionality and size effects in Materials (Emergence of Nanomaterials) — 5 h

Your Responsibilities
Texas A&M University assumes that all students enroll in its programs with a serious learning purpose and expects them to be responsible individuals who demand of themselves high standards of honesty and personal conduct. All students are expected to behave at all times with respect and courtesy toward their fellow students and instructors and are to have the highest standards of

Attendance policy:
The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located on-line at http://student-rules.tamu.edu/rule07

Americans with Disabilities Act (ADA) Policy Statement
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Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Oceanography
3. Course prefix, number and complete title of course: OCNG 615 Numerical Modeling of Ocean Circulation I

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: OCNG 608 To: Graduate classification or approval of instructor
   b. Withdrawal (reason):
   c. Cross-list with: ATMO 618 and GEOP 618

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course:
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

Numerical Modeling of Ocean Circulation I. Mathematical theory and numerical technique of model development for ocean circulation; concepts of numerical consistency and stability; Lax equivalence theorem; commonly used finite difference schemes in ocean modeling; finite element and spectral methods as alternative means of discretisation; positivity and CFT method; relaxation and direct methods for solving elliptic equations.

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

Numerical Methods for the Geosciences. Mathematical theory and numerical techniques for modeling physical systems and processes in the Geosciences; discretization of continuum equations for solids and fluids; finite difference methods, convergence, consistency, and stability; finite element and spectral methods in fluid dynamics and seismology; iterative solvers; implicit and explicit methods for diffusion and advection.

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
OCNG	615	NUMERICAL MODELING I

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
03	02	00	04	4006070002	2140	0 0 3 6 3 2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
OCNG	618	NUMERICAL METHODS GEOSCIENCES

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
03	00	00	03	4006070002	2140	16 - 17	0 0 3 6 3 2	6

Approval recommended by:

Deborah Thomas DJ 11/10/15

Department Head or Program Chair *(Type Name & Sign)* Date

[signature] 11/11/15

Chair, College Review Committee Date

Michael C Pope - Michael C. Pope 11/09/15

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

[signature] 11/11/15

Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Supporting statement for changes in OCNG 615

The following changes are requested for OCNG 615 – Numerical Modeling of Ocean Circulation I to adjust its content and scope for a broader audience and to fulfill the requirements of the upcoming certificate program in Computational Geosciences, which is being developed within the College of Geosciences:

1. **Course syllabus.** A few topics have been added to broaden the original scope of the course from ocean circulation to a larger set of physical processes studied within the disciplines of the Geosciences by using similar mathematical and numerical methods. The resulting course is expected to serve a wider student population and will be one of the required courses in the new Computational Geosciences certificate program.

2. **Course title.** A change in course title is necessary to more accurately reflect its broader content and scope;

3. **Course number.** A new course number is requested in order to cross-list the revised course with identical courses proposed in the Atmospheric Sciences and Geology and Geophysics departments;

4. **Prerequisites.** Original prerequisites are dropped to include a larger and interdisciplinary student base;

5. **Cross-listing.** Cross-listing will improve interdisciplinary exchanges among graduate students and between college programs;

6. **Contact hours and semester credit hours.** The 2 contact lab hours in OCNG 615 will be eliminated since the original lab programming assignments will be covered in greater detail in the proposed new course: Fundaments of High Performance Computing for the Geosciences (ATM/OCNG/GEOP 634). As a result, the number of semester credit hours is requested to change from 4.00 to 3.00.

TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	**Numerical Methods for the Geosciences, OCNG 618**
Term (e.g., Fall 200X)	Fall 201X
Meeting times and location	TBD

Course Description and Prerequisites

Mathematical theory and numerical techniques for modeling physical systems and processes in the Geosciences; discretization of continuum equations for solids and fluids; finite difference methods, convergence, consistency, and stability; finite element and spectral methods in fluid dynamics and seismology; iterative solvers; implicit and explicit methods for diffusion and advection.

The goal of this course is to provide students with the mathematical and numerical foundations required to understand how to develop numerical models in the various disciplines of the Geosciences that employ the continuum approximation to study systems with a large number of degrees of freedom.

Students in this course are assumed to have a graduate-level working knowledge of and experience with continuum dynamics.

Learning Outcomes

By the end of this course, students will be able to:

1. Apply fundamental discretization techniques to the continuum partial differential equations (PDEs) used in the Geosciences to describe the physical behavior of solids and fluids;
2. Evaluate convergence, consistency, and stability of numerical solutions of initial value problems obtained by finite difference methods;
3. Identify problems of interest in the Geosciences whose solution may be approximated by using the finite element or spectral method and create a simplified numerical scheme based on the selected method;
4. Apply iterative methods to solve systems of linear equations resulting from discretized PDEs and address convergence issues;
5. Create one or more numerical models for specific physical processes in the Geosciences by identifying and applying the most suitable numerical techniques learned in the course;
6. Write a comprehensive technical report.

Instructor Information

Name	Ping Chang
Telephone number	979-845-8196
Email address	ping@tamu.edu
Office hours	Open
Office location	O&M 624

Textbook and/or Resource Material

Course material will be provided to the students in the form of lecture notes and handouts.

Students are encouraged, but not required, to read the following:

1. Roache, J.P., Fundamentals of Computational Fluid Dynamics, Hermosa Publishers, 1988
2. Ferziger, J.H., Peric, M., Computational Methods for Fluid Dynamics, 3rd rev. ed., Springer-Verlag

Berlin Heidelberg, 2002
3. Fletcher, C.A.J., Computational Techniques for Fluid Dynamics, Volume 1: Fundamental and General Techniques, Springer-Verlag, Berlin, 1988
4. Fletcher, C.A.J., Computational Techniques for Fluid Dynamics, Volume 2: Specific Techniques for Different Flow Categories, Springer-Verlag, Berlin, 1988
5. Canuto, C., et al., Spectral Methods in Fluid Dynamics, Springer-Verlag, Berlin Heidelberg, 1988
6. Gerya, T., Introduction to Numerical Geodynamic Modelling, Cambridge University Press, 2010
7. Haidvogel, D.B, Beckmann, A., Numerical Ocean Circulation Modeling, Imperial College Press, 1999
8. Griffies, S., Fundamentals of Ocean Climate Models, Princeton University Press, 2004
9. Mesinger, F., Arakawa, A., Numerical Methods Used in Atmospheric Models, Volume 1, GARP Publication Series No. 17, August 1976
10. Haltiner, G.J., Williams, R.T., Numerical Prediction and Dynamic Meteorology, Wiley, 1980
11. Washington, W.M., Parkinson, C.L., An Introduction to Three-Dimensional Climate Modeling, 2nd Ed., University Science Books, 2005
12. Bedford, A., Drumheller, D.S., Introduction to Elastic Wave Propagation, Wiley, 1994
13. Pujol, J., Elastic Wave Propagation and Generation in Seismology, Cambridge University Press, 2003
14. Yanfei Wang, Anatoly G. Yagola, Changchun Yang (Eds.), Computational Methods for Applied Inverse Problems. Higher Education Press, 2012

Grading Policies

Final grades will be based on the following weights:

1) Assignments (30% of course grade)
2) Midterm exam (20% of course grade)
3) Final project (50% of course grade)

Assignments will be due at the beginning of class on the scheduled week, unless stated otherwise by the instructor. Late homework will be assessed a penalty equal to 20% of its grade per day unless the students submits a university-excused absence (see Attendance and Make-up Policies section). An unexcused delay longer than 4 working days will automatically result in receiving zero points on the assignment.

Midterm. There will be a two-hour long in-class midterm exam.

Final Project. A final modeling project will be due by 5pm on the last day of the university's Final Examination Schedule for the semester, available at http://registrar.tamu.edu/Courses,-Registration,-Scheduling/Final-Exam-Schedule. This final project must include a 10-page written scientific report that comprehensively summarizes foundations, methods, and results of the modeling project in the style of the American Geophysical Union *Geophysical Research Letters* journal (http://agupubs.onlinelibrary.wiley.com/agu/journal/10.1002/(ISSN)1944-8007/).

Final course grades will be posted on http://elearning.tamu.edu

Please consult University Student Rule 10 (Grading) at http://student-rules.tamu.edu/rule10 for additional details on grading policies.

Grading Scale

A final percentage grade will be calculated based on your total weighted scores as listed above. A final letter grade will be assigned as follows:

A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F = <60%

Attendance and Make-up Policies

The university views class attendance as an individual student responsibility. You are expected to attend class and to complete all assignments. Attendance is essential to complete the course successfully.

Please consult the University Student Rule 7 at http://student-rules.tamu.edu/rule07 for details on university-excused absences and make-up policies.

Course Topics, Calendar of Activities, Major Assignment Dates

Week	Topic	Assignment
Week 1	Introduction to fundamental physical systems and processes in Geosciences that can be represented using continuum partial differential equations (PDEs). Basic concepts in numerical modeling.	
Week 2	Mathematical description of continuum media and key physical properties: Fluids – Continuity equation; viscosity; classification of flow regimes; Eulerian and Lagrangian descriptions; advection. Solids – Deformation and stresses; stress and strain tensors; equations of motion; gravity and gravitational potential.	
Week 3	Fundamental equations in the Geosciences. Traditional working approximations. Primitive equations: continuity, momentum, thermal energy. Beta plane approximation in fluid dynamics.	
Week 4	Boundary value problems in the Geosciences. Dynamic and thermodynamic boundary conditions. Elliptic (Laplace's equation), parabolic (diffusion equation), and hyperbolic (wave equation) PDEs. Examples of common transition cases between PDE types in solids (e.g. homogenous to localized deformation) and fluids (e.g. steady, irrotational, isentropic, compressible flow below and above the speed of sound).	
Week 5-6	Discretization techniques for PDEs: Finite Difference Method (FDM), Finite Element Method (FEM), Spectral Method, Pseudospectral Method.	
Week 7	Consistency, convergence, and stability of numerical solutions of initial value problems by FDMs. Equivalence theorem.	
Week 8	Iterative solvers for discretized linear PDEs used in large three-dimensional problems: Jacobi method, Gauss-Seidel (GS) Iteration, Successive Over Relaxation (SOR) method, Conjugate Gradient Method (CGM), Steepest Descent method. Convergence and preconditioning.	
Week 8		**Midterm Exam**
Week 9	Modeling diffusive processes: explicit and implicit methods.	

Week 10	Modeling linear advective processes: explicit and implicit methods. Modeling transport.	**Assignment #1 due**
Week 11-12	Modeling nonlinear advective processes: Burger's equation. Positive-definite processes and flux-corrected methods. Nonlinear wave processes: Korteweg-de Vries equation.	**Assignment #2 due**
Week 13	Elliptic boundary-value problems in the Geosciences. Energy- and enstrophy-conserving space finite-difference schemes.	**Assignment #3 due**
Week 14	Basic models of physical systems in the Geosciences: spectral model for a homogeneous, non-divergent, incompressible flow on the surface of a sphere; quasi-geostrophic ocean model; spectral-element model for seismic wave propagation;	

Final project due by 5pm on the last day of the university's Final Examination Schedule for the semester.

Please note that the above schedule and topics are subject to change.

Other Pertinent Course Information

Copyright Policy. All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu

Academic Integrity

For additional information please visit: http://aggiehonor.tamu.edu

"An Aggie does not lie, cheat, or steal, or tolerate those who do."

Students are encouraged to study together and discuss the information presented in the course lectures and material with other students. However, all coursework submitted to the instructor must be the result of the original work of the student. Intentional or careless appropriation of someone else's work or ideas, even with their explicit consent, violates the Aggie Honor System Rules (Student Rule 20.1.2) and will result in all the students involved automatically receiving zero points for the assignment as well as mandatory reporting of the violation.

Each student is responsible for authenticating all submitted work and, if asked, to produce proof that the item submitted is indeed the work of that student. The inability to authenticate one's work upon the instructor's request is sufficient grounds to initiate an academic dishonesty case.

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional
• Submit original form and attachments •

RECEIVED
NOV 12 2015
GRADUATE STUDIES

Form Instructions

1. Course request type: ☐ Undergraduate ☑ Graduate ☐ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Department of Oceanography
3. Course prefix, number and complete title of course: OCNG 616 Numerical Modeling of Ocean Circulation II

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: OCNG 615 To: OCNG 618
   b. Withdrawal (reason):
   c. Cross-list with:

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course:
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

   Numerical Modeling of Ocean Circulation II. Quasigeostrophic ocean circulation models; Arakawa's energy and enstrophy conserving scheme; spectral barotropic vorticity model on sphere; shallow water primitive equation models; geostrophic adjustment on different numerical grids; boundary conditions in numerical models; introduction to ocean general circulation models; mixed models and sub-gridscale parameterization; oceanic data assimilation.

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

    Numerical Modeling of Ocean Circulation. Quasigeostrophic ocean circulation models; Arakawa's energy and enstrophy conserving scheme; spectral barotropic vorticity model on sphere; shallow water primitive equation models; geostrophic adjustment on different numerical grids; boundary conditions in numerical models; introduction to ocean general circulation models; mixed models and sub-gridscale parameterization; oceanic data assimilation.

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
OCNG	616	NUMERICAL MODELING II

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code						Level
03	02	00	04	4006070002	2140	0	0	3	6	3	2	6

b. Change to:

Prefix	Course #	Title (excluding punctuation)
OCNG	616	NUMERICAL MODELING OCN CIRC

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year			FICE Code					
03	02	00	04	4006070002	2140	16	-	17	0	0	3	6	3	2

Level: 6

Approval recommended by:

Deborah Thomas 11/10/15

Department Head or Program Chair *(Type Name & Sign)* Date

11/11/15

Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

11/11/15

Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Supporting statement for changes in OCNG 616

A change in course title is requested for OCNG 616 from “Numerical Modeling of Ocean Circulation II” to “Numerical Modeling of Ocean Circulation” to accompany the course change request from OCNG 615 – Numerical Modeling of Ocean Circulation I to OCNG 618 – Numerical Methods for the Geosciences.

The new name will reflect that OCNG 615 and OCNG 616 are no longer sequential courses.

As a result of the course change request for OCNG 615, a change in prerequisites is also requested from OCNG 615 to OCNG 618.

Curriculum Changes

COLLEGE OF NURSING
HEALTH SCIENCE CENTER

Office of the Dean

TEXAS A&M UNIVERSITY

September 2, 2015

MEMORANDUM

TO: Rex C. Peebles, Ph.D.
Assistant Commissioner
Texas Higher Education Coordinating Board
1200 East Anderson Lane
Austin, TX 78752

THROUGH: Vernon Tesh, Ph.D.
Vice President for Academic Affairs
Texas A&M Health Sciences Center

FROM: Sharon A. Wilkerson, Ph.D. SWilkerson
Dean and Professor
Texas A&M Health Sciences Center, College of Nursing

SUBJECT: Substantive Change

This is to notify you of a change in the curriculum for the MSN education program which was approved July 16, 2013. The curriculum was approved for 41 credit hours including a research thesis. The changes noted below reduce the program required hours to 36 credit hours.

The MSN Nursing Education program is comprised of 36 credit hours with 150 clinical practice hours and 75 hours of teaching practicum. The didactic portion of all tracks is delivered totally online. Clinical practice hours and teaching practicum hours are accrued with preceptors in the student's own community. Student visits to the Bryan campus are limited to 2 times over the course of the program.

Course	Number	Name	Credit Hours
NURS	501	Curriculum Design	3
NURS	552	Scholarship: Integration and Application	3
NURS	556	Leadership and Health Policy	3
NURS	512	Advanced Pathophysiology	3
NURS	553	Advanced Health Assessment	3
NURS	554	Prevention and Population Health	3
NURS	516	Advanced Pharmacology	3
NURS	551	Quality Improvement and Informatics	3
NURS	502	Assessment and Evaluation in Education	3
NURS	503	Teaching Strategies	3
NURS	508	Advanced Clinical Practicum and Project	4
NURS	504	Teaching Practicum	2
		Total	36 credit hours *

Health Professions Education Building
8447 State Highway 47
Bryan, TX 77807-3260

Tel. 979.436.0110 Fax. 979.436.0098
nursing.tamhsc.edu

*The thesis (NURS 505/506) will now be optional at 3 to 6 credit. This reduced the credit hours by 3.

NURS 500 Teaching and Learning Theory course content has been incorporated into NURS 503 Teaching Strategies and NURS 501. This resulted in a 3 hour reduction.

NURS 551 reduced from 4 credit hours to 3 hours. This resulted in a 1 hour reduction.

NURS 508 Advanced Clinical Practicum & Project increased from 2 credit hours to 4 credit hours. This resulted in an addition of 2 credit hours.

Total net change is a reduction of 5 credit hours (41 credit hours to 36 credit hours).

Texas Higher Education Coordinating Board
Request to Change Semester Credit Hours

Directions: An institution shall use this form to request a change in the number of semester credit hours (SCH) required for a degree program already on the institution's program inventory in accordance with Coordinating Board Rules, Chapter 5, Subchapter C, Section 5.55 – Revisions to Approved Programs.

Options:

1) Revisions that **reduce** the number of SCH require notification of change and affirmation that the reduction does not fall below the minimum requirements of the Southern Association of Colleges and Schools Commission on Colleges, program accreditors, and licensing bodies, if applicable.

2) Revisions that **increase** the number of SCH require detailed written documentation describing the compelling academic reason for the increase in the number of required hours.

NOTE: No request or notification is needed if revisions to the degree program curriculum do not result in a change in SCH.

Options 1 and 2 require the signature of the Provost or Chief Academic Officer.

Please submit *Request to Change Semester Credit Hour* via the Online Submission Portal: https://www1.thecb.state.tx.us/apps/proposals/

Information: Contact the Division of Workforce, Academic Affairs and Research at 512/427-6200.

Administrative Information

1. Institution: Texas A&M University
Texas A&M University Health Science Center – College of Nursing

2. Program Name – *As it appears on the Coordinating Board's program inventory (e.g., Bachelor of Business Administration degree with a major in Accounting)*:

Master of Science in Nursing – Nursing Education

3. Program CIP Code: 51.3817.00

4. Contact Person: *Provide contact information for the person who can answer specific questions about the program.*

Name: Dr. Debra Matthews
Title: Associate Dean for Academic Affairs
E-mail: dmatthews@tamhsc.edu
Phone: 979-436-0131

Notification/Request for Change in Semester Credit Hours (SCH):

Current SCH: 41 (as stated on Program Inventory)

Proposed SCH: 36 SCH

Implementation Date: Immediately

Complete Option 1 or 2 as appropriate

Option 1: Reduction in Semester Credit Hours

Is the change in the number of SCH compatible with the requirements of accreditation for the program?

a. Southern Association of Colleges and Schools Commission on Colleges
☒ YES ☐ NO

b. Program Accreditor(s) ☒ YES ☐ NO ☐ NA
Name of Program Accreditor: CCNE

c. Licensing Body(ies) ☐ YES ☐ NO ☒ NA
Name of Licensing Body(ies): ____________________

Option 2: Increase in Semester Credit Hours

Provide detailed documentation, such as changes in accrediting agency or licensing body requirements, workforce needs, or academic professional standards and needs, describing a compelling reason for the change in the number of SCH:

N/A

Signature of Compliance

I hereby certify that all of the above changes have been approved in accordance with the procedures outlined in Coordinating Board Rules, Chapter 5, Subchapter C, Section 5.55.

Provost/Chief Academic Officer Date

Texas A&M University
Request for a Change in Curriculum
Undergraduate ♦ Graduate ♦ Professional

1. Program request type: ☐Undergraduate ☑Graduate ☐First Professional *(ex., DVM, JD, MD, etc.)*

2. Request change for: ☑Degree Program ☐Minor ☐Certificate

3. Request submitted by *(Department or Program Name)*: TAMHSC College of Nursing

4. Program Designation and Name *(e.g., B.A. in History, Minor in History, Certificate in European Union)*: MSN - Nursing Education

5. Brief description of change:
Reduction of degree program offering from 41 hours to 36 hours.

6. Rationale for change:
The thesis (NURS 505/506) will now be optional at 3 to 6 credit. This reduced the credit by 3 hours.
NURS 500 Teaching and Learning Theory course content has been incorporated into NURS 503 Teaching Strategies and NURS 501 resulting in a 3 hour reduction.
NURS 551 reduced from 4 credit hours to 3 hours. This resulted in a 1 hour reduction.
NURS 508 Advanced Clinical Practicum and Project increased from 2 hours to 4 hours. This resulted in an addition of 2 hours.
Total net changes is a reduction of 5 credit hours (41 credit hours to 36 credit hours).

Use the checkboxes below to make sure that all information is included.

7. a. Proposed curriculum attached. ☑Yes ☐No

   b. Current catalog curriculum with handwritten edits attached. ☑Yes ☐No

   c. Current Howdy degree evaluation with handwritten edits attached. ☑Yes ☑No

   Please make sure the attached proposed curriculum, catalog and Howdy degree evaluation match.

8. a. Will degree program hours change (increase/decrease) due to the proposed curriculum changes? ☑Yes ☐No

   b. If yes, degree program hours will change from: 41 to: 36

   c. If yes, is the Texas Higher Education Coordinating Board form attached? ☑Yes ☐No
   http://www.thecb.state.tx.us/index.cfm?objectid=A0F9F7FA-9A92-4F11-2756AD3BBFF01D60

9. If proposed changes affect other unit(s), are letters of support attached? ☐Yes ☑No

IMPORTANT NOTE: Curriculum changes submitted through the approval process and **fully approved** by February (*December-UCC/GC, January-Faculty Senate, February-President*) will be effective in the next academic year. Changes requiring approval beyond the University should complete the internal approval process early in the fall semester whenever possible in order to ensure timely implementation.

Approval recommended by:

Cathy Hansen for Debra Matthews 11/16/2015 [signature] 11/16/15

Department Head or Program Chair *(Type Name & Sign)* Date | Dean of College Date

Kevin [signature] for Debra Matthews 11/17/2015

Chair, College Review Committee Date | Chair, GC or UCC Date immediate supervision of the student's research and thesis, has the responsibility for calling required meetings of the committee and for calling meetings at any other time considered desirable.

If the chair of a student's advisory committee voluntarily leaves the University and the student wants the chair to continue to serve in this role, the student is responsible for securing a current member of the University Graduate Faculty, from her/his academic program and located on the respective Texas A&M University campus, to serve as the co-chair of the committee. If the committee chair is on an approved leave of absence, s/he can remain as chair without a co-chair for up to one year with written approval of the Department Head or chair of the intercollegiate faculty. Extensions beyond the one year period can be granted with additional approval of the Dean.

If the chair of the student's advisory committee is unavailable for an extended time in any academic period during which the student is involved in activities relating to an internship, thesis or professional paper, and is registered for courses such as 5V98, 5V99, 684, 691, 692 or 693, the student may request, in writing, that the department head appoint an alternate advisory committee chair during the interim period.

The duties of the committee include responsibility for the proposed degree plan, the research proposal, the thesis and the final examination. In addition, the committee as a group and as individual members are responsible for advising the student on academic matters, and, in the case of academic deficiency, initiating recommendations to the Office of Graduate and Professional Studies.

The committee members' approval on the degree plan indicate their willingness to accept the responsibility for guiding and directing the entire academic program of the student and for initiating all academic actions concerning the student. Although individual committee members may be replaced by petition for valid reasons, a committee cannot resign *en masse*.

Degree Plan

The student's advisory committee, in consultation with the student, will develop the proposed degree plan. **The degree plan must be completed and filed with the Office of Graduate and Professional Studies prior to the deadline imposed by the student's college or interdisciplinary degree program, if applicable, and no later than 90 days prior to the date of the final oral examination or thesis defense.**

A student should submit the degree plan using the online Document Processing Submission System located on the website ogsdpss.tamu.edu.

A student submitting a proposed degree plan for a Master of Science degree should designate on the official degree plan the appropriate program option.

Additional coursework may be added to the approved degree plan by petition if it is deemed necessary by the advisory committee to correct deficiencies in the student's academic preparation. No changes can be made to the degree plan once the student's Request for Final Examination or Request for Final Examination Exemption is approved by the Office of Graduate and Professional Studies.

Credit Requirement

A minimum of 32 semester credit hours of approved courses and research is required for the thesis option Master of Science degree with the exception of the Master of Science in Visualization, which requires 48 hours, ~~and~~ Master of Science in Athletic Training, Master of Science in Nursing Education, which requires a minimum of 39 hours, which requires 60 hours. A minimum of 36 semester credit hours of approved coursework is required for the Non-Thesis Option. * okay, no change

Ordinarily the student will devote the major portion of his or her time to work in one or two closely related fields. Other work will be in supporting fields of interest.

Transfer of Credit

A student who has earned 12 hours of graduate credit in residence at Texas A&M University may be authorized to transfer courses in excess of the limits prescribed below upon the advice of the advisory committee and with the approval of the Office of Graduate and Professional Studies. Courses taken in residence at an accredited U.S. institution or approved international institution with a final grade of B or greater **may** be considered for transfer credit if, at the time the courses were completed, the courses would be accepted for credit toward a similar degree for a student in degree-seeking status at the host institution. Otherwise, the limitations stated in the following section apply. Coursework **in which no formal grades are given or in which grades other than letter grades (A or B) are earned (for example, CR, P, S, U, H, etc.) is not accepted for transfer credit**. Courses appearing on the degree plan with grades of D, F or U may not be absolved by transfer work. Credit for thesis research or the equivalent is not transferable. Credit for coursework submitted for transfer from any college or university must be shown in semester credit hours or equated to semester credit hours. An official transcript from the university at which the transfer coursework was taken must be sent directly to the Office of Admissions.

Courses used toward a degree at another institution may not be applied for graduate credit. If the course to be transferred was taken prior to the conferral of a degree at the transfer institution, a letter from the Registrar at that institution stating that the course was not applied for credit toward the degree must be submitted to the Office of Graduate and Professional Studies.

Grades for courses completed at other institutions are not included in computing the GPR.

Limitations on the Use of Transfer, Extension and Certain Other Courses

Some departments may have more restrictive requirements for transfer work. If otherwise acceptable, certain courses may be used toward meeting credit-hour requirements for the master's degree under the following limitations.

1. The maximum number of credit hours which may be considered for transfer credit is the greater of 12 hours or one-third (1/3) of the total hours of a degree plan. The following restrictions apply:
   - Graduate and/or upper-level undergraduate courses taken in residence at an accredited U.S. institution, or approved international institution with a final grade of B or greater will be considered for transfer credit if, at the time the courses were completed, the student was in degree-seeking status at Texas A&M University, or the student was in degree-seeking status at the institution at which the courses were taken; and if the courses would be accepted for credit toward a similar degree for a student in degree-seeking status at the host institution.
   - Courses previously used for another degree are not acceptable for degree plan credit.

853. Podiatry. Credit 1.25 to 10. This 2-week elective is designed to educate the student on the medical problems of the foot. This elective will increase the student's familiarity and knowledge to evaluate weight bearing foot x-rays; perform a thorough examinations, diagnose and provide differentiate foot problems. Students will properly render, prescribe, or evaluate diabetic foot care; understand how to perform a digital block; and perform a basic biomechanical exam. Prerequisite: Satisfactory completion of year three of the medical school curriculum.

857. Ophthalmology - Retina. Credit 1.25 to 10. This 2- to 4-week elective is designed for students work along faculty in the diagnosis, testing and treatment of corneal, external, and vitreoretinal diseases. This elective will increase the student's familiarity and knowledge as they learn how to use a direct-ophthalmoscope, slit lamp and other specialized instruments as well as how to perform ophthalmology examinations. They are allowed to observe surgical procedures performed both in office and in the operating room. Prerequisite: Satisfactory completion of year three of the medical school curriculum.

985. Off Campus Student Initiated Elective. Credit 1 to 15. Formally described elective courses at another medical school or off-campus opportunities that are not formally approved electives. The College of Medicine requires that each of these electives be approved prior to the rotation.

999. On Campus Student Initiated Elective. Credit 1.25 to 12. This is an on-campus opportunity in the department of Surgery in the College of Medicine that is not defined herein. Experiences may include clinical research, basic science research, library research, other basic science activities, and other clinical activities. Students interested in developing an elective of this type should contact the head of the appropriate department for additional details.

College of Nursing

nursing.tamhsc.edu

Head: S. A. Wilkerson

Nursing *
(NURS)

* No changes, this information is correct

501. Curriculum Design. Credit 3. Various models of curriculum development and design based on educational philosophy and professional standards will be investigated. Students will demonstrate knowledge of program development including scope and sequence, curriculum alignment, and mapping. Program development through topic identification and generation of content outlines/syllabi, objectives, and outcome measures are included in this course. Cross-listed with EDHP 501.

502. Assessment and Evaluation in Education. Credit 3. Practical and theoretical issues involved in evaluating student performance, teacher performance and educational programs will be explored. Students will explore various means of performance-based assessments applicable to didactic, simulated and clinical learning environments. Students will examine a variety of assessment instruments and strategies and the role each has in the evaluation process. The course will enable students to plan, execute and interpret educational assessments. Cross-listed with EDHP 502.

503. Teaching Strategies. Credit 3. Best practices research on instructional pedagogy and adult learning will be examined. The course focuses on recommended principles, concepts and theories used in practice that create effective learning environments. Teaching strategies responsive to diverse learning styles and needs of learners will be explored as well as reflective practices and self-assessment. A variety of practical classroom, simulation and clinical teaching strategies consistent with current evidence will be discussed emphasizing teaching methods using technology. Cross-listed with EDHP 503.

504. Teaching Practicum. Credit 2. This course allows the student to synthesize knowledge gained in the education track courses by working with a faculty mentor to actualize the faculty role. The student will implement effective teaching strategies in content/curriculum development, test construction and clinical supervision in a variety of settings. Interprofessional collaborative teaching strategies will be evidence based and promote critical thinking scholarship and innovation.

508. Advanced Clinical Practicum and Project. Credit 4. This course provides the opportunity for the student to develop advanced clinical proficiency in a population interest or professional role. Using direct or indirect care approaches, the student will develop and implement a plan to improve patient outcomes, utilizing a variety of advanced skills and knowledge including health promotion, wellness management, quality improvement, health care finance, leadership, policy and evidence based practice and informatics. This course will include 105 hours of clinical practice.

512. Advanced Pathophysiology. Credit 3. Advanced concepts of pathophysiology of health problems across the lifespan, preparing the student at the level of advanced nursing practice will be emphasized.

516. Advances Pharmacology. Credit 3. Advanced pharmacotherapeutic principles related to the management of health problems will be presented. The focus is on pharmacologic treatments utilized by the advanced practice nurse.

551. Healthcare Quality Improvement and Informatics. Credit 3. This course provides an overview of health care from the viewpoint of quality improvement and health care informatics. The student will use the science of quality measurement and improvement in conjunction with information science to propose a quality improvement initiative. The legal and ethical implications of current trends in information technology and safety are discussed.

552. Scholarship: Integration and Application. Credit 3. This course integrates theory, evidence, clinical judgment, research and inter-professional perspectives using translational processes to improve patient outcomes. The emphasis in the course is on the application of available evidence to interdisciplinary clinical practice, the identification of gaps in knowledge and the development of a spirit of inquiry and lifelong scholarship.

553. Advanced Health Assessment. Credit 3. This course will focus on the application of advanced assessment techniques and skills for comprehensive evaluation of patients across the life span using a common symptom approach. Emphasis will be placed on common deviations from normal assessment findings within the context of holistic practice. The course includes 45 hours of clinical practice.

554. Clinical Prevention and Population Health. Credit 3. Leadership skills will be developed in the design of clinical prevention interventions and population based care that promotes health and reduces the risk of chronic illness and disease. The student will plan care that is responsive to unique cultural and ethnic identities, socioeconomic conditions and the needs and values of individuals and populations.

556. Leadership and Health Policy II. Credit 3. The development of skills essential to leadership and policy processes, including communication, collaboration, negotiation, delegation and coordination by applying systems theory and complexity science will be promoted. The student will be prepared to assume a leadership role in the management and evaluation of human, fiscal and physical health resources. Students will develop skills in political efficacy and the ability to improve the systems and population outcomes through the development of health policy. Cross-listed with HCPI 556.

Irma Lerma Rangel College of Pharmacy

pharmacy.tamhsc.edu

Head: I. Reddy

The Irma Lerma Rangel College of Pharmacy (COP) offers the Doctor of Pharmacy program leading to the PharmD degree. The students enrolled in this program are exposed to a core professional curriculum that includes the biomedical sciences; pharmaceutical sciences; social, behavioral and administrative pharmacy sciences; and pharmacy practice.

The curriculum, which is offered through 146 semester credit hours (SCH), is organized in such a way that the student progresses through the pharmaceutical sciences and clinical sciences didactic and laboratory coursework into summative experiential rotations. This total includes 103 SCH of the core curriculum (required courses), six hours of elective classes and 37 SCH of clinical-experiential, including one hour of capstone. The fourth year of the curriculum is devoted exclusively to Advanced Pharmacy Practice Experiences and Pharmacy Grand Rounds, where the knowledge gained and skills developed in the first three years are greatly enhanced and expanded. The primary goal of the program is to provide a comprehensive pharmacy education in a stimulating environment to prepare students for the practice of pharmacy as competent, caring, ethical professionals dedicated to the provision of optimal pharmaceutical care.

Detail Requirements

Kathryn Cochran
Nov 17, 2015 11:04 am

Viewing: Degree Evaluation (DEGEVAL, , Email)
Change Student
Print

Information for Degree Evaluation

This is NOT an official evaluation.

Program Evaluation

Master of Science in Nursing - Non-Thesis Option (Distance Program)

Time Limits: All requirements for the degree must be completed within seven consecutive years.

Degree Plan: A Graduate Degree Plan of at least 36 hrs must be completed with a minimum GPR of 3.000 and no grade lower than C.

Course Limitations: Courses exceeding limits below will not be considered for meeting degree requirements.

1. Only approved courses on the degree plan will be considered for this program.
2. No more than 12 hrs or one-third of the total hours on the degree plan, whichever is greater, may be used. Transfer course work must be completed at an accredited institution with a grade of B or better.
3. No more than 12 hrs taken in a non-degree seeking (G6) classification may be used.
4. No more than 25 percent of the total degree plan hours may be used in any combination of the following categories:
   a. Not more than 4 hrs of 684 (Professional Internship) may be used.
   b. Not more than 8 hrs of 685 (Directed Studies) may be used.
   c. Not more than 3 hrs of 690 (Theory of Research) may be used.
   d. Not more than 3 hrs of 695 (Frontiers in Research) may be used.
5. No more than 2 hrs of 681 (Seminar) may be used.
6. No more than 9 hrs of advanced undergraduate courses (300-499) may be used.
7. No correspondence study may be used.
8. No credit hours of extension course work may be used.
9. No credit hours of FREN 601 or GERM 603 may be used.
10. No credit hours of 691 (Research) may be used.

Advisory Committee: The Advisory Committee consists of ~~at least three members~~ one member of the Graduate Faculty, ~~one of which must be from outside the student's major department.~~ e

Final Examination: A final comprehensive examination is Not required. ~~The final examination may be written and/or oral. The request to hold and announce the final exam must be submitted to the Office of Graduate Studies a minimum of 10 working days in advance of the scheduled date.~~ e

~~To be eligible to hold the final exam, the student:~~ e

1. ~~must have a graduate GPR of at least 3.000 (listed as "Program GPA" below),~~ e
2. ~~must have a Degree Plan GPR of at least 3.000 with no grade lower than a C in any course on the degree plan,~~ e
3. ~~must have completed or be registered for all remaining degree plan course work.~~ e

Program :	MSN [NU] Non-thesis distance	**Catalog Term :**	Fall 2015 - College Station
Campus :	College Station	**Evaluation Term :**	Fall 2015 - College Station
College :	Nursing	**Expected Graduation Date :**	
Degree :	Master of Science in Nursing	**Request Number :**	4
Level :	Graduate	**Results as of :**	Nov 17, 2015
Majors :	Nursing Education	**Minors :**	
Departments :	College of Nursing	**Concentrations :**	

	Met	**Credits Required**	**Credits Used**	**Courses Required**	**Courses Used**
Total Required :	Yes		0.000		0
Program GPA :	No	3.00	.00		
Overall GPA :	Yes	.00	.00		
Other Course Information					
Transfer :			0.000		0

This is NOT an official evaluation.

Area : **Courses for Degree Plan GPR - Not Met** * See attached correction

Description : A minimum degree plan GPR of 3.000 is required. Courses with grades of D, F or U are not acceptable for degree plan credit and must be repeated for a grade of C or better or Satisfactory (S).

Met	Condition	Rule	Subject	Attribute	Low	High	Required Credits	Required Courses	Term	Subject	Course	Title	Attribute	Credits	Grade	Source
No		A.	No Approved Degree Plan													

Total Credits and GPA 0.000 .00

unofficial evaluation

Area : **Courses Not Applied - Met**

Description : See Graduate Committee Chair or Graduate Advisor for acceptable changes to degree plan coursework.

Met	Condition	Rule	Subject	Attribute	Low	High	Required Credits	Required Courses	Term	Subject	Course	Title	Attribute	Credits	Grade	Source
No		A.	Additional Unused Courses													
												Total Credits and GPA		0.000	.00	

unofficial evaluation

Area : **Graded Degree Plan Courses - Not Met** * See attached correction

Description : A grade of C or better is required in all courses listed.

Met	Condition	Rule	Subject	Attribute	Low	High	Required Credits	Required Courses	Term	Subject	Course	Title	Attribute	Credits	Grade	Source
No		A.	No Approved Degree Plan													
												Total Credits and GPA		0.000	.00	

unofficial evaluation

Area : **S/U Degree Plan Courses - Met**

Description : A grade of S is required in all courses listed.

Met	Condition	Rule	Subject	Attribute	Low	High	Required Credits	Required Courses	Term	Subject	Course	Title	Attribute	Credits	Grade	Source
No		A.	No S/U Courses on Degree Plan													
												Total Credits and GPA		0.000	.00	

unofficial evaluation

Back to Display Options

1

Both areas of the degree should reflect the courses below:
① ~~Area~~: Courses for Degree Plan GPR (36.000 credits)
② Area: Graded Degree Plan Courses

Area : **Graded Degree Plan Courses - Met**

Description : A grade of C or better is required in all courses listed.

Met	Condition	Rule	Subject	Attribute	Low	High	Required Credits	Required Courses	Term	Subject	Course	Title	Attribute	Credit
Yes			NURS		501		3.000		201421	NURS	501	CURRICULUM DESIGN		3.00
Yes	AND		NURS		502		3.000		201511	NURS	502	ASSESS & EVAL IN EDUCATION		3.00
Yes	AND		NURS		503		3.000		201531	NURS	503	TEACHING STRATEGIES		3.00
Yes	AND		NURS		504		2.000		201611	NURS	504	TEACHING PRACTICUM		2.00
Yes	AND		NURS		508		4.000		201531	NURS	508	ADV CLINICAL PRACT & PROJECT		4.0C
Yes	AND		NURS		512		3.000		201411	NURS	512	ADVANCED PATHOPHYSIOLOGY		3.0C
Yes	AND		NURS		516		3.000		201521	NURS	516	ADVANCED PHARMACOLOGY		3.0C
Yes	AND		NURS		551		3.000		201421	NURS	551	HLTHCARE QUAL IMPROV AND INFO		3.0C
Yes	AND		NURS		552		3.000		201431	NURS	552	SCHOLARHIP: INTEG & APP		3.0C
Yes	AND		NURS		553		3.000		201411	NURS	553	ADVANCED HLTH ASSESMENT		3.0(
Yes	AND		NURS		554		3.000		201511	NURS	554	CLIN PREVENT & POP HLTH		3.0(
Yes	AND		NURS		556		3.000		201431	NURS	556	LEADERSHIP & HEALTH POLICY II		3.0(
												Total Credits and GPA		36.0(

Special Consideration Items

DWIGHT LOOK COLLEGE OF ENGINEERING

Department of Electrical & Computer Engineering

TEXAS A&M UNIVERSITY

November 9, 2015

MEMORANDUM

TO: **Dr. Mark Zoran**
Chair, Graduate Council

THROUGH: **Dr. N.K. Anand** N.K. Anand
Executive Associate Dean
Dwight Look College of Engineering

THROUGH: **Dr. Valerie Taylor** Valerie E. Taylor
Senior Associate Dean for Academic Affairs
Dwight Look College of Engineering

THROUGH: **Dr. Prasad Enjeti** (GOC dean)
Associate Dean for Academic Affairs
Dwight Look College of Engineering

FROM: **Dr. Miroslav Begovic** M. Begovic
Head, Department of Electrical & Computer Engineering

FROM: **Dr. Jose Silva-Martinez**
Associate Head for Graduate Affairs, Department of Electrical & Computer Engineering

SUBJECT: **Distance Education Master of Engineering in Computer Engineering (CEEN)**

The Master of Engineering in Computer Engineering (CEEN) is currently approved for on-campus, face-to-face delivery. We would like to offer the degree via distance education beginning fall 2016. Please see the attached approval and online delivery proposal forms for additional information

Please contact me if you have any questions at jsilva@ece.tamu.edu or 979-845-7477.

301 Wisenbaker Engineering Building
3128 TAMU
College Station, TX 77843-3128

Tel. 979.845.7441 Fax. 979.845.6259
www.ece.tamu.edu

Texas Higher Education Coordinating Board

Certification Form for Electronically Delivered and Off-Campus Education Programs
April 2014

Directions: For all new programs that are to be delivered electronic-to-individuals (i.e., online), electronic-to-groups, or off-campus face-to-face, a signed pdf of this form must accompany email notification of the new program to Dr. Andrew B. Lofters (andrew.lofters@thecb.state.tx.us). (Institutions offering distance education programs **for the first time** – i.e. have never offered a distance education program, such as newly created institutions -- must complete and submit an *Institutional Plan for Distance Education*).

Please fill out the Administrative Information below and then sign and date on page 4.

Administrative Information

1. Institution: Texas A&M University
2. Program Name – Masters of Engineering in Computer Engineering
3. Program CIP Code: 14.0902.00
4. Program Delivery – Distance Education/Online
5. Proposed Implementation Date – Fall 2016
6. Contact Person – Provide contact information for the person who can answer specific questions about the program.

Name: Jose Silva-Martinez, IEEE Fellow

Title: Associate Department Head for Graduate Programs

E-mail: jsilva@ece.tamu.edu

Phone: 979.845.7961

Based on *Principles of Good Practice for Academic Degree and Certificate Programs and Credit Courses Offered Electronically.*

CURRICULUM AND INSTRUCTION

- Each program or course results in learning outcomes appropriate to the rigor and breadth of the degree or certificate awarded.
- A degree or certificate program or course offered electronically is coherent and complete.
- The program or course provides for appropriate interaction between faculty and students and among students.
- Qualified faculty provide appropriate oversight of the program or course that is offered electronically.
- Academic standards for all programs or courses offered electronically will be the same as those for programs or courses delivered by other means at the institution where the program or course originates.
- Student learning in programs or courses delivered electronically should be comparable to student learning in programs offered at the campus where the programs or courses originate.

INSTITUTIONAL CONTEXT AND COMMITMENT

<u>Role and Mission</u>

- The program or course is consistent with the institution's role and mission.
- Review and approval processes ensure the appropriateness of the technology being used to meet the objectives of the program or course.

<u>Students and Student Services</u>

- Program or course announcements and electronic catalog entries provide appropriate information.
- Students shall be provided with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/student interaction, assumptions about technological competence and skills, technical equipment requirements, availability of academic support services and financial aid resources, and costs and payment policies.
- Enrolled students have reasonable and adequate access to the range of student services and student rights appropriate to support their learning.
- The institution has admission/acceptance criteria in place to assess the extent to which a

student has the background, knowledge and technical skills required to undertake the program or course.

- Advertising, recruiting, and admissions materials clearly and accurately represent the program or course and the services available.

Faculty Support

- The program or course provides faculty support services specifically related to teaching via an electronic system.
- The institution assures appropriate training for faculty who teach via the use of technology.
- The institution provides adequate equipment, software, and communications access to faculty to support interaction with students, institutions, and other faculty.

Resources for Learning

- The institution ensures that appropriate learning resources are available to students.
- The institution evaluates the adequacy of, and the cost to students for, access to learning resources and documents the use of electronic resources.

Commitment to Support

- Policies for faculty evaluation include appropriate recognition of teaching and scholarly activities related to programs or courses offered electronically.
- The institution demonstrates a commitment to ongoing support, both financial and technical, and to continuation of the program or course for a period of time reasonable and sufficient for students to complete the course or program.

EVALUATION AND ASSESSMENT

- The institution evaluates the program's or course's educational effectiveness, including assessments of student learning outcomes, student retention, and student and faculty satisfaction.
- At the completion of the program or course, the institution provides for assessment and documentation of student achievement in each course.

On behalf of _Texas A&M University______ (Institution), I assert that the preceding Coordinating Board criteria have been met for all courses associated with this program that will be delivered electronically and off-campus face-to-face.

Chief Academic Officer or President

Date

Name: ______________________________

Title: ______________________________

THECB 4/2014

DISTANCE EDUCATION

ELECTRONIC TO INDIVIDUALS (ONLINE DELIVERY) APPROVAL FORM

Submitted by:

☒ Texas A&M University	☐ Texas A&M University–Texarkana
☐ Texas A&M University–Central Texas	☐ Texas A&M International University
☐ Texas A&M University–Commerce	☐ Prairie View A&M University
☐ Texas A&M University–Corpus Christi	☐ Tarleton State University
☐ Texas A&M University–Kingsville	☐ West Texas A&M University
☐ Texas A&M University–San Antonio	☐ Texas A&M Health Science Center

Distance Education: Electronic to Individuals (online Delivery) Authorization Request

Please list the proposed degree and CIP code:

Degree: Master of Engineering in Computer Engineering

CIP Code: 14.0902.00

When is the effective date of the proposed program?

Effective Date: Fall 2016

****Please note:** This proposed program cannot be advertised as an online delivered degree program until the A&M System Office of Academic Affairs has approved it and the Texas Higher Education Coordinating Board has been notified.

Summary of Proposal (Include Background Information and Rationale for the change.)

Electrical and Computer Engineering (ECEN) has advanced national and global prosperity through research, development and application of electrical and information technologies and sciences for the benefit of humanity, and has helped create the global village. By choosing computer engineering our graduates embark on an exciting and productive career with endless opportunities and help in shaping a better future for mankind. As a major department with an enrollment of about 750 students pursuing graduate degrees in both electrical and computer engineering, our mission is to create new knowledge and challenge young minds by participation in the process of discovery and invention, to educate electrical and computer engineers with a solid background of fundamentals, to prepare leaders for an exciting future and to serve the society through research, education and outreach activities.

ECEN currently has about 70 tenured/tenure track faculty. Some indicators of our faculty recognition include 22 IEEE Fellows, two members of the National Academy of Engineering, two recipients of the Presidential Early Career Award for Scientists and Engineers (PECASE)

20 recipients of the National Science Foundation (NSF) Career Award, the Office of Naval Research (ONR) Young Investigator Award, the Air Force Office of Scientific Research (AFOSR) young investigator award and numerous editorships of major journals and national level awards. We also have the unique honor that one of our former faculty members (1978-1984), Jack Kilby, received the 2000 Nobel Prize in Physics. Most of our faculty members work across focus areas and across related disciplines, providing opportunities for students to experience interdisciplinary research and education. The department of ECEN offers unmatched diversity and richness of educational and research experience. Our high quality research program and low tuition rates make graduate studies in our programs among the best values in the world.

ECEN is planning to offer the Masters of Engineering in Computer Engineering. Through the Distance Learning (DL) program, the students can study anywhere in the world, and earn the same degree as our on-campus student in College Station, Texas. Whether taking classes on campus or through distance education, the standards for admission, course work, graduation and your diploma will all be the same. The currently in place automatic admission program used to engage top TAMU undergraduates in research applies to this program; details can be found in the following link http://engineering.tamu.edu/electrical/academics/degrees/graduate/automatic-admission-to-the-graduate-program. Also, up to 6 credits from the fast track program can be used towards this degree; further information can be found at https://engineering.tamu.edu/electrical/academics/fast-track.

Computer engineering focuses on the design, analysis and application of computers and on their applications as components of systems. The Computer Engineering group sustains and strengthens its teaching and research program to provide students with inspiration and quality education in the theory and practice of computer engineering.

The Masters of Engineering in Computer Engineering via distance education is a non-thesis degree requiring at least 30 credit hours. At least 13 credit hours must be taken from the Department of Electrical and Computer Engineering courses; a minimum of 24 credit hours must be taken from the departments of computer science and computer engineering and ECEN. Credits from the existing ECEN fast track program (up to 6) can be validated in this program. Up to 6 credits can be transferred from peer institutions if approved by the graduate studies committee. Seminar (681), Internship (684), Directed Studies (685) and Research (691) hours are not allowed on this program. Final examination may be waived for any masters of engineering student maintaining a GPR of at least 3.0. A petition to waive the final exam must be submitted through the Graduate Office. The Graduate Coordinator will be the chair of all masters of engineering committees. No other committee members are needed. The students will find help from his/her Advisory Committee of faculty members in formulating an individual plan of study that satisfies the degree requirements and matches his/her own needs, interests, and long-term goals.

Financial Implications:

TAMU has sufficient resources to initiate and maintain quality distance learning programs. Traditional funding sources and student fees ensure the excellence of electronically based courses and programs. Students who are enrolled in online courses within the college of engineering are charged distance education differential tuition of $540.00 per semester credit hour, which allows for the delivery of the course and ensures the quality of distance and distributed education programs of the University. In addition to the distance education differential tuition, there are traditional services that are a part of the university's operations that contribute to the effective delivery of distance education. A list of all student fee and explanations can be found at http://sbs.tamu.edu/.

University: Request for Authorization

I recommend adoption of the following program:

"Having complied with all of the requirements of the Texas Higher Education Coordinating Board, Texas A&M University is hereby authorized to offer the Masters of Engineering in Mechanical Engineering program by distance education, electronic to individuals (online delivery) effective Spring 2015.

The Texas A&M University System Office of Academic Affairs finds that the program offering aforementioned is within the role and scope and capacity of the institution and will benefit students.

Texas A&M University certifies that the proposed distance delivery of the aforementioned program meets the criteria under Texas Administrative Code Chapter 4 Subchapter P regarding quality of the curriculum and courses; delivery of instruction; evaluation, training, supervision, and support of faculty; financial resources; and admission of the support services for students. The program is within the role and mission of the institution and in the Table of Program. The institution will comply with the standards and criteria of the Commission on Colleges of the Southern Association of Colleges and Schools and will adhere to criteria outlined in the *Principles of Good Practice for Degree and Certificate Programs and Courses Offered Through Distance Education.*"

Approval –University:

Karan L. Watson — Date
Provost and Executive Vice President for Academic Affairs

Authorization: System

Approval – Texas A&M University System:

James R. Hallmark, Ph.D. — Date
Vice Chancellor for Academic Affairs

DWIGHT LOOK COLLEGE OF ENGINEERING

Department of Electrical & Computer Engineering

TEXAS A&M UNIVERSITY

RECEIVED
NOV 09 2015
ESSAP

RECEIVED
NOV 17 2015
GRADUATE STUDIES

November 9, 2015

MEMORANDUM

TO: **Dr. Mark Zoran**
Chair, Graduate Council

THROUGH: **Dr. N.K. Anand** N.K. Anand
Executive Associate Dean
Dwight Look College of Engineering

THROUGH: **Dr. Valerie Taylor** Valerie E. Taylor
Senior Associate Dean for Academic Affairs
Dwight Look College of Engineering

THROUGH: **Dr. Prasad Enjeti** (GOC dean)
Associate Dean for Academic Affairs
Dwight Look College of Engineering

FROM: **Dr. Miroslav Begovic** M. Begovic
Head, Department of Electrical & Computer Engineering

FROM: **Dr. Jose Silva-Martinez**
Associate Head for Graduate Affairs, Department of Electrical & Computer Engineering

SUBJECT: **Distance Education Master of Engineering in Electrical Engineering**

The Master of Engineering in Electrical Engineering is currently approved for on-campus, face-to-face delivery. We would like to offer the degree via distance education beginning fall 2016. Please see the attached approval and online delivery proposal forms for additional information

Please contact me if you have any questions at jsilva@ece.tamu.edu or 979-845-7477.

301 Wisenbaker Engineering Building
3128 TAMU
College Station, TX 77843-3128

Tel. 979.845.7441 Fax. 979.845.6259
www.ece.tamu.edu

Texas Higher Education Coordinating Board

Certification Form for Electronically Delivered and Off-Campus Education Programs
April 2014

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Please fill out the Administrative Information below and then sign and date on page 4.

Administrative Information

1. Institution: Texas A&M University

2. Program Name – Masters of Engineering in Electrical Engineering

3. Program CIP Code: 14.1001.00

4. Program Delivery – Distance Education/Online

5. Proposed Implementation Date – Fall 2016

6. Contact Person – Provide contact information for the person who can answer specific questions about the program.

Name: Jose Silva-Martinez, IEEE Fellow

Title: Associate Department Head for Graduate Programs

E-mail: jsilva@ece.tamu.edu

Phone: 979.845.7961

Based on *Principles of Good Practice for Academic Degree and Certificate Programs and Credit Courses Offered Electronically.*

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Commitment to Support

- Policies for faculty evaluation include appropriate recognition of teaching and scholarly activities related to programs or courses offered electronically.
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EVALUATION AND ASSESSMENT

- The institution evaluates the program's or course's educational effectiveness, including assessments of student learning outcomes, student retention, and student and faculty satisfaction.
- At the completion of the program or course, the institution provides for assessment and documentation of student achievement in each course.

On behalf of _Texas A&M University_____ (Institution), I assert that the preceding Coordinating Board criteria have been met for all courses associated with this program that will be delivered electronically and off-campus face-to-face.

__________________________________ __________________________

Chief Academic Officer or President Date

Name: ______________________________

Title: ______________________________

THECB 4/2014

Distance Education
Electronic to Individuals (online Delivery) Approval Form

Submitted by:

- [X] Texas A&M University
- [ ] Texas A&M University–Central Texas
- [ ] Texas A&M University–Commerce
- [ ] Texas A&M University–Corpus Christi
- [ ] Texas A&M University–Kingsville
- [ ] Texas A&M University–San Antonio
- [ ] Texas A&M University–Texarkana
- [ ] Texas A&M International University
- [ ] Prairie View A&M University
- [ ] Tarleton State University
- [ ] West Texas A&M University
- [ ] Texas A&M Health Science Center

Distance Education: Electronic to Individuals (online Delivery) Authorization Request

Please list the proposed degree and CIP code:

Degree: Master of Engineering in Electrical Engineering

CIP Code: 14.1001.00

When is the effective date of the proposed program?

Effective Date: Fall 2016

****Please note:** This proposed program cannot be advertised as an online delivered degree program until the A&M System Office of Academic Affairs has approved it and the Texas Higher Education Coordinating Board has been notified.

Summary of Proposal (Include Background Information and Rationale for the change.)

Electrical and Computer Engineering (ECEN) has advanced national and global prosperity through research, development and application of electrical and information technologies and sciences for the benefit of humanity, and has helped create the global village. By choosing electrical engineering our graduates embark on an exciting and productive career with endless opportunities and help in shaping a better future for mankind. As a major department with an enrollment of about 750 students pursuing graduate degrees in both electrical and computer engineering, our mission is to create new knowledge and challenge young minds by participation in the process of discovery and invention, to educate electrical and computer engineers with a solid background of fundamentals, to prepare leaders for an exciting future and to serve the society through research, education and outreach activities.

ECEN currently has about 70 tenured/tenure track faculty. Some indicators of our faculty recognition include 22 IEEE Fellows, two members of the National Academy of Engineering, two recipients of the Presidential Early Career Award for Scientists and Engineers (PECASE), 20 recipients of the National Science Foundation (NSF) Career Award, the Office of Naval Research (ONR) Young Investigator Award, the Air Force Office of Scientific Research

(AFOSR) young investigator award and numerous editorships of major journals and national level awards. We also have the unique honor that one of our former faculty members (1978-1984), Jack Kilby, received the 2000 Nobel Prize in Physics. Most of our faculty members work across focus areas and across related disciplines, providing opportunities for students to experience interdisciplinary research and education. The department of ECEN offers unmatched diversity and richness of educational and research experience. Our high quality research program and low tuition rates make graduate studies in our programs among the best values in the world.

ECEN is planning to offer the Masters of Engineering in Electrical Engineering. Through the Distance Learning (DL) program, the students can study anywhere in the world, and earn the same degree as our on-campus student in College Station, Texas. Whether taking classes on campus or through distance education, the standards for admission, course work, graduation and your diploma will all be the same. The currently in place automatic admission program used to engage top TAMU undergraduates in research applies to this program; details can be found in the following link http://engineering.tamu.edu/electrical/academics/degrees/graduate/automatic-admission-to-the-graduate-program. Also, up to 6 credits from the fast track program can be used towards this degree; further information can be found at https://engineering.tamu.edu/electrical/academics/fast-track.

Electrical engineering is a diverse field that embraces many specialty areas such as Analog and Mixed Signal, Biomedical Imaging, Sensing and Genomic Signal Processing, Device Science and Nanotechnology, Electric Power Systems and Power Electronics, Electromagnetics and Microwaves, and Information Science and Systems.

The Masters of Engineering in Electrical Engineering via distance education is a non-thesis degree requiring at least 30 credit hours. At least 18 credit hours must be ECEN courses. Credits from the existing ECEN fast track program (up to 6) can be validated. Up to 6 credits can be transferred from peer institutions if approved by the graduate studies committee. Seminar (681), Internship (684), Directed Studies (685) and Research (691) hours are not allowed on this program. Final examination may be waived for any student maintaining a GPR of at least 3.0. A petition to waive the final exam must be submitted through the Graduate Office. The Graduate Coordinator will be the chair of all student committees. No other committee members are needed. The students will find help from his/her Advisory Committee of faculty members in formulating an individual plan of study that satisfies the degree requirements and matches his/her own needs, interests, and long-term goals.

Financial Implications:

TAMU has sufficient resources to initiate and maintain quality distance learning programs. Traditional funding sources and student fees ensure the excellence of electronically based courses and programs. Students who are enrolled in online courses within the college of engineering are charged distance education differential tuition of $540.00 per semester credit hour, which allows for the delivery of the course and ensures the quality of distance and distributed education programs of the University. In addition to the distance education differential tuition, there are traditional services that are a part of the university's operations that contribute to the effective delivery of distance education. A list of all student fee and explanations can be found at http://sbs.tamu.edu/.

University: Request for Authorization

I recommend adoption of the following program:

"Having complied with all of the requirements of the Texas Higher Education Coordinating Board, Texas A&M University is hereby authorized to offer the Masters of Engineering in Mechanical Engineering program by distance education, electronic to individuals (online delivery) effective Spring 2015.

The Texas A&M University System Office of Academic Affairs finds that the program offering aforementioned is within the role and scope and capacity of the institution and will benefit students.

Texas A&M University certifies that the proposed distance delivery of the aforementioned program meets the criteria under Texas Administrative Code Chapter 4 Subchapter P regarding quality of the curriculum and courses; delivery of instruction; evaluation, training, supervision, and support of faculty; financial resources; and admission of the support services for students. The program is within the role and mission of the institution and in the Table of Program. The institution will comply with the standards and criteria of the Commission on Colleges of the Southern Association of Colleges and Schools and will adhere to criteria outlined in the *Principles of Good Practice for Degree and Certificate Programs and Courses Offered Through Distance Education.*"

Approval –University:

____________________________________ ________________

Karan L. Watson Date
Provost and Executive Vice President for Academic Affairs

Authorization: System

Approval – Texas A&M University System:

____________________________________ ________________

James R. Hallmark, Ph.D. Date
Vice Chancellor for Academic Affairs

DEPARTMENT OF ENGINEERING TECHNOLOGY
& INDUSTRIAL DISTRIBUTION

TEXAS A&M UNIVERSITY

MEMORANDUM

To: TAMU Engineering Graduate Instruction Committee (GIC)

From: Dr. V. Jorge Leon, Allen-Bradley Professor
ETID Associate Department Head for Graduate Programs

Date: October 20, 2015

RE: Vote for Approval Request: Master of Engineering in Technical Management

The Engineering Technology and Industrial Distribution Department respectfully requests the inclusion of the attached proposal for a new Master of Engineering in Technical Management Program, and corresponding GIC vote of approval for the creation of the program, on the October 28th, 2015 Meeting of the GIC.

Following University Rule 11.99.99.M3, Curricular Processes and Substantive Changes (http://rules-saps.tamu.edu/PDFs/11.99.99.M3.pdf), attached are the following documents for your consideration:

1. Required Forms
    a. Briefing and Minute Order
    b. Program Review Outline
    c. New Program Request Form
    d. Cover/Signature Page (For Engineering (CIP code 14) and programs > 2 Million new cost)
    e. Program Checklist
2. Additional information
    a. Letters of Support

For convenience, the documents have been compiled into a single file, with each document separated by a title page.

Please contact Dr. Leon, at jleon@tamu.edu, or (979) 845-4993 if you have any questions about the contents of the memorandum.

cc. Reza Langari, ETID Department Head

Briefing and Minute Order

Proposal: Master of Engineering in Technical Management

Agenda Item No.

AGENDA ITEM BRIEFING

Submitted by: XXXXXXXXXXXXXX, President/CEO
Texas A&M University

Subject: Approval of a New Master of Engineering Degree Program with a Major in Technical Management and Authorization to Request Approval from the Texas Higher Education Coordinating Board

Proposed Board Action:

Approve the establishment of a new degree program at Texas A&M University leading to a Master of Engineering in Technical Management, authorize the submission of this degree program to the Texas Higher Education Coordinating Board (THECB) for approval and certify that all applicable THECB criteria have been met.

Background Information:

The Master of Engineering Technical Management is a distance-learning professional graduate program for early career technical professionals. This rigorous program is industry-oriented, and relevant to manufacturing, energy, process and related industrial channels. The program targets early engineering and technical professionals and allows them to become future leaders in technical management positions, while continuing to work in their companies. The program's curriculum, carefully crafted in consultation with industrial leaders, provides a unique blend of industry-critical skills in managing people, projects and profitability. The curriculum is 20%, 60% and 20%, analytical, technical management and capstone project, respectively. The graduates of this program will meet industry needs for qualified technical managers and leaders resulting from the expected industrial growth in the short- and medium-term future.

A&M System Funding or Other Financial Implications:

The estimated 5-year cost for this program is $1,997,844 and the 5-year revenue is $3,574,960. Special item request is not requested.

Agenda Item No.

TEXAS A&M UNIVERSITY
Office of the President
Date of Submission

Members, Board of Regents
The Texas A&M University System

Subject: Approval of a New Master of Engineering Degree Program in Technical Management, and Authorization to Request Approval from the Texas Higher Education Coordinating Board

I recommend adoption of the following minute order:

> **"The Board of Regents of The Texas A&M University System approves the establishment of a new degree program at Texas A&M University leading to Master of Engineering degree in Technical Management.**
>
> **The Board also authorizes submission of Texas A&M University's new degree program request to the Texas Higher Education Coordinating Board for approval and hereby certifies that all applicable criteria of the Coordinating Board have been met."**

Respectfully submitted,

(CEO's SIGNATURE)

CEO's Name, Title

(One or two spaces)
Approval Recommended:
(Three spaces)

John Sharp
Chancellor

Billy Hamilton
Executive Vice Chancellor and
Chief Financial Officer

James R. Hallmark, Ph.D.
Vice Chancellor for Academic Affairs

Approved for Legal Sufficiency:

Ray Bonilla
General Counsel

Program Review Outline

Proposal: Master of Engineering in Technical Management

ATTACHMENT TO ITEM

Texas A&M University

Master of Engineering
with a major in Technical Management
(CIP 14.0101.00)

Program Review Outline

BACKGROUND & PROGRAM DESCRIPTION

Administrative Unit: College of Engineering, Engineering Technology and Industrial Distribution

The Master of Engineering Technical Management (METM) is a distance-learning professional graduate program for early career technical professionals. This rigorous program is applied, focused, and relevant to manufacturing, energy, process and related industrial channels.

The program is designed to develop early engineering and technical professionals to become the future leaders in technical management positions. The program's curriculum, carefully crafted in consultation with industrial leaders, provides a unique blend of industry-critical skills in managing people, projects and profitability.

METM is a 21 month, lock-step, part-time program, developed with a focus on technical professionals and designed for distance learning delivery. With students enrolled in cohorts, innovative and immersive learning experiences, such as a yearly residency week, and capstone projects, the program provides students and faculty a rich and high-contact, virtual learning-community.

The proposed implementation date is Fall 2017.

Texas A&M University certifies that the proposed new degree program meets the criteria under the 19 Texas Administrative Code, Section 5.45 in regards to need, quality, financial and faculty resources, standards and costs. New costs during the first five years will not exceed $2 million.

I. NEED

A. Employment Opportunities

The employment opportunities for graduates of the proposed METM is excellent as substantiated by the results of direct meetings with industry leaders, large scale survey, market research analysis, and strong letters of support from industry. Industry leaders participated in the definition of the program objectives and learning outcomes. The results of a large scale survey indicate that the skills of an METM graduate will close gaps present in the current workforce in specific critical skills, and that 70% of the respondents would consider enrolling in the METM program if available. The market prospects for the METM are even more significant in Texas, were the employment growth (2012-2020) in engineering employment (appox. 24.5%) is stronger than the national average (approx. 7%).

B. Projected Enrollment

Year	Change of Major / Transfers	New Students	Attrition	Graduation	Cumulative Headcount	Cumulative * FTES (New only)
1	0	12	1	0	11	11
2	0	12	2	10	21	21
3	0	15	2	10	24	24
4	0	20	2	13	32	32
5	0	25	2	18	42	42

*These numbers will dictate the projected formula income in the funding source portion in Section III.

C. Existing State Programs

The METM program-level educational objectives (PLO) were designed with direct input from industry leaders to overcome gaps in critical skills present in the current technical management workforce; thus, the uniqueness of METM's focus and curriculum. Comparable programs in the state include:

School	Program Name	Delivery	Student; class type	Main differences with proposed METM program
TAMU, College Station	**ME in Technical Management**	**DL**	**PT; CO**	**PROPOSED PROGRAM**
TAMU, College Station	MS in Engineering Systems Management	OC & DL	FT & PT; OE	• An MS program, rather than a professional, practice-oriented degree. • Focus on engineering systems management, rather than technical management
TAMU, College Station	ME in Construction Project Management	OC	FT; OE	• Focus on project management, rather than management • On-campus delivery only, rather than distance-learning
Texas Tech, Lubbock	MS in Systems & Engineering Management	OC & DL	PT & FT; OE	• An MS program, rather than a professional, practice-oriented degree. • Focus on engineering systems management, rather than technical management
UH, Houston	MS in Industrial Engineering with MBA	OC	PT; OE	• An MS program, rather than a professional, practice-oriented degree.

				• Focus on industrial engineering and management, rather than technical management
UT - Austin	MS in Engineering Management	OC and DL	FT; OE	• An MS program, rather than a professional, practice-oriented degree. • Focus on management, rather than technical management
Key: Master of Engineering (ME); Master of Science (MS); On-campus(OC); Distance-learning (DL); Full-time (FT), Part-time (PT); Open enrollment (OE), Cohort (CO)				

II. QUALITY & RESOURCES

A. Faculty

Name of Core Faculty and Faculty Rank	Highest Degree and Awarding Institution	Courses Assigned in Program	% Time Assigned To Program*
Dr. Jorge Alvarado Associate Professor	Ph.D. in Mechanical Engineering University of Illinois Urbana Champaign	METM 612 – Engineering Analytics	33%
Dr. Wei Zhan Associate Professor	D.Sc. in Systems Science, Washington University	METM 641 – Six Sigma & Lean Management for professionals	33%
Dr. Michael Johnson Associate Professor	Ph.D. in Mechanical Engineering, Massachusetts Institute of Technology	METM 611 – Financial Engineering	33%
Dr. V. Jorge Leon Professor	Ph.D. in Industrial Engineering, Lehigh University	METM 651 – Engineering and the Value Chain	33%
Dr. Joe Morgan Professor	D.E., Industrial & Systems Engineering, Texas A&M University	METM 621 – Technical Project Management	33%
Dr. Ben Zoghi Professor	Ph.D. in Biomedical/Electrical Engineering, Texas A&M University	METM 601 - Engineering Leadership	33%
Professor of Practice	Patent Lawyer	METM 622 – Contract & Risk Management for Technical Professionals	33%
Bharani Nagarathnam	Ph.D. Human Resource Development (Expected 2015) MS in Industrial Engineering, Texas A&M University	METM 644 – Leading and Managing Teams	25%
All Faculty		MTM 664 – Capstone Project I	
All Faculty		MTM 665 – Capstone Project II	

*The percent of time each professor is assigned to the program is only valid if the professor is teaching a course in any one semester (Fall, Spring or Summer).

B. Program Administration
A faculty-member will serve part-time (16.7%) as the Director of the new program.

C. Other Personnel
One clerical/staff person will be hired to support the program. Graduate students will be hired to assist the instructors in the delivery of the course.

D. Supplies, Materials
Supplies and materials required for recruitment, advertisements are included in the budget.

E. Library
No additional library resources are anticipated.

F. Equipment , Facilities
No additional equipment and facilities are anticipated.

G. Accreditation
No program specific accreditation will be sought. Program reviews will be conducted as required in order to be consistent with the standards established by the College of Engineering and Texas A&M University.

III. NEW 5 YEAR COSTS & FUNDING SOURCES

NEW FIVE-YEAR COSTS			SOURCES OF FUNDING	
Faculty	$752,995		Formula Income	$988,317
Program Administration	$341,356		Statutory Tuition	$156,000
Graduate Assistants	$271,293		Reallocation	$0
Supplies & Materials	$185,000		Designated Tuition	$424,548
Library & IT Resources	$0		Other Funding:	
Equipment, Facilities	$0		• DL Diff. Tuition	$1,061,100
			• Program fees	$655,000
Other	$447,200		• University Fees	$289,995
Estimated 5-Year Costs	**$1,997,844**		**Estimated 5-year Revenues**	**$3,574,960**

New Program Request Form

Proposal: Master of Engineering in Technical Management

Request Form for Bachelor's and Master's Degrees

I. Need

NEEDS ASSESSMENT

The needs assessment for the proposed Master of Engineering in Technical Management (METM) program was determined using: (1) Meeting with Industry Focus-Group, (2) Survey potential students and industry sponsors, (3) and feedback from current programs' Industry Advisory Boards, (4) database research on potential job markets, and (5) Industry Letters of Support.

The objective of the meeting with an industry focus-group was to determine the skills required for future technical managers and identify the skill-gaps in the current workforce; this information served as the basis to design the program-level learning objectives (PLO) and curriculum of the proposed METM program. In addition, a large survey was conducted presenting the proposed curriculum to the potential students and potential sponsors with the objectives of validating the curriculum and PLO's. Furthermore, a job market research was conducted to verify that the job market targeted had growth prospects. Details of these three needs assessment studies are described in the next two subsections. Finally, we have received letters from industry that strongly support the creating of the proposed Master of Engineering in Technical Management.

A. Job Market Need

Needs Assessment with Industry Focus Group. To gather direct requirements from industry, the Engineering Technology and Industrial Distribution (ETID) department consulted with leaders of key industries in Texas, including energy, equipment manufacturers, electronics, and automation, to define the specific characteristics of a program that would satisfy their current and future workforce needs. The meeting was held on the Texas A&M University campus on February 4, 2015. The meeting was hosted by Dr. Ben Zoghi, Professor in ETID, Bharani Nagarathnam, Associate Director of the Masters of Industrial Distribution Program, and facilitated by Dr. Debra Fowler, Associate Director of the Center for Teaching Excellence. Interested faculty also participated in the meeting.

Companies representing strategic industry sectors in Texas (e.g. energy, equipment manufacturers, and automation) were invited to the meeting. Participants included Baker Hughes, MIC Group, Applied Materials, BP International, Honeywell Process, Solutions, and Oil States Industries, Inc. The company representatives that attended were selected based on their commitment to engineering education, and potential to fund employees to participate in the new graduate program.

Specific results of the focus group meeting were used to define the characteristics and curriculum of the proposed program by establishing the skill-set required for graduates of the proposed program, and identifying the particular gaps observed in graduates from similar programs. The information gathered in the meeting was analyzed and synthesized as Program Level Learning Outcomes (PLO) selected faculty led by Dr. Debra Fowler, Associate Director of the Center for Teaching Excellence. Briefly, the PLOs are summarized as:

METM Program Level Learning Objectives: Every student graduating from the program will be able to:

1. Manage new product development
2. Demonstrate project management skills
3. Manage resources and assets

4. Practice leadership
5. Communicate clearly and effectively to both technical and non-technical audiences
6. Demonstrate financial and business acumen
7. Negotiate and manage contracts
8. Assure continuous improvement of quality in products and processes
9. Apply data driven approach to decision making
10. Apply problem solving and critical thinking methods

Detailed results of the Industry Focus Group Meeting are included in Appendix A.

Letters of Support from Industry. We have received strong letters of support from industry. Letters confirm the need for a program like the one proposed here: Mr. Marc Marini, Director of R&D at National Instruments (Austin, Texas), states that the "plurality of courses listed in the program proposal" will allow their "managers and program managers excel at leadership and communication" and that exposure to "financial engineering and value chain management" will provide "program graduates with a competitive advantage relative to [peers] at the same level of experience." Mr. Ross Smith, Melt Shop Manager at Nucor Steel (Jewett, Texas) states that he sees the "need and desire from [Nucor's] younger engineers to gain better understanding of the 'business' side of [their] operation," and that the proposed program "addresses a need that [Nucor] has been struggling to find a good solution for."

The letters of support are Attached.

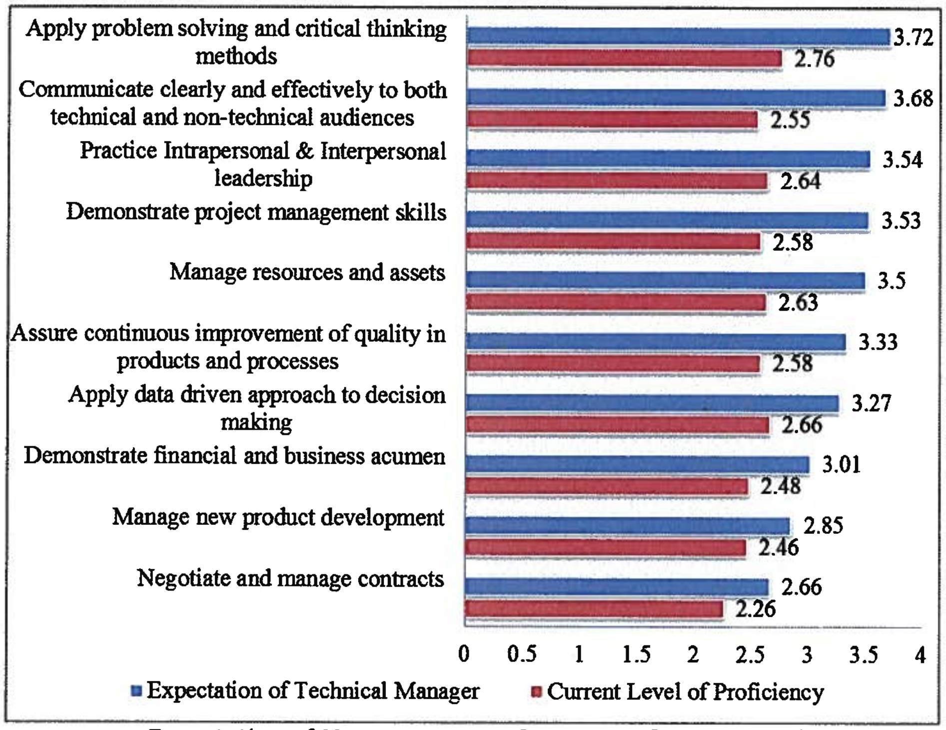
B. Student Demand

Two research methods were used in order to establish the potential student demand. The first and main methodology was a large scale survey aimed at potential students and industry leaders that could potentially sponsor students in the program; the second methodology was a database research to validate the employment growth in the engineering areas targeted by the proposed program.

a. Survey of Potential Students and Industry Sponsors

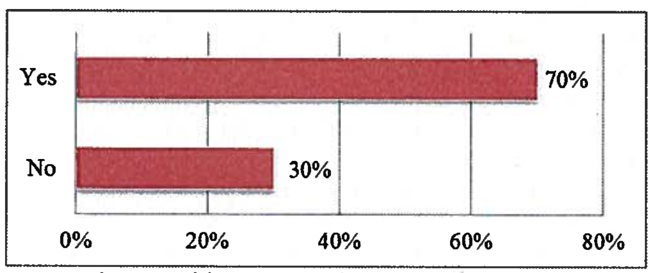
A survey was deployed to validate the specific PLOs defined for the proposed program (see previous section), and to gage the student demand for a program using the specific learning outcomes for the proposed program. The results show a significant potential demand for the proposed program; briefly:

- Sample:
  - Survey was sent to:
    - ETID Former Student List - 3119
    - ETD-Listserv ~ Few Thousand
    - Third Party Industry List Rental - 7000
  - Survey Response
    - About 240 Responses
- Respondents' work experience 80% had more than 6-year experience, 12% had between 3 to 5 years of experience, and 8% had 2 or less years of experience.
- The PLO's were validated as important skills where the current workforce lacks proficiency in (i.e. current skill gap). Results are shown in the following graph:



Expectation of Manager versus Current Proficiency Level

- 70% of the respondents said that, if given the opportunity, they would be interested in pursuing the proposed degree (Masters in Engineering in Technical Management). The summary is shown in the graph below:



If you had the opportunity, would you consider pursuing ME in Technical Management?

b. Secondary Data: Job Market Assessment / Analysis.

A secondary database research and analysis is conducted to identify the needs for technical managers. The statistics confirm the ample job opportunities expected for engineering careers in the nation and in Texas.

- **USA**
  The Occupational Outlook Handbook of US Bureau of Labor Statistics shows many engineering job categories growing much faster than the total projected employment growth of 7%. In addition the Architectural and Engineering Managers jobs category is projected to grow at an annual rate of 7%. This shows a strong need for engineers and engineering / technical managers

Engineering Employment Growth Outlook 2012-2022

Aerospace Engineers	7%

Biomedical Engineers	27%
Civil Engineers	20%
Electrical & Electronics Engineers	4%
Environmental Engineers	26%
Petroleum Engineers	15%

Source: http://www.bls.gov/ooh/architecture-and-engineering/home.htm

- **Texas**
  The Texas Job outlook for engineers shows a stronger demand than the national average. With the projected engineering jobs growth in Texas, the need for engineering / technical managers will grow as well.

Texas Long-Term Employment Projections

Aerospace Engineers	14.0%
Biomedical Engineers	35.8%
Chemical Engineers	21.2%
Civil Engineers	30.5%
Computer Hardware Engineers	24.0%
Electrical Engineers	20.8%
Electronics Engineers, Ex. Computer	22.2%
Environmental Engineers	24.0%
Industrial Engineers	22.2%
Materials Engineers	17.3%
Mechanical Engineers	20.0%
Mining & Geological Engineers	29.9%
Petroleum Engineers	45.3%
Engineers, All Other	16.4%

Source: http://www.tracer2.com/publication.asp?PUBLICATIONID=826

C. Enrollment Projections

Year	Change of Major/Transfers	New Students	Attrition	Graduation	Cumulative Headcount	Cumulative* FTES (New only)
1	0	12	2	0	11	11
2	0	12	2	10	21	21
3	0	15	2	10	24	24
4	0	20	2	13	32	32
5	0	25	2	18	42	42

*These numbers will dictate the projected formula income in the funding source portion in Section III.

D. Existing State Programs

Driven by the newly determined PLO's mentioned previously, the proposed program will produce graduates with a distinct and valuable skill set that complements the gaps found in graduates from comparable programs. The following paragraphs will describe the differences between comparable programs at Texas A&M University, and the other institutions in Texas.

There are comparable programs at Texas A&M University; particularly relevant are the M.S. in Industrial Engineering (ENSM), and the Master of Engineering in Construction Project Management (MECPM) programs in the College of Engineering.

Comparison between METM and Master of Science in Engineering Systems Management (ENSM):

There are significant differences between the proposed professional online Masters of Engineering in Technical Management (METM) and the existing Master of Science in Engineering Systems Management in the Industrial & Systems Engineering department at Texas A&M University. Important differences include:

1. Degree: METM is a masters of engineering degree, while ENSM is a master's of science. Hence, fundamentally METM is designed as a professional degree, while ENSM although intended for people interested working in industry, it is more academic in the sense that it also offers a path towards academic research (i.e., PhD).
2. Delivery: METM is solely offered via distance education and in cohorts, while ENSM is offered both for on-campus and distance education student and does not use a cohort system.
3. Number of credits required: The proposed METM requires 30 credit hours or about 10 courses for graduation; while the ENSM requires 36 credit hours or about 12 courses for graduation.
4. Program focus: The most salient difference between the two programs is their respective focus. The proposed METM focuses on the management of technology and broad supply chain operations with emphasis on people, projects and profitability. In contrast, ENSM focuses on the management of manufacturing systems with an emphasis on system analysis.
5. Curriculum: The differences in programmatic focus are evident in the curriculum. The content of the proposed METM is approximately 20%, 60% and 20%, analytical, technical management and capstone project, respectively. In contrast, ENSM is approximately 60-80% and 20-40%, analytical and management, respectively (depending on the electives taken), with no project. These course distributions emphasize the professional degree orientation of the proposed program.

The comparison between the two programs is summarized in the table below.

Characteristic	**METM**	**ENSM**
Degree	Master of Engineering Professional graduate program	Master of Science Graduates for Industry or PhD
Delivery	Distance education only	On-Campus & Distance Education
Number of credits	30 credit hours (10 courses)	36 credit hours (12 courses)
Program focus	People, technology and value-chain operations and management	Engineering (general including services) Systems management
Curriculum emphasis	• Analytical (2 course) • Technology and operations Management (6 courses) • Projects (2 courses)	• Systems engineering (7 analytical courses) • Eng. Management (1 course) • Electives (4 courses) Certificates: Business, Applied Statistics, Quality

		Engineering for Medical tech, Nonprofit Management)
Capstone Projects	• Two semester industry sponsored capstone projects	• No capstone projects

Comparison between METM and Master of Engineering in Construction Project Management:

There are significant differences between the proposed professional online Masters of Engineering in Technical Management (METM) and the existing Master of Engineering in Construction Project Management Master of Engineering in Construction Project Management (MECPM) in the Civil Engineering department at Texas A&M University. Important differences include:

1. Program focus: The most salient difference between the two programs is their respective focus. The proposed METM focuses on the management of technology and broad supply chain operations with emphasis on people, projects and profitability. In contrast, MECPM focuses on the management of large construction projects with focus on risk management.
2. Curriculum: The differences in programmatic focus are evident in the curriculum. The content of the proposed METM is approximately 20%, 60% and 20%, analytical, technical management and capstone project, respectively. In contrast, MECPM is approximately 50-60% and 30-50%, civil/construction engineering and construction project/risk management, respectively (depending on the electives taken), with no project. These course distributions emphasize the professional degree orientation of the proposed program.
3. Delivery: METM is solely offered via distance education and in cohorts, while MECPM is offered on-campus only and does not use a cohort system.

Comparable programs in Texas:

The following table shows three comparable programs in Texas. Notably all other comparable programs in Texas are Masters of Science degrees; in contrast the proposed METM is a Masters of Engineering degree, thus by design the proposed degree is industry-oriented and professional, rather than a purely academic degree.

University Name	Program Name	Enrollment/ Mode of Offering	Unique Feature
Texas Tech University	MS in Systems & Engineering Management	Part-time/ Distance Education	Thesis & Non-Thesis option
University of Houston	MS in Industrial Engineering with MBA	Part-time/ On-Campus	Course can be completed in a duration shorter than Industrial Engineering & MBA separately
University of Texas, Austin	MS in Engineering Management	Full-time/ Distance Education & On-Campus	UT Austin is surrounded by an environment that encourages creativity and innovation. Students here have opportunities to attend conferences that make an impact on a global scale, join student organizations and get involved in

			other events that UT have to offer.

II. Quality

A. Degree Requirements

Master Program:

	Non-thesis SCH	Thesis SCH	Clock Hours
a. *Foundation Courses: prerequisite/leveling (explain any special circumstances)	0	0	
b. Required Courses (of all students)	30	0	
• METM 601 Engineering Leadership	3		
• METM 611 Financial Engineering	3		
• METM 612 Engineering Decision Making	3		
• METM 621 Technical Project Management	3		
• METM 622 Contract & Risk Management	3		
• METM 641 Developing New Products and	3		
Services	3		
• METM 644 Leading & Managing Professional	3		
Teams	3		
• METM 651 Technology and the Value Chain	3		
• METM 664 Capstone Project I	3		
• METM 665 Capstone Project II	3		
c. Prescribed Elective Courses	0	0	
d. Elective Courses	0	0	
e1. Thesis/Dissertation	0	0	
e2. Other (specify) (e.g. internships/clinical practicum, etc.)	0	0	
TOTAL SCH REQUIREMENTS	30	0	

B. Curriculum

Prefix and Number	Required Courses	SCH
METM 601	Engineering Leadership*	3
METM 611	Financial Engineering*	3
METM 612	Engineering Decision Making*	3
METM 621	Technical Project Management*	3
METM 622	Contract & Risk Management*	3
METM 641	Developing New Products and Services*	3
METM 644	Leading & Managing Professional Teams*	3
METM 651	Engineering and the Value Chain*	3
METM 664	Capstone Project I*	3

METM 665	Capstone Project II*	3

Prefix and Number	Prescribed Elective Courses	SCH
	Elective courses will be allowed subject to advisor's approval to account for the student's previous background to ensure breadth and depth of study.	

C. Faculty

The faculty qualifications are summarized in the following table. All faculty members listed belong to the Graduate Faculty at Texas A&M University.

Name of Core Faculty and Faculty Rank	Highest Degree and Awarding Institution	Courses Assigned in Program	% Time Assigned To Program
Dr. Jorge Alvarado Associate Professor	Ph.D. in Mechanical Engineering University of Illinois Urbana Champaign	METM 612 – Engineering Decision Making	33%
Dr. Wei Zhan Associate Professor	D.Sc. in Systems Science, Washington University	METM 641 – New Products and Services	33%
Dr. Michael Johnson Associate Professor	Ph.D. in Mechanical Engineering, Massachusetts Institute of Technology	METM 611 – Financial Engineering	33%
Dr. Jorge Leon Professor	Ph.D. in Industrial Engineering, Lehigh University	METM 651 – Engineering and the Value Chain	33%
Dr. Joe Morgan Professor	D.E., Industrial & Systems Engineering, Texas A&M University	METM 621 – Technical Project Management	33%
Dr. Ben Zoghi Professor	Ph.D. in Biomedical/Electrical Engineering, Texas A&M University	METM 601 - Engineering Leadership	33%
Professor of Practice	Patent Lawyer	METM 622 – Contract & Risk Management	33%
Bharani Nagarathnam	Ph.D. Human Resource Development (*Expected 2015*) MS in Industrial Engineering, Texas A&M University	METM 644 – Leading and Managing Professional Teams	*25%
All Faculty		MTM 664 – Capstone Project I	

All Faculty		MTM 665 – Capstone Project II	

The percent of time each professor is assigned to the program is only valid if the professor is teaching a course in any one semester (Fall, Spring or Summer). During a specific semester where a current faculty is re-assigned to teach a course in the new program, the department will be provided support from the college for the designated percentage of equivalent annual, and use this support to hire qualified instructors to fulfill the current teaching obligations of the re-assigned faculty.

The teaching load of the current faculty will not be impacted. Any teaching load assigned to teach in the new program will be subtracted from the faculty's teaching load.

D. Students

General recruitment efforts, including plans to recruit and retain students from underrepresented groups can be categorized as follows:

Industry Professionals:
As a professional master's program, the main recruitment efforts will be focused on recruiting industry professional from technical fields such as oil & gas, energy, construction, manufacturing, electrical, electronics, plumbing & HVAC, systems integrators, and related channels. Professionals from engineering, design, sales, operations, technology and management will be ideal candidates. Efforts will be made to make sure the candidates have an appropriate bachelor's degree and sufficient industry knowledge and experience to make them successful in the METM program.

Industry Partnerships:
A concentrated effort will be taken to forge industry partnerships where the companies sponsor their top talent for the METM program. Capstone projects will be designed with the sponsors to bring value / innovation to the company and add competitive advantage.

Recruiting & Marketing Programs:
Based on the rich and successful experience within ETID with the Master of Industrial Distribution Program, the following recruiting and marketing programs will be developed:

- Print advertising – Industry related trade publications and engineering education journals.
- Electronic advertising – E-mails, banner ads and sponsorships in industry related trade publications and engineering education outlets / associations.
- Informational events & sessions: conduct admissions informational events in key cities to present, interact and recruit students.
- Corporate meetings and visits: Visit key partner companies to meet prospective students and company leadership sponsors.
- Educational institutions: Recruit faculty at multiple universities / colleges as well as academic conferences and events.
- Industry events, conferences and presentations: Participate in industry conferences, events and present the new METM program.

E. Library

No additional library resources are anticipated.

F. Facilities and Equipment

No additional facilities and equipment resources are anticipated.

G. Accreditation

Program reviews will be conducted as required in order to be consistent with the standards established by the College of Engineering and Texas A&M University. No program specific accreditation will be sought.

H. Evaluation

Graduate program reviews will be conducted periodically as required for all other graduate programs in the College of Engineering at Texas A&M University.

III. Costs and Funding

New Five-Year Costs and Funding Sources

The total 5-year costs and five-year funding totals are summarized in the following table.

Five-Year Costs		Five-Year Funding	
Personnel[1]		Reallocated Funds	$0
Faculty	$752,995		
Administration	$89,066		
Graduate Assistants	$271,293		
Clerical/Staff	$252,290		
Other Personnel	$0		
Facilities, Equipment & IT Resources	$0	Anticipated New Formula Funding[3]	$988,317
Supplies and Materials	$185,000	Special Item Funding	$0
Library	$0	Designated Tuition	$424,548
Other[2]	$447,200	Other[4](DT tuition, fees, stat. tuition)	$2,162,095
Total Costs	**$1,997,844**	**Total Funding**	**$3,574,960**

1. Report costs for reassigned faculty, new faculty hires, graduate assistants, and technical support personnel. Prorate individual salaries as a percentage of the time assigned to the program. If existing faculty will contribute to program, include costs necessary to maintain existing programs (e.g., cost of adjunct to cover courses previously taught by faculty who would teach in new program).
2. Specify other costs here (e.g., accreditation, travel).
3. Indicate formula funding for students new to the institution because of the program; formula funding should be included only **for years three through five** of the program and should reflect enrollment projections for years three through five.
4. Report other sources of funding here. In-hand grants, "likely" future grants, and fees can be included.

Reference and Resources for completion of proposal.

For certification on signature page.

TAC Section 5.50 (b).

(b) To be approved by the Commissioner, a proposal for a new degree program must include certification in writing from the Board of Regents of a proposing institution, in a form prescribed by the Commissioner, that the following criteria have been met:

(1) The proposed degree program is within the Table of Programs previously approved by the Board for the requesting institution.

(2) The curriculum, faculty, resources, support services, and other components of a proposed degree program are comparable to those of high quality programs in the same or similar disciplines offered by other institutions.

(3) Clinical or in-service placements, if applicable, have been identified in sufficient number and breadth to support the proposed program.

(4) The program is designed to be consistent with the standards of the Commission on Colleges of the Southern Association of Colleges and Schools, and with the standards of other applicable accrediting agencies; and is in compliance with appropriate licensing authority requirements.

(5) The institution has provided credible evidence of long-term student interest and job-market needs for graduates; or, if proposed by a university, the program is appropriate for the development of a well-rounded array of basic baccalaureate degree programs at the institution where the principal faculty and other resources are already in place to support other approved programs and/or the general core curriculum requirements for all undergraduate students.

(6) The program would not be unnecessarily duplicative of existing programs at other institutions.

(7) Implementation and operation of the program would not be dependent on future Special Item funding.

(8) New costs to the institution over the first five years after implementation of the program would not exceed $2,000,000.

Section II. C of the CB proposal asks campuses to provide information about Core and Support Faculty but does not ask for any other personnel information or any additional personnel who may be involved in the delivery of the new program. AND Section III of the proposal requests identification of personnel costs for first five-year period.

The following 'FTE personnel' table provides program proposal preparers an avenue to identify personnel requirements by category types, along with the types of funding sources [new costs vs. reallocated/reassigned funds from existing sources] for these personnel. The total costs from this table will provide 'Personnel' information costs to be included within Section III -- the 'Five-Year Costs and Funding Sources' table on p. 4 of the program proposal form.

FTE Personnel Involved in Delivery of New Program

Personnel		Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Program Administration	New						
	Reassignment	0.17	0.17	0.17	0.17	0.17	0.83
CORE Faculty	New						
	Reassignment	0.78	1.56	1.56	1.56	1.56	7.00
SUPPORT Faculty	New						
	Reassignment						
Graduate Student Assts	New	1	2	2	3	3	11
	Reassignment						
Clerical/Other Support	New	1	1	1	1	1	5
	Reassignment						
TOTAL	New	2	3	3	4	4	16
	Reassignment	.95	1.73	1.73	1.73	1.73	7.87
5-Year TOTAL/TOTAL	16						
	7.87						

NOTE: Reassignment = reallocation(s)

NEW COSTS TO THE INSTITUTION OF THE PROGRAM/ADMINISTRATIVE CHANGE (TAMUS modified)

Complete this chart to indicate the dollar costs to the institution that are anticipated from the change requested.

Cost Category	Cost Sub-Category	1st Year	2nd Year	3rd Year	4th Year	5th Year	TOTALS
Faculty Salaries	(New)						
	(Reassignments)	$78,288	$161,273	$166,111	$171,095	$176,228	$ 752,995
Program Administration	(New)						
	(Reassignments)	$16,776	$17,279	$17,798	$18,332	$18,882	$ 89,066
Graduate Assistants	(New)	$22,920	$47,215	$48,632	$75,136	$77,390	$ 271,293
	(Reassignments)						
Clerical/Staff	(New)	$47,520	$48,946	$50,414	$51,926	$53,484	$ 252,290
	(Reassignments)						
Supplies & Materials		$37,000	$37,000	$37,000	$37,000	$37,000	$185,000
Library		-	-	-	-	-	
Equipment& IT Resources**		-	-	-	-	-	
Facilities		-	-	-	-	-	
Other (books and course materials; residency week transportation, meals, hotels; other)		$37,840	$72,240	$82,560	$110,080	$144,480	$ 447,200

TOTALS		$240,344	$383,953	$402,515	$463,569	$507,463	**$ 1,997,844**

ANTICIPATED SOURCES OF FUNDING *Note:* Use this chart to indicate the dollar amounts anticipated from various sources. Use the additional explanation section that follows this page to specify as completely as possible each non-formula funding source.

Funding Category	**1st Year**	**2nd Year**	**3rd Year**	**4th Year**	**5th Year**	**TOTALS**
I. Formula Income*			$242,037	$322,716	$423,564	$988,317
II. Other State Funding*	$70,154	$132,815	$151,613	$201,741	$264,402	$820,725
III. Reallocation of Existing Resources*						
IV. Federal Funding* (In-hand only)						
V. Other Funding*	$146,720	$277,720	$317,020	$421,820	$552,820	$1,716,100
TOTALS	$216,874	$410,535	$468,633	$623,561	$817,222	$ 3,525,142

*For more information, please refer to the accompanying *Anticipated Sources of Funding: Explanatory Notes and Examples*

NON-FORMULA SOURCES OF FUNDING

Note: Use this form to specify as completely as possible each of the non-formula funding sources for the dollar amounts listed on the reverse side of this form.

Funding Category	Non-Formula Funding Sources
II. Other State Funding*	**#1 Texas A&M University required tuition**
	#2 Texas A&M University required fees
III. Reallocation of Existing Resources*	**#1**
	#2
IV. Federal Funding*	**#1**
	#2
V. Other Funding*	**#1 Distance learning differential tuition. Students will be charged $540/SCH in distance learning differential tuition**
	#2 Program fee. Students will be charged $1,000/course; this fee will cover books and other course materials, and
	transportation, hotel and meals associated with a residency week (one residency week per year).

Explanations: ANTICIPATED SOURCES OF FUNDING: EXPLANATORY NOTES AND EXAMPLES

I. **Formula Income**

A. The first two years of any new program should not draw upon formula income to pay for the program.

B. For each of Years 3 through 5, enter the smaller of:

1. the new formula income you estimate the program would generate, based on projected enrollments and formula funding rates; or
2. half of the estimated program cost for that year.

C. Because enrollments are uncertain and programs need institutional support during their start-up phase, it is the Coordinating Board's policy to require institutions to demonstrate that they can provide:

1. sufficient funds to support **all** the costs of the proposed program for the first two years (when no **new** formula funding will be generated); and
2. half of the costs of the new program during years three through five.

D. When estimating new formula income, institutions should take into account the fact that students switching programs do not generate additional formula funding to the institution. For example, if a new master's program has ten students, but five of them switched into the program from existing master's programs at the institution, only five of the students will generate new formula income to help defray the costs of the program.

II. **Other State Funding**

This category could include special item funding appropriated by the legislature, or other sources of funding from the state that do not include formula-generated funds (e.g., HEAF, PUF, etc.).

III. **Reallocation of Existing Resources:**

If faculty in existing, previously budgeted positions is to be partially or wholly reallocated to the new program, you should explain in the text of your proposal how the institution will fulfill the current teaching obligations of those faculty and include any faculty replacement costs as program costs in the budget.

IV. **Federal Funding**

Only federal monies from grants or other sources currently **in hand** may be included. Do not include federal funding sought but not secured. If anticipated federal funding is obtained, **at that time** it can be substituted for funds designated in other funding categories. Make note within the text of the proposal of any anticipated federal funding.

V. **Other Funding**

This category could include Auxiliary Enterprises, special endowment income, or other extramural funding.

APPENDIX A – Results from Industry Focus Group Meeting

1) **The ideal candidate for the program was discussed and the following characteristics were agreed upon:**
   - Target candidate for this program will be required to have graduated from an undergraduate program 3-5 years prior to applying to the program. Enrollment requirements will assist to ensure that the candidate demonstrates inherit values and has enough base knowledge of the industry.
   - Candidates 4-7 years out of their undergraduate program are likely applicants to enroll. Ideally, the candidates could have any level of career experience and could be from varying company sizes from around the world.
   - Industries could be a group to identify potential employees for the program. Individuals may also self-identify to enroll and cover their own expenses.
   - Industry representatives place the value of an earned master's degree to be equivalent to a few years of work experience. The master's program could be used to transition an employee within a company, a new career path, or to repurpose experiences.

2) **Program Elements:**
   - Instructors will be a combination of Professor of Practice and Tenured Professors whom will meet TAMU graduate faculty requirements and qualifications.
   - Distance education courses plus a 2 week on-site project experience (one week per year of program)
   - The target participation is 20 students per cohort in years with a growth plan associated with the program after 3 years of implementation.
   - The proposed program will typically run over 2 academic years.
   - The time commitment for this program will be approximately15-20 hours a week.
   - A letter of recommendation will be required from the company leader as part of the application to the program. A value proposition to company and individual is recommended.
   - This program will use a project based business model.

3) **Knowledge (core principles) currently needed in the industry were listed:**
   There is an assumption that students already have a strong technical background. An additional skill that needs strengthening are:
   - Decipher Profit &Loss and cash flow
   - Demonstrate individual value to the company
   - Demonstrate/justify team's value
   - Possess global & cultural awareness
   - Willingness to challenge the process
   - Demonstrate appropriate attitude
   - Understand geopolitical conditions
   - Assessing the project from a systems approach
   - Ability to plan human resource (HR)
   - Understand performance management
   - Maintain interpersonal communication
   - Manage expectations

- Understand proposal development (ie. opportunity capture, risk assessment, needs identification, etc.)
- Have delegation expertise
- Supply chain management
- Drive ownership & accountability
- Desire to develop others and self
- Differentiate the need for coaching, mentoring and successful planning
- Manage stakeholder expectations (manage engineers and stakeholders)
- Have PMP certification (potentially covered in a course)
- Understand legal ramifications (fire/hire/Interaction/contracting)
- Identify and protect intellectual property
- Understand ethics
- Have skills in accounting/budgeting
- Implement business practices
- Apply communication skills to effectively manage the project
- Utilize technology assessments
- Have a broad exposure of other programs available
- Recognize engineering analytics
- Know the fundamental/knowledge of operational research statistics
- Understand aptitude of abstractions and modeling
- Quantify decision making
- Make decisions based on data sets
- Utilize data driven decision making
- Function with any size company
- Need a HR Management, Basics of HR
- Problem solving/Six Sigma/Scientific method
- Improve research skills
- Capstone / Scope mgmt. / Problem statement / Design options

4) **Gaps currently seen in the industry were initially explored:**
   - Employees feel that they are on their own in their place of employment.
   - Employers need to create solution architects in some businesses.
   - Employees need to know how to convey an idea into an action.
   - Employees need to understand and promote systems engagement.
   - Companies do not want to put their best technical person moved to management position.
   - Current breadth of thinking is not sufficient (strategic thinking)
   - Cross-functional leadership skills are deficient.
   - Communication skills in general are lacking.
   - Project management skills are lacking. (QC-Quality management)
   - Team building and experiential learning are poor.
   - Employees are unable to recognize what they do not know.
   - Associate loyalty is lacking.
   - Drive, passion, and a sense of purpose need to be present.
   - Aptitude and attitude over knowledge and skills need to be improved.
   - Employees need to improve skills in financial management.
   - Employees need to understand the life cycle including balance sheet as well as the technical and business side of product development.

- Employees need to have a passion to continually improve
- Employees need to employ an ignorance of the ability to fail.
- Employees need to know when to make the small failures.
- Employees need to improve leadership management and the analytic aspect risk management.

Cover/Signature Page

Proposal: Master of Engineering in Technical Management

New Bachelor's and Master's Degree
Cover Page/Signature Page

Directions: An institution shall use this form to propose a new bachelor's or master's degree program. In completing the form, the institution should refer to the document *Standards for Bachelor's and Master's Programs,* which prescribes specific requirements for new degree programs. Note: This form requires signatures of (1) the Chief Executive Officer, certifying adequacy of funding for the new program; (2) a member of the Board of Regents (or designee), certifying Board approval, and (3) if applicable, a member of the Board of Regents or (designee), certifying that criteria have been met for staff-level approval. NOTE: Preliminary authority is required for all engineering programs. An institution that does not have preliminary authority for a proposed engineering program shall submit a separate request for preliminary authority prior to submitting the degree program request form. That request shall address criteria set in Coordinating Board rules Section 5.24 (a).

Information: Contact the Division of Academic Affairs and Research at 512/427-6200 for more information.

Administrative Information

1. Institution: Texas A&M University, College Station

2. Program Name: Master of Engineering in Technical Management

3. Proposed CIP Code: 14.0101.00

4. Number of Required Semester Credit Hours (SCHs): 30 semester credit hours

5. Brief Program Description – Describe the program and the educational objectives:

6. Administrative Unit: The Department of Engineering Technology and Industrial Distribution, College of Engineering

7. Proposed Implementation Date: 09/01/17

8. Contact Person – Provide contact information for the person who can answer specific questions about the program:

   Name: V. Jorge Leon

   Title: Associate Department Head for Graduate Programs

   E-mail: jleon@tamu.edu

   Phone: (979) 845-4993

Signature Page

1. Adequacy of Funding – The chief executive officer shall sign the following statement:

   I certify that the institution has adequate funds to cover the costs of the new program. Furthermore, the new program will not reduce the effectiveness or quality of existing programs at the institution.

   Chief Executive Officer Date

2. Board of Regents or Designee Approval – A member of the Board of Regents or designee shall sign the following statement:

   On behalf of the Board of Regents, I approve the program.

   Board of Regents (Designee) Date of Approval

3. Board of Regents Certification of Criteria for Commissioner of Assistant Commissioner Approval – For a program to be approved by the Commissioner or the Assistant Commissioner for Academic Affairs and Research, the Board of Regents or designee must certify that the new program meets the eight criteria under TAC Section 5.50 (b): The criteria stipulate that the program shall:

(1) be within the institution's current Table of Programs;
(2) have a curriculum, faculty, resources, support services, and other components of a degree program that are comparable to those of high quality programs in the same or similar disciplines at other institutions;
(3) have sufficient clinical or in-service sites, if applicable, to support the program;
(4) be consistent with the standards of the Commission of Colleges of the Southern Association of Colleges and Schools and, if applicable, with the standards or discipline-specific accrediting agencies and licensing agencies;
(5) attract students on a long-term basis and produce graduates who would have opportunities for employment; or the program is appropriate for the development of a well-rounded array of basic baccalaureate degree programs at the institution;
(6) not unnecessarily duplicate existing programs at other institutions;
(7) not be dependent on future Special Item funding
(8) have new five-year costs that would not exceed $2 million.

On behalf of the Board of Regents, I certify that the new program meets the criteria specified under TAC Section 5.50 (b).

Board of Regents (Designee) Date

Program Checklist

Proposal: Master of Engineering in Technical Management

Texas A&M University
New Certificate, Bachelors, Masters, or Doctoral Program
Undergraduate ◆ Graduate ◆ Professional
◆ Proposal Checklist ◆

Program request type: ☐ Undergraduate ☒ Graduate ☐ First Professional *(ex., DVM, JD, MD, etc.)*

Requested by the Department or Unit of : Department of Engineering Technology and Industrial Distribution

Program Type, Level, Designation, Title, Description, Hours

Program Type: ☐ Certificate Program ☒ Degree Program

Program Level: ☐ UG Certificate ☐ Grad Certificate ☐ Bachelor ☒ Master ☐ Doctoral ☐ Professional

Degree Designation *(i.e., BS, BA, MA, MS, MAgr, MEd, PhD, EdD, etc.)* MEng

Title of proposed program: Master of Engineering in Technical Management

Proposed CIP Code (*if known*): 14.0101.00

Brief program description *(provide a catalog description for undergraduate and graduate certificates)*:
The Master of Engineering Technical Management (METM) is a distance-learning graduate program for early career technical professionals. The program is designed to develop early engineering and technical professionals to become the future leaders in technical management positions. The program's curriculum, carefully crafted in consultation with industrial leaders, provides a unique blend of industry-critical skills in managing people, projects and profitability. This rigorous program is applied, focused, and relevant to manufacturing, energy, process and related industrial channels. METM is a 21 month, lock-step, part-time program, developed with a focus on technical professionals and designed for distance learning delivery. With students enrolled in cohorts, innovative and immersive learning experiences, such as a yearly residency week, and capstone projects, the program provides students and faculty a rich and high-contact virtual learning-community .

Minimum program semester credit hours (SCH)	*Certificates - 12 hours**	*Bachelors - 120 hours*	*Masters - 30 hours*
Proposed program hours:	____	____	30

**12 hours minimum to appear on transcript*

Certificate Programs ☐ Embedded
Students take coursework that will result in a degree and certificate being earned at the same time.

☐ Standalone
Non-degree seeking students take coursework to earn a certificate only (no degrees are awarded).

Off-Campus or Distance Delivery

% of Program a student can take off-campus or through Distance Education	Program Start Date	SACSCOC Approval**	When Provost needs to inform SACSCOC
☐ 25%	____	Notification Only	--------
☐ 50%	____	Approval Required	6 months before first day of program
☒ 80%	09/2017	Approval Required	6 months before first day of program
☐ 100%	____	Approval Required	6 months before first day of program

***Notification letter arranged through the Vice Provost for Academic Affairs and sent by TAMU President.*

Program Delivery Mode

	Location
☐ On-campus	____
☐ Broadcast / TTVN	____
☐ Specific off-campus location***	____
☒ Distance Education / Internet	☒ In-State ☒ Out-of-State Start Date 09/2017
☐ Out-of-Country	Will this program be offered with another institution? ☐ Yes ☒ No If yes, contact the Vice Provost for Academic Affairs for additional reporting requirements.

***Is this an approved SACSCOC location? ☐ Yes ☐ No If no, a program prospectus must be sent to SACSCOC.
Approved locations as of March 2012: TAMU-Galveston, TAMU-Qatar, University Center-The Woodlands, CityCentre-Houston, Dubai and Saudi Arabia.

Texas A&M University

New Certificate, Bachelors, Masters, or Doctoral Program

Undergraduate • Graduate • Professional

• Proposal Checklist •

Program Funding

Has program funding been finalized at the department or college level? If no, explain or attach budget: _____	☒ Yes	☐ No
Will new costs for the first five years of the program be under $2 million? If new costs exceed $2 million, coordinating board approval is required.	☒ Yes	☐ No

Submitted by (Contact Person):

V. Jorge Leon	jleon@tamu.edu
Name	Email
Associate Department Head for Graduate Programs	(979) 845-4993
Title	Phone

Certification Statement

By signing below, the Dean of the College certifies the proposed program complies with coordinating board standards. If the program is delivered through Distance Education, the Dean of the College certifies that they are following the *Principles of Good Practice for Academic Degree and Certificate Programs and Credit Courses Offered Electronically.*

Use additional signature lines if program is between three or more departments or colleges.

Signature, Department Head — Date

Reza Langari

Typed or Printed Name

Chair, College Review Committee — Date

Dean of College — Date

Chair, University Curriculum Committee or Graduate Council — Date

Signature, Department Head or Interdisciplinary Program Chair (*if joint program*) — Date

Typed or Printed Name

Chair, College Review Committee — Date

Dean of College — Date

Chair, University Curriculum Committee or Graduate Council — Date

Additional Approvals Required: Faculty Senate and President.

Letters of Support

Proposal: Master of Engineering in Technical Management

INDUSTRY LETTERS OF SUPPORT

Attached are letters of support received from industry:

- Mr. Marc Marini, Director of R&D, Embedded Systems, **National Instruments**, Austin, Texas.
- Mr. Ross C. Simmons, Melt Shop Manager, **Nucor Steel Texas**, Jewett, Texas.
- Mr. Tom Munns, Technical Writer, **Freescale**, and Former Product and Test Director, **Freescale and Motorola**, Austin, Texas.
- Mr. John Lyons, Escalation Manager, **Liveops**, San Antonio, Texas.

NATIONAL INSTRUMENTS

October 14, 2015

Dr. Jorge Leon
Associate Department Head, ETID Graduate Programs
Department of Engineering Technology & Industrial Distribution
Texas A&M University
MS 3367
College Station, TX 77843-3367

Dear Dr. Jorge Leon:

For nearly forty years, NI has worked with engineers and scientists to provide answers to the most challenging questions. Our greatest and most sustainable long-term competitive advantage is our employees. These employees directly influence the company's culture and it's continued success. As NI continues its steady growth and global expansion, the company ensures that its "people advantage" strategy is preserved, lending success to the company's other key stakeholders: customers, shareholders, and partners. With this strategy, NI meticulously hires the best and brightest employees. It then nurtures a great work environment with career development opportunities and purposeful work.

The purpose of this letter is to express our support for the proposed Master of Engineering in Technical Management program. We support this program for a number of reasons:

- Entering our managerial career track requires a few years of product development experience. Being able to complete on-line course work in parallel with real project experience will ensure an immediate positive impact, through reduced learning and mentoring, upon transition from the technical track.
- As a global organization with multi-discipline project teams, it is imperative that our managers and program managers excel at leadership and communication. A plurality of the courses listed in the program proposal will provide an educational foundation in these areas.
- Being able to comprehend the "bigger picture" leads to better decision making and project trade-offs. Through exposure to financial engineering and value chain management course, program graduates with a competitive advantage relative to non-graduates, at the same experience level.

In closuring, we believe the proposed program will produce engineering and technology professionals desperately needed by industry. As such, we recommend and support the creation of the program.

Sincerely,

Marc Marini
Director of R&D, Embedded Systems
National Instruments

NUCOR
BAR MILL GROUP
JEWETT DIVISION

October 14, 2015

Dr. Ben Zoghi
TEES Texas A&M Engineering
College Station, TX 77843

Re: Master of Engineering in Technical Management (METM) – Letter of Recommendation

Dr. Zoghi,

I am writing this letter in support of the proposed METM program.

As a manager of technical employees, I see the need and desire from our younger engineers to gain a better understanding of the "business" side of our operation. The proposed curriculum that Dr. Langari forwarded looks well developed and targeted to the needs of our future managers.

We have discussed this concept with a couple of our high potential engineers and both were excited as the course content and schedule were very attractive to them.

I truly believe this program has merit, and I can honestly say it addresses a need that our corporation has been struggling find a good solution for.

Please feel free to call me at 903-626-4461 if you have any questions.

Sincerely,

Ross C. Simmons

Ross C. Simmons
Melt Shop Manager
Nucor Steel Texas

Freescale Semiconductor, Inc. 6501 William Cannon Drive West MD: OE58, Austin, TX 78735 www.freescale.com

freescale

Dr Zoghi, Oct 20, 2015

From discussions held in regard to the METM degree within the IAC committee and community, I was already a supporter and in favor of the new academic direction. The current two page degree summary matches the intent of the prior discussion.

To gather more insight into the relevance of the degree, I contacted the recruiting department within Freescale HR. I talked to Denise Douroux from corporate recruiting, and she was also impressed with the purpose and intent of the degree. We were both certain that seeing this type of degree on a resume would greatly influence a candidate's selection for an entry-level manager, or even mid-level manager position. In my opinion, for the purpose of technical management, this METM degree would prove much more beneficial than a generic MBA.

My second reason for contacting Freescale HR was to investigate whether a degree like this would be "supported" by Freescale to the extent that the company would recommend and therefore even financially support a prospective employee/student. In my 30-year technical career, and in the time that one normally refers to as the "good old days", it was possible to get support from one's management, or from the corporation, to attend graduate school. It appears that this practice is very limited now. However, a progressive manager or supervisor would be likely to give some schedule accommodation to a high energy, top notch young employee to attend this mostly remote study METM curriculum.

Regards,
Tom Munns
(Freescale Technical Writer, former Motorola and Freescale Product and Test Director)

10/19/2015

John Lyons

15437 Canteen Creek Dr

San Antonio, TX 78247

To whom it may concern:

I am writing to enthusiastically endorse the proposed Master of engineering in Technical Management (METM) degree. This is a needed and important addition to the curriculum at Texas A&M. This degree program will be able to fill an industry need to supply high quality and fully qualified technical managers. It will also provide a career enhancing mechanism for Engineering Practitioners seeking to improve their capabilities.

If I can be of assistance or if you wish to have further discussion, please feel free to contact me in the future.

Sincerely,

John Lyons

Escalation Manager

Life Senior Member IEEE

Mobile: 682-556-2372

jlyons@liveops.com

liveops

Department of Maritime Administration

July 17, 2015

To: Dr. Karen Butler-Purry, Associate Provost for Graduate and Professional Studies

Through: Dr. Mark Zoran, Chair of Graduate Council

Through: Dr. Antonietta Quigg, Associate Vice President for Research and Graduate Studies AQuigg

From: Dr. Joan P. Mileski, Department Head, Maritime Administration Joan P Mileski

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The Department of Maritime Administration respectfully requests waiving of the one-semester residency requirement for students in the Maritime Administration and Logistics (MAAL) program.

The MAAL program prepares professionals for leadership positions in the public and private sectors. Designed for working professionals in maritime fields, the program seeks to provide an avenue for a professional degree at a part time pace; thus allowing employment to be continued. The residency requirement creates restrictions for our target audience; limiting the number of applicants. Waiver of this requirement will broaden access to this audience.

Thank you for your consideration.

Program request type: ☐ Undergraduate ☒ Graduate ☐ First Professional *(ex., DVM, JD, MD, etc.)*

Requested by the Department or Unit of : Latino/a and Mexican American Studies minor, on behalf of Sociology

Program Type, Level, Designation, Title, Description, Hours

Program Type: ☒ Certificate Program ☐ Degree Program

Program Level: ☐ UG Certificate ☒ Grad Certificate ☐ Bachelor ☐ Master ☐ Doctoral ☐ Professional

Degree Designation *(i.e., BS, BA, MA, MS, MAgr, MEd, PhD, EdD, etc.)* ____

Title of proposed program: Graduate Certificate in Latino/a and Mexican American Studies

Proposed CIP Code (*if known*): **05.0203.0001**

Brief program description *(provide a catalog description for undergraduate and graduate certificates)*:

The Graduate Certificate in Latino/a and Mexican American Studies offers all graduate students at Texas A&M University an opportunity to develop an interdisciplinary graduate concentration in Latino/a and Mexican American Studies while pursuing a degree in a disciplinary degree. Latino/a and Mexican American Studies is an interdisciplinary field of study focused on issues connected with Mexican Americans, Puerto Ricans, and other US Latino/as. The certificate ensures that students have developed core knowledge and appreciation for interdisciplinary scholarship in this area.

Minimum program semester credit hours (SCH)	*Certificates - 12 hours**	*Bachelors - 120 hours*	*Masters - 30 hours*
Proposed program hours:	12	____	____

**12 hours minimum to appear on transcript*

Certificate Programs

☒ Embedded
Students take coursework that will result in a degree and certificate being earned at the same time.

☐ Standalone
Non-degree seeking students take coursework to earn a certificate only (no degrees are awarded).

Off-Campus or Distance Delivery

% of Program a student can take off-campus or through Distance Education	Program Start Date	SACS Approval**	When Provost needs to inform SACS
☐ 25%	____	Notification Only	--------
☐ 50%	____	Approval Required	6 months before first day of program
☐ 80%	____	Approval Required	6 months before first day of program
☐ 100%	____	Approval Required	6 months before first day of program

***Notification letter arranged through the Vice Provost for Academic Affairs and sent by TAMU President.*

Program Delivery Mode

	Location
☒ On-campus	Through regularly held courses
☐ Broadcast / TTVN	____
☐ Specific off-campus location***	____
☐ Distance Education / Internet	☐ In-State ☐ Out-of-State Start Date ____
☐ Out-of-Country	Will this program be offered with another institution? ☐ Yes ☒ No If yes, contact the Vice Provost for Academic Affairs for additional reporting requirements.

***Is this an approved SACS location? ☒ Yes ☐ No If no, a program prospectus must be sent to SACS.
Approved locations as of March 2012: TAMU-Galveston, TAMU-Qatar, University Center-The Woodlands, CityCentre-Houston, Dubai and Saudi Arabia.

Program Funding

Has program funding been finalized at the department or college level? ☒ Yes ☐ No
If no, explain or attach budget: No funds are being requested

Will new costs for the first five years of the program be under $2 million? ☒ Yes ☐ No
If new costs exceed $2 million, coordinating board approval is required.

Submitted by (Contact Person):

Pat Rubio Goldsmith	pgoldsmith@tamu.edu
Name	Email
Associate Professor, unofficial director of LMAS	262 515-4647
Title	Phone

Certification Statement

By signing below, the Dean of the College certifies the proposed program complies with coordinating board standards. If the program is delivered through Distance Education, the Dean of the College certifies that they are following the *Principles of Good Practice for Academic Degree and Certificate Programs and Credit Courses Offered Electronically*.

Use additional signature lines if program is between three or more departments or colleges

Jane Sell 10/7/2015
Signature, Department Head or Interdisciplinary Program Chair — Date

Jane Sell
Typed or Printed Name

11/2/15
Chair, College Review Committee — Date

Lenny G. Dorsey 11/2/15
Dean of College — Date

Chair, University Curriculum Committee or Graduate Council — Date

Signature, Department Head or Interdisciplinary Program Chair (*if joint program*) — Date

Typed or Printed Name

Chair, College Review Committee — Date

Dean of College — Date

Chair, University Curriculum Committee or Graduate Council — Date

Additional Approvals Required: Faculty Senate and President

New Program Request Form for Certificate Programs

Directions: An institution shall use this form to propose a new bachelor's or master's degree program. In completing the form, the institution should refer to the document *Standards for Bachelor's and Master's Programs,* which prescribes specific requirements for new degree programs. Note: This form requires signatures of (1) the Chief Executive Officer, certifying adequacy of funding for the new program; (2) a member of the Board of Regents (or designee), certifying Board approval, and (3) if applicable, a member of the Board of Regents or (designee), certifying that criteria have been met for staff-level approval. NOTE: Preliminary authority is required for all engineering programs. An institution that does not have preliminary authority for a proposed engineering program shall submit a separate request for preliminary authority prior to submitting the degree program request form. That request shall address criteria set in Coordinating Board rules Section 5.24 (a).

Administrative Information

1. Institution: Texas A&M University

2. Program Name – Show how the program would appear on the Coordinating Board's program inventory (*e.g., Bachelor of Business Administration degree with a major in Accounting*):

Graduate Certificate in Latino/a and Mexican American Studies

3. Proposed CIP Code: **05.0203.0001**

4. Brief Program Description – Describe the program and the educational objectives:

The Graduate Certificate in Latino/a and Mexican American Studies offers all graduate students at Texas A&M University an opportunity to develop an interdisciplinary graduate concentration in Latino/a and Mexican American Studies while pursuing a degree in a disciplinary degree. Latino/a and Mexican American Studies is an interdisciplinary field of study focused on issues connected with Mexican Americans, Puerto Ricans, and other US Latino/as. The certificate ensures that students have developed core knowledge and and appreciation for interdisciplinary scholarship in this area.

Number of Semester Credit Hours Required: 12

5. Administrative Unit – Identify where the program would fit within the organizational structure of the university (*e.g., The Department of Electrical Engineering within the College of Engineering*):

Department of Sociology

6. Proposed Implementation Date – Report the first semester and year that students would enter the program:
Fall 2016

7. Contact Person – Provide contact information for the person who can answer specific questions about the program:

Name: Pat Rubio Goldsmith
Title: Associate Professor
E-mail: pgoldsmith@tamu.edu
Phone: 262-515-4647

Program Information

I. Need

Note: Complete I.A and I.B only if preliminary authority for the program was granted more than four years ago. This includes programs for which the institution was granted broad preliminary authority for the discipline.

A. Job Market Need – Provide short- and long-term evidence of the need for graduates in the job market.

According to the Pew Hispanic Center, Latinos constituted 17.1% of the United States population in 2013, up from 6.5% as late as 1980. Almost 1 in 5 Latinos (18.8%) live in Texas. In future years, Latinos will become a larger share of the Texas population because the Latino population is much younger (with a median age of 27) than the non-Hispanic white population (with a median age of 42). As this population grows, academic programs to serve Latino students and to provide advanced training to serve the community will be in greater need. Institutions of higher education are responding to these changes. For example, UT-Austin has created a Latino and Mexican American Studies Department, which offers a Masters degree, and the University of Arizona has added a doctoral degree in the Department of Mexican American Studies. Developments in the graduate curriculum at Texas A&M University have not kept pace with these national trends. Texas A&M faculty in the Departments of Sociology, History, Political Science, Hispanic Studies, Performance Studies, Educational Psychology and others are renowned for research on Latinas and Latinos. Yet the university offers no graduate credential of any kind in this area. The proposed graduate certificate in Latino/a and Mexican American Studies provides students with advanced interdisciplinary knowledge of the field and an official recognition of their accomplishments. By improving the training of graduate students in the study of Latinos and Latinas, Texas A&M University will be developing leaders for the state of Texas with expertise on how to improve the social and economic conditions of this population.

B. Student Demand – Provide short- and long-term evidence of demand for the program.

The graduate certificate in LMAS is open to all graduate students at Texas A&M. However, courses in this area have traditionally been more popular among Latino and Latina students. At Texas A&M, Latinos and Latinas comprise 9.6% of all Masters students and 8.3% of all PhD students, far lower than their averages in the overall population of Texas (which is now 50% of in the young adult age groups). Nevertheless, the percentages have risen in recent years. In the Fall of 2005, the percent of MA and PhD students that were Latino or Latina was only 6.9 and 6.2%, respectively. In the College of Liberal Arts, representation of Latino and Latina students is lower at the MA level (7.1%) and higher at the PhD level (15.6%). In the departments that have historically offered the most material connected to Latino and Latina studies, Sociology and Hispanic Studies, the percentages are higher yet.

In these departments, 33% and 46% of the students are Latino and Latina, respectively. Given that the representation of Latino and Latina students is likely to increase further in the short- and long-term, demand for these courses is likely to increase as well. In addition, the development of academic programs in the areas of Latino and Latina studies is likely to foster a more inclusive campus culture and attract Latino and Latina students and faculty to campus.

C. Enrollment Projections – Use this table to show the estimated cumulative headcount and full-time student equivalent (FTSE) enrollment for the first five years of the program. (*Include majors only and consider attrition and graduation.*)

Based on an analyses of course offerings and enrollments in the departments of Sociology, History, Political Science, and Hispanic Studies from the Spring of 2012 to the Spring of 2015, we estimated that between 5 and 8 students could have completed the equivalent of what we are requiring for a certificate. Using the lower estimate to be conservative, this suggests that two students will be expected to enroll in the program per year. Given that some students are lost to attrition or graduation, we project the enrollment pattern shown below.

YEAR	1	2	3	4	5
Headcount	2	4	5	7	8
FTSE					

II. Quality

A. Certificate and Degree Requirements – Use this table to show the certificate and degree requirements of the program. *(Modify the table as needed; if necessary, replicate the table for more than one option.)*

Category	Semester Credit Hours
General Education Core Curriculum *(bachelor's degree only)*	
Required	3
Prescribed	9
Other *(Specify, e.g., internships, clinical work)*	(if not included above)
TOTAL	12

B. Curriculum – Use these tables to identify the required courses and prescribed electives of the program, and curriculum as it will appear in the undergraduate and graduate catalog. Note with an asterisk (*) courses that would be added if the program is approved. *(Add and delete rows as needed. If applicable, replicate the tables for different tracks/options as shown in the undergraduate catalog.)*

Students must take four courses, with two in the social sciences and two in the humanities. At least one course must be from the list of core courses. Students are required to earn an A, B, or P.

Take at least one core course

Prefix and Number	Core courses in humanities	SCH
HIST 674	Reading on Chicano Latino History	CLA
HIST 675	Seminar on Chicano Latino History	CLA
	Core courses in social science	
SOCI 667	Seminar in Race and Ethnic Relations: Mexican Americans and Latinos	CLA
SOCI 667	Seminar in Race and Ethnic Relations: US-Mexico Border	CLA

Prefix and Number	Elective Courses in humanities	SCH
HISP 606	Spanish in the United States	CLA
HISP 625	US Hispanic Literature and Culture	CLA
HISP 646	Seminar in Cultural Encounters and Borders	CLA
HISP 670	Topics in Latino/a Literature and Culture	CLA
HISP 671	Bilingualism in the Spanish-Speaking World	CLA
ENGL 670	Topics in Latino/a Literature and Culture	CLA
HIST 678	Readings: Southwest Borderlands	CLA
HIST 679	Research Seminar: Southwest Borderlands	CLA
PERF 625	Latino/a Expressive Culture	CLA
	Elective Courses in social science	
CSPY 637	Latino Psychology	CEHD
EDCI 710	The Hispanic Learner in Urban Settings	TLAC
POLS 674	Seminar in US Latino Politics	CLA
SOCI 663	Black and Latino Americans	CLA

C. Faculty – Use these tables to provide information about Core and Support faculty. Add an asterisk (*) before the name of the individual who will have direct administrative responsibilities for the program. *(Add and delete rows as needed.)*

Name of Core Faculty and Faculty Rank	Highest Degree and Awarding Institution	Courses Assigned in Program	% Time Assigned To Program
N/A			

Name of Support Faculty and Faculty Rank	Highest Degree and Awarding Institution	Courses Assigned in Program
*Goldsmith, Pat Rubio Assoc. Professor	PhD. in Sociology University of Arizona	SOCI 667 SOCI 663
Plankey-Videla, Nancy Assoc. Professor	PhD. in Sociology University of Wisconsin, Madison	SOCI 667 SOCI 663
Murguia, Edward Professor	PhD. in Sociology University of Texas, Austin	SOCI 667 SOCI 663
Blanton, Carlos Assoc. Professor	PhD. in American History Rice University	HIST 674 HIST 675 HIST 678 HIST 679
Hinojosa, Felipe Asst. Professor	PhD. in History University of Houston	HIST 674 HIST 675 HIST 678 HIST 679
Pedraza, Francisco Asst. Professor	PhD. in Political Science University of Washington	POLS 674
Neshyba, Monica Clinical Asst. Professor	PhD. in Curriculum and Instruction, Bilingual/Bicultural Education University of Texas, Austin	EDCI 689
Portales, Marco Professor	PhD. in English State University of New York at Buffalo	ENGL 670
Alonzo, Juan Assoc. Professor	PhD. in English University of Texas, Austin	ENGL 670
Castillo, Linda Professor	PhD. in Counseling Psychology University of Utah	CPSY 637
Ojeda, Lizette Assoc. Professor	PhD. Counseling Psychology University of Missouri	CPSY 637
Hernandez , Sonia Assoc. Professor	PhD. Latin American History University of Houston	HIST 674 HIST 675 HIST 678 HIST 679
Moyna , Maria Assoc. Professor	PhD. in Linguistics University of Florida	HISP 606
Lawo-Sukam , Alain Assoc. Professor	PhD. in Spanish University of Illinois at Urbana-Champaign	HISP 646
Kattari, Kim Assistant Professor	PhD. in Ethnomusicology, University of Texas at Austin	PERF 625

D. Students – Describe general recruitment efforts and admission requirements. How will students be accepted into the program? In accordance with the institution's Uniform Recruitment and Retention Strategy, describe plans to recruit, retain, and graduate students from underrepresented groups for the program.

The graduate certificate in Latino/a Studies will be promoted in the University graduate course catalog, on the Sociology Department website, the College of Liberal Arts website, brochures, and social media outlets. Support faculty will identify interested and qualified students and advise them to apply for the certificate. Any Texas A&M graduate student may apply for the graduate certificate, as long as the student is in good academic standing. The application process will require a proposed plan of study, including a statement by the student explaining how the certificate will enhance the student's goals. Pat Rubio Goldsmith, in consultation with a committee of support faculty, will review the applications.

E. Library – Provide the library director's assessment of library resources necessary for the program. Describe plans to build the library holdings to support the program.

N/A

F. Facilities and Equipment – Describe the availability and adequacy of facilities and equipment to support the program. Describe plans for facility and equipment improvements/additions.

N/A

G. Accreditation – If the discipline has a national accrediting body, describe plans to obtain accreditation or provide a rationale for not pursuing accreditation.

N/A

H. Evaluation – Describe the evaluation process that will be used to assess the quality and effectiveness of the new degree program.

If the certificate is approved, supporting faculty will develop clear and explicit goals around three themes: Advanced interdisciplinary theory and methods, Latino/a and Mexican American Studies content knowledge, and contribution to the diversity of LMAS, the University, and Academia. Using the WEAVEonline system, we will articulate these goals, translate them into objectives, and develop measurable learning outcomes. To measure learning outcomes, support faculty will evaluate student's MA/MS paper, major paper, preliminary exams, and/or dissertation.

I. Administration of Program – Describe how the program will be administered. Where will the program be administered (i.e., department, college)?

The Department of Sociology will administer the certificate program.

III. Costs and Funding

Five-Year Costs and Funding Sources - Use this table to show five-year costs and sources of funding for the program.

All courses are already in the graduate catalog. No additional resources or budget is required.

Five-Year Costs		**Five-Year Funding**	
Personnel[1]	$0	Reallocated Funds	$0
Facilities and Equipment	$0	Anticipated New Formula Funding[3]	$0
Library, Supplies, and Materials	$0	Special Item Funding	$0
Other[2]	$0	Other[4]	$0
Total Costs	**$0**	**Total Funding**	**$0**

1. Report costs for new faculty hires, graduate assistants, and technical support personnel. For new faculty, prorate individual salaries as a percentage of the time assigned to the program. If existing faculty will contribute to program, include costs necessary to maintain existing programs (e.g., cost of adjunct to cover courses previously taught by faculty who would teach in new program).
2. Specify other costs here (e.g., administrative costs, travel).
3. Indicate formula funding for students new to the institution because of the program; formula funding should be included only for years three through five of the program and should reflect enrollment projections for years three through five.
4. Report other sources of funding here. In-hand grants, "likely" future grants, and designated tuition and fees can be included.

Signature Page

1. Adequacy of Funding – The chief executive officer shall sign the following statement:

I certify that the institution has adequate funds to cover the costs of the new program. Furthermore, the new program will not reduce the effectiveness or quality of existing programs at the institution.

Chief Executive Officer Date

2. Board of Regents or Designee Approval – A member of the Board of Regents or designee shall sign the following statement:

On behalf of the Board of Regents, I approve the program.

Board of Regents (Designee) Date of Approval

3. Board of Regents Certification of Criteria for Commissioner of Assistant Commissioner Approval – For a program to be approved by the Commissioner or the Assistant Commissioner for Academic Affairs and Research, the Board of Regents or designee must certify that the new program meets the eight criteria under TAC Section 5.50 (b): The criteria stipulate that the program shall:

(1) be within the institution's current Table of Programs;
(2) have a curriculum, faculty, resources, support services, and other components of a degree program that are comparable to those of high quality programs in the same or similar disciplines at other institutions;
(3) have sufficient clinical or in-service sites, if applicable, to support the program;
(4) be consistent with the standards of the Commission of Colleges of the Southern Association of Colleges and Schools and, if applicable, with the standards or discipline-specific accrediting agencies and licensing agencies;
(5) attract students on a long-term basis and produce graduates who would have opportunities for employment; or the program is appropriate for the development of a well-rounded array of basic baccalaureate degree programs at the institution;
(6) not unnecessarily duplicate existing programs at other institutions;
(7) not be dependent on future Special Item funding
(8) have new five-year costs that would not exceed $2 million.

On behalf of the Board of Regents, I certify that the new program meets the criteria specified under TAC Section 5.50 (b).

Board of Regents (Designee) Date

Course Descriptions

EDCI 710. The Hispanic Learner in Urban Settings.
Credit 3. 3 Lecture Hours.
Overview of demographic, social, psychological, cultural, political, and historical issues that impact the school achievement of Hispanics in urban settings in the US.; analyzes methodological approaches of current research that guides common perceptions about Hispanics in education. Prerequisite(s): Graduate classification.

CPSY 637 Latino Psychology
Credits 3. 3 Lecture Hours.
Examination of psychological research and literature related to Latino experience in the U.S. via readings, media and class discussion; introduction to various Latino groups with the primary focus on individuals of Mexican descent.
Prerequisites: Graduate classification; approval of department head.

HISP 606 Spanish in the United States
Credits 3. 3 Lecture Hours.
In-depth description and analysis of Spanish varieties spoken in the United States, by both traditional and new immigrant populations, including New Mexico and Louisiana Spanish, Mexican, Cuban, Puerto Rican, Dominican, Central and South American dialects; topics include accommodation, borrowing, code-switching, attitudes and policies related to language maintenance and shift.
Prerequisite: Graduate classification.

HISP 625 US Hispanic Literature and Culture
Credits 3. 3 Lecture Hours.
Study of the origins and evolution of U.S. Hispanic literature, culture and folklore, and U.S. Hispanic regional dialects.
Prerequisite: Graduate classification.

HISP 646 Seminar in Cultural Encounters and Borders
Credits 3. 3 Lecture Hours.
Study of cultural encounters across borders in geography, language, society, gender and genre. May be taken three times for credit as content varies.
Prerequisite: Graduate classification.

HISP 670 Seminar in US-Hispanic Literature
Credits 3. 3 Lecture Hours.
Topics in the history, theory, interpretation of Latino/a literature and culture; may focus on authors, groups of authors, themes, movements, genres, cultural contexts and/or theoretical framing. May be taken three times for credit as content varies. **Prerequisite:** Graduate classification.

HISP 671 Bilingualism in the Spanish-Speaking World
Credits 3. 3 Lecture Hours.

Linguistic, psycholinguistic, and social aspects of bilingualism and multilingualism with special reference to Spanish and the United States; bilingual speakers and bilingual acquisition; bilingual communities: language identity, language maintenance and shift; implications for education and society; written and oral manifestations of bilingualism in the media and arts.
Prerequisite: Graduate classification.

ENGL 670 Seminar in US-Hispanic Literature
Credits 3. 3 Lecture Hours.
Topics in the history, theory, interpretation of Latino/a literature and culture; may focus on authors, groups of authors, themes, movements, genres, cultural contexts and/or theoretical framing. May be taken three times for credit as content varies.
Prerequisite: Graduate classification.

HIST 674 Reading on Chicano Latino History
Credits 3. 3 Lecture Hours.
Selected topics and themes related to Chicano-Latino history; race/ethnicity, gender/sexuality, labor adaption and resistance movements; colonialism, transnationalism, immigration; identity, and citizenship. May be taken three times for credit as content varies.
Prerequisite: Graduate classification.

HIST 675 Research Seminar on Chicano Latino History
Credits 3. 3 Lecture Hours.
Seminar focuses on researching and writing, core skills for historians; conduct primary source research in a subfield Chicano-Latino history and compose an article-length paper. May be taken three times for credit.
Prerequisite: Graduate classification.

HIST 678 Readings: Southwest Borderlands
Credits 3. 3 Lecture Hours.
Reading seminar focusing on how groups in the American Southwest articulate, enforce and challenge difference; brings together disparate historiographies to consider a variety of theoretical and methodological approaches used in understanding borders; examines contact, conflict and change across various kinds of historical and cultural boundaries. May be taken two times for credit as content varies.
Prerequisite: Graduate classification.

HIST 679 Research Seminar: Southwest Borderlands
Credits 3. 3 Lecture Hours.
Research and writing seminar focusing on selected topics and themes in an identified area of Southwest Border Studies. May be taken two times for credit as content varies.
Prerequisite(s): Graduate classification.

PERF 625 Latino/a Expressive Culture
Credits 3. 3 Lecture Hours.
Explores how issues concerning Latinos, including race and ethnicity, religion, border politics, immigration, the drug war, family, gender and sexuality, and class, are reflected and debated through expressive forms of performance such as theater, comedy music, folklore and

performance art.

Prerequisite: Acceptance into the MA in Performance Studies program or approval of instructor.

POLS 674 Seminar in US Latino Politics

Credits 3. 3 Other Hours.

This seminar examines social science theories of race, ethnicity and politics in the United States; highlights the political behavior of Latinos, African-Americans, and Asian Americans. May be taken three times for credit.

Prerequisite: Graduate classification.

SOCI 663 Black and Latino Americans

Credits 3. 3 Lecture Hours.

This seminar focuses social science theory and research about African Americans and Latinos. We will emphasize historical backgrounds, social science theories applied to these groups, patterns of immigration, cognitive framing, patterns of racial-ethnic discrimination, and racial/class/gender intersections. We will review critically important research books dealing with these and related U.S. racial-ethnic issues.

Prerequisite: Graduate classification.

SOCI 667 Seminar in Race and Ethnic Relations: Mexican Americans and Latinos

Credits 3. 3 Lecture Hours.

Origins, extent, consequences of racial and ethnic differences on key demographic variables such as fertility, mortality, migration and population size, growth, distribution and composition; how demographic variables affect and are affected by racial and ethnic differences in family structure, social mobility and socioeconomic stratification. May be taken up to three times for credit as content varies.

Prerequisite: Graduate classification.

SOCI 667 Seminar in Race and Ethnic Relations: US-Mexico Border

Credits 3. 3 Lecture Hours.

Origins, extent, consequences of racial and ethnic differences on key demographic variables such as fertility, mortality, migration and population size, growth, distribution and composition; how demographic variables affect and are affected by racial and ethnic differences in family structure, social mobility and socioeconomic stratification. May be taken up to three times for credit as content varies.

Prerequisite: Graduate classification.

From: Clark, William
Sent: Friday, October 02, 2015 2:19 PM
To: Pat Rubio Goldsmith
Subject: Letter of support for graduate certificate in Latino/a and Mexican American Studies

Dear Pat,

We support the inclusion of the following course(s) to be included in the course inventory list for the LMAS graduate certificate.

POLS 674 Seminar in US Latino Politics

Sorry for the delayed response.

Best,
Bill

William Roberts Clark
Professor and Head
Department of Political Science
Charles Puryear Professor in Liberal Arts
Texas A&M University
2010 Allen Building
4348 TAMU
College Station, TX 77843-4348
(979) 845-2827 (direct)
(979) 845-8833 (Assistant: Carrie Kilpatrick)

From: Moyna, Maria I
Sent: Thursday, October 01, 2015 1:43 PM
To: Pat Rubio Goldsmith
Subject: RE: Reminder: Graduate certificate in Latino/a and Mexican American Studies

Dear Pat:

We support the inclusion of the following courses in the inventory list for the LMAS certificate:

HISP 606 Spanish in the United States
HISP 625 US Hispanic Literature and Culture
HISP 646 Seminar in Cultural Encounters and Borders
HISP 670 Seminar in US Hispanic Literature
HISP 671 Bilingualism in the Spanish-speaking World

Several of our rotating topics courses may be appropriate, too.

Let me know if you have any further questions.

Irene Moyna

María Irene Moyna
Associate Professor and Department Head
Department of Hispanic Studies
219 Academic Building
TAMU 4238
College Station, TX 77843-4238
Phone 979-845-2164
Fax 979-845-6421

From: Victor Willson <v-willson@tamu.edu>
Sent: Monday, September 28, 2015 1:41 PM
To: Pat Rubio Goldsmith
Subject: RE: Letter of support for graduate certificate in Latino/a and Mexican American Studies

Dear Dr. Goldsmith,
The Department of Educational Psychology supports the inclusion of the following course(s) to be included in the course inventory list for the LMAS certificate.

CPSY 637 Latino Psychology

Victor Willson
Head and Professor
Douglas J. Palmer Chair in Educational Psychology
Department of Educational Psychology
Texas A&M University

From: Maura Ives
Sent: Thursday, October 01, 2015 3:42 PM
To: Pat Rubio Goldsmith
Cc: Sally Robinson
Subject: Support for the Proposed Graduate Certificate in Latino/a and Mexican American Studies

Dear Professor Goldsmith,

I am writing to support the inclusion of the following course in the course inventory list for the LMAS Certificate:

ENGL 670 Topics in Latino/a Literature and Culture

Sincerely,

Maura Ives

Dr. Maura Ives, Professor and Interim Head
Department of English
Texas A&M University
349 LAAH Building
4227 TAMU
College Station, TX 77843
979-845-3452

DEPARTMENT OF ENGINEERING TECHNOLOGY
& INDUSTRIAL DISTRIBUTION

TEXAS A&M UNIVERSITY

RECEIVED
NOV 17 2015
cu
GRADUATE STUDIES

MEMORANDUM

TO: Dr. Mark Zoran
Chair, Graduate Council
Texas A&M University Division of Student Affairs

THROUGH: Dr. N.K. Anand N.K. Anand 11/17/15
Executive Associate Dean
Dwight Look College of Engineering

THROUGH: Dr. Valerie Taylor Valerie E. Taylor
Senior Associate Dean for Academic Affairs
Dwight Look College of Engineering

THROUGH: Dr. Prasad Enjeti (GOC dean) VE Taylor for
Associate Dean for Academic Affairs
Dwight Look College of Engineering

FROM: Dr. Reza Langari R Langari
J.R. Thompson Department Head/Chair

FROM: Dr. Jorge Leon Jorge Leon
Associate Department Head for Graduate Programs

DATE: November 9, 2015

SUBJECT: Distance Education Master of Engineering in Technical Management

The Master of Engineering in Technical Management is in the approval process as a new degree program to be offered by distance education modalities. We would like to offer the new degree via distance education beginning Fall 2017. Please see the attached approval and online delivery proposal forms for additional information.

Please contact me if you have any questions at jleon@tamu.edu or 979-845-4993.

Thank you.

106 Fermier Hall • 3367 TAMU • College Station, Texas 77843-3367 • Tel. 979.845.4951 • Fax. 979.847.9396 • http://etidweb.tamu.edu

Texas Higher Education Coordinating Board

Certification Form for Electronically Delivered and Off-Campus Education Programs
April 2014

Directions: For all new programs that are to be delivered electronic-to-individuals (i.e., online), electronic-to-groups, or off-campus face-to-face, a signed pdf of this form must accompany email notification of the new program to Dr. Andrew B. Lofters (andrew.lofters@thecb.state.tx.us). (Institutions offering distance education programs **for the first time** – i.e. have never offered a distance education program, such as newly created institutions -- must complete and submit an *Institutional Plan for Distance Education*).

Please fill out the Administrative Information below and then sign and date on page 4.

Administrative Information

1. Institution: Texas A&M University
2. Program Name – Master of Engineering (ME) in Technical Management
3. Program CIP Code: 14.0101.00
4. Program Delivery – Distance Education/Online
5. Proposed Implementation Date – Fall 2017
6. Contact Person – Provide contact information for the person who can answer specific questions about the program.

Name: V. Jorge Leon

Title: Associate Department Head for Graduate Programs

E-mail: jleon@tamu.edu

Phone: 979.845.4993

Based on *Principles of Good Practice for Academic Degree and Certificate Programs and Credit Courses Offered Electronically.*

CURRICULUM AND INSTRUCTION

- Each program or course results in learning outcomes appropriate to the rigor and breadth of the degree or certificate awarded.
- A degree or certificate program or course offered electronically is coherent and complete.
- The program or course provides for appropriate interaction between faculty and students and among students.
- Qualified faculty provide appropriate oversight of the program or course that is offered electronically.
- Academic standards for all programs or courses offered electronically will be the same as those for programs or courses delivered by other means at the institution where the program or course originates.
- Student learning in programs or courses delivered electronically should be comparable to student learning in programs offered at the campus where the programs or courses originate.

INSTITUTIONAL CONTEXT AND COMMITMENT

Role and Mission

- The program or course is consistent with the institution's role and mission.
- Review and approval processes ensure the appropriateness of the technology being used to meet the objectives of the program or course.

Students and Student Services

- Program or course announcements and electronic catalog entries provide appropriate information.
- Students shall be provided with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/student interaction, assumptions about technological competence and skills, technical equipment requirements, availability of academic support services and financial aid resources, and costs and payment policies.
- Enrolled students have reasonable and adequate access to the range of student services and student rights appropriate to support their learning.
- The institution has admission/acceptance criteria in place to assess the extent to which a

student has the background, knowledge and technical skills required to undertake the program or course.

- Advertising, recruiting, and admissions materials clearly and accurately represent the program or course and the services available.

Faculty Support

- The program or course provides faculty support services specifically related to teaching via an electronic system.

- The institution assures appropriate training for faculty who teach via the use of technology.

- The institution provides adequate equipment, software, and communications access to faculty to support interaction with students, institutions, and other faculty.

Resources for Learning

- The institution ensures that appropriate learning resources are available to students.

- The institution evaluates the adequacy of, and the cost to students for, access to learning resources and documents the use of electronic resources.

Commitment to Support

- Policies for faculty evaluation include appropriate recognition of teaching and scholarly activities related to programs or courses offered electronically.

- The institution demonstrates a commitment to ongoing support, both financial and technical, and to continuation of the program or course for a period of time reasonable and sufficient for students to complete the course or program.

EVALUATION AND ASSESSMENT

- The institution evaluates the program's or course's educational effectiveness, including assessments of student learning outcomes, student retention, and student and faculty satisfaction.

- At the completion of the program or course, the institution provides for assessment and documentation of student achievement in each course.

On behalf of _Texas A&M University_____ (Institution), I assert that the preceding Coordinating Board criteria have been met for all courses associated with this program that will be delivered electronically and off-campus face-to-face.

Chief Academic Officer or President ____________________ Date ____________________

Name: ______________________________

Title: ______________________________

THECB 4/2014

DISTANCE EDUCATION
ELECTRONIC TO INDIVIDUALS (ONLINE DELIVERY) APPROVAL FORM

Submitted by:

- [x] Texas A&M University
- [ ] Texas A&M University–Central Texas
- [ ] Texas A&M University–Commerce
- [ ] Texas A&M University–Corpus Christi
- [ ] Texas A&M University–Kingsville
- [ ] Texas A&M University–San Antonio
- [ ] Texas A&M University–Texarkana
- [ ] Texas A&M International University
- [ ] Prairie View A&M University
- [ ] Tarleton State University
- [ ] West Texas A&M University
- [ ] Texas A&M Health Science Center

Distance Education: Electronic to Individuals (online Delivery) Authorization Request

Please list the proposed degree and CIP code:

Degree: Master of Engineering in Technical Management

CIP Code: 14.0101.00

When is the effective date of the proposed program?

Effective Date: Fall 2017

****Please note:** This proposed program cannot be advertised as an online delivered degree program until the A&M System Office of Academic Affairs has approved it and the Texas Higher Education Coordinating Board has been notified.

Summary of Proposal (Include Background Information and Rationale for the change.)

The Master of Engineering Technical Management (METM) is a distance-learning professional graduate program for early career technical professionals. This rigorous program is applied, focused, and relevant to manufacturing, energy, process and related industrial channels.
The program is designed to develop early engineering and technical professionals to become the future leaders in technical management positions. The program's curriculum, carefully crafted in consultation with industrial leaders, provides a unique blend of industry-critical skills in managing people, projects and profitability.

METM is a 21 month, lock-step, part-time program, developed with a focus on technical professionals and designed for distance learning delivery. With students enrolled in cohorts, innovative and immersive learning experiences, such as a yearly residency week, and capstone projects, the program provides students and faculty a rich and high-contact, virtual learning-community.

Financial Implications:

TAMU has sufficient resources to initiate and maintain quality distance learning programs. Traditional funding sources and student fees ensure the excellence of electronically based courses and programs. Students who are enrolled in online courses within the college of engineering are charged distance education differential tuition of $540.00 per semester credit hour, which allows for the delivery of the course and ensures the quality of distance and distributed education programs of the University. In addition to the distance education differential tuition, there are traditional services that are a part of the university's operations that contribute to the effective delivery of distance education. A list of all student fee and explanations can be found at http://sbs.tamu.edu/.

University: Request for Authorization

I recommend adoption of the following program:

"Having complied with all of the requirements of the Texas Higher Education Coordinating Board, Texas A&M University is hereby authorized to offer the Masters of Engineering in Mechanical Engineering program by distance education, electronic to individuals (online delivery) effective Spring 2015.

The Texas A&M University System Office of Academic Affairs finds that the program offering aforementioned is within the role and scope and capacity of the institution and will benefit students.

Texas A&M University certifies that the proposed distance delivery of the aforementioned program meets the criteria under Texas Administrative Code Chapter 4 Subchapter P regarding quality of the curriculum and courses; delivery of instruction; evaluation, training, supervision, and support of faculty; financial resources; and admission of the support services for students. The program is within the role and mission of the institution and in the Table of Program. The institution will comply with the standards and criteria of the Commission on Colleges of the Southern Association of Colleges and Schools and will adhere to criteria outlined in the *Principles of Good Practice for Degree and Certificate Programs and Courses Offered Through Distance Education.*"

Approval –University:

______________________________________ ________________

Karan L. Watson — Date
Provost and Executive Vice President for Academic Affairs

Authorization: System

Approval – Texas A&M University System:

______________________________________ ________________

James R. Hallmark, Ph.D. — Date
Vice Chancellor for Academic Affairs

Informational Items

First Professional Programs
Informational Review
October 30, 2015

School of Law

New Courses

LAW 7304. Due Diligence for the Professional. (1-0). Credit 1. Practical skills in performing due diligence in business and financial transactions; analyze documents such as financial statements to uncover red flags for fraud; receive a certification from the International Organization of Due Diligence. Must be taken on a satisfactory/unsatisfactory basis. Prerequisite: One year of law school in the full-time or part-time program.

LAW 7402. Pre-Suit Patent Litigation. (1-0). Credit 1. Exploration of issues patent litigators should consider prior to filing a complaint for patent infringement; includes (1) the market for patent enforcement; (2) substantive assessment of cases; (3) valuation of cases and economics of patent litigation; (4) best practices for patent case assessment and pre-litigation ethical considerations; and (5) complaint drafting. Prerequisites: One year of law school in the full-time or part-time program; LAW 7131, LAW 7350, or LAW 7452.

LAW 7409. Special Problems in Corporate Law: Offshore Financial Transactions, Cayman Islands. (2-0). Credit 2. Combined classroom and field experience in the Cayman Islands: examination of international business, tax strategies, and related policy issues; goals motivating U.S. corporations to organize offshore business entities and policy and legal issues related to the use of such entities; interaction with professionals and policymakers from the Cayman Islands. Must be taken on a satisfactory/unsatisfactory basis. Prerequisite: One year of law school in the full-time or part-time program. Concurrent enrollment in LAW 7057, LAW 7362, or LAW 7516.

LAW 7445. Environmental Oil & Gas Law. (2-0). Credit 2. Exploration of federal, state, and local environmental laws that impact the oil and gas Industry; current laws that apply to hydraulic fracturing activities as well as current studies and enforcement actions concerning the same; and analyzes typical claims and defenses asserted in recent hydraulic fracturing litigation. Prerequisite: One year of law school in the full-time or part-time program; LAW 7444.

LAW 7646. Sentencing Law & Policy Seminar. (2-0). Credit 2. The sentencing phase of an offender's contact with the criminal justice system; exploration of the dynamics of the creation, use and impact of sentencing law and policy through the experiences of the key stakeholders at the state and federal level. Prerequisites: All lockstep courses except Constitutional Law.

LAW 7793. LARW III: Public Policy Drafting. (2-0). Credit 2. Introduction to the various forms of written (and oral) communication encountered in the public policymaking process, particularly in regulated industries; overview of "public policy" and the various communication strategies and skills necessary to participate in the policymaking process. Prerequisites: One year of law school in the full-time or part-time program; LAW 7001, LAW 7002.

First Professional Programs
Informational Review
October 30, 2015

LAW 7851S. Wills & Estates Clinic. (3-0). Credit 3.
Real-world experience in handling the estate planning needs of low-income clients; under the supervision of licensed attorneys, interview clients, draft documents including wills, powers of attorney, health care advance directives and other instruments; may handle probate matters. Must be taken on a satisfactory/unsatisfactory basis. Prerequisite: One year of law school in the full-time or part-time program; LAW 7076.

Change in Courses

LAW 7839. Residency Externship.

Course Description

From: The Legislative Externship is an immersion experience in the Texas Legislature for a small number of carefully selected law students (1-4). These students will earn 12 pass/fail academic credit hours by working full-time during the legislative session in Austin, Texas on either a legislative committee or in the office of a house or senate member. In addition to this fieldwork component, participating students will also work directly with a professor on substantive, procedural, and ethical topics relating to their

To: Immersion experience; work full-time in legislature, state or federal government offices, nonprofit organizations, or in-house counsel; work with professor on substantive, procedural and ethical topics relating to externship; development of experience and understanding in particular policy and legal areas.

Lecture contact hours

From: (12-0). Credit 12.

To: Credit 9 to 12.

Title

From: Legislative Externship

To: Residency Externship

LAW 7932. Journal of Property Law Board.

Course Description

From: The Journal of Real Property Law is a scholarly publication dedicated to promoting academic discussions of real property law. The organization explores the relationships arising from ownership, possession, and use of real property. The Board of Editors is responsible for the operation, supervision, editing, and publication of the Journal of Real Property with faculty cooperation.

To: Scholarly publication Journal of Property Law dedicated to promoting academic discussions of real property law; exploration of the relationships arising from ownership, possession, and use of real property; Board of Editors responsible for the operation, supervision, editing, and publication of the Journal of Property Law with faculty cooperation.

First Professional Programs
Informational Review
October 30, 2015

Title
From: Journal of Real Property Law Board
To: Journal of Property Law Board

LAW 7933. Journal of Property Law.

Course Description
From: The Journal of Real Property Law is a scholarly publication dedicated to promoting academic discussions of real property law. The organization explores the relationships arising from ownership, possession, and use of real property. Participation is limited to those who meet specific academic requirements and those who are selected through a writing competition.
To: Scholarly publication Journal of Property Law dedicated to promoting academic discussions of real property law; exploration of the relationships arising from ownership, possession, and use of real property. Participation limited to those who meet specific academic requirements and selected through a writing competition.

Title
From: Journal of Real Property Law
To: Journal of Property Law

INFORMATIONAL REVIEW

SCHOOL OF LAW

NEW COURSES

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☐ Graduate ☑ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Select or Type Department/Program Name School of Law
3. Course prefix, number and complete title of course: LAW- 7304 Due Diligence for the Professional
4. Catalog course description (not to exceed 50 words):
Practical skills in performing due diligence in business and financial transactions; analyze documents such as financial statements to uncover red flags for fraud; receive a certification from the International Organization of Due Diligence.
5. Prerequisite(s): One year of law school in the full-time or part time program

   Cross-listed with: ______ Stacked with: ______

   Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ______ to ______
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ______ times.

   Will this course be repeated within the same semester? ☐ Yes ☑ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☐ Grade ☑ S/U ☐ P/F (CLMD)
10. This course will be:

    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*

    J.D. School of Law
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
LAW	7304	Due Diligence for Prof

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
1.00	00	00	1	2201010008	1710	16 - 17	0 0 3 6 3 2

Level 7

Approval recommended by:

Maxine M. Harrington Maxine M. Harrington Sept 30, 2015
Department Head or Program Chair *(Type Name & Sign)* Date

Wayne Barnes Wayne Barnes 9/30/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Andrew P. Morriss Sept. 29, 2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14

Law 7304 Special Topics: Due Diligence for the Professional Winter 20xx

Professor: Dean Andrew Morriss amorriss@tamu.edu
Office: Dean's Suite
Office hours by appointment
Cell: 216-272-9187

Guest instructor: L. Burke Files
Financial Examinations & Evaluations, Inc. POB 27346
• Tempe, Arizona 85285
T (480) 422-6100 • F (480) 237-5953
Email: lbf@feeinc.com

Course description: This course teaches practical skills in performing due diligence in business and financial transactions.

Goals:Students will learn how to analyze documents like financial statements to uncover red flags for fraud. from the International Organization of Due Diligence.

Prerequisites: One year of law school in the full or part time programs.

Course materials: L. Burke Files, **Due Diligence for the Financial Professional 2nd Edition (2010) (available in the bookstore).**

Evaluation and Grading policies: This is a P/F course.
Students will be graded on class participation and performance on group projects.

Class Participation: this class depends on active participation by the students in discussion and case study development. If you do not participate, the professor reserves the right to penalize a student's course grade.

Attendance: Due to the collaborative and condensed nature of this class, class attendance for all sessions is mandatory. Any class absence for any reason will result in administrative withdrawal from the class. You are required to adhere to the attendance policy as outlined in Texas A&M University School of Law Student Handbook.

Law School Disability Policy
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Assistant Dean of Students, Rosalind Jeffers, Due to the law school's policy of testing anonymity, students should not discuss their disabilities with professors. For assistance, students should consult with Dean Jeffers. For additional information visit http://law.tamu.edu/current-students/student-affairs/exam-accommodation.

Academic Integrity Statement and Policy
"An Aggie does not lie, cheat or steal, or tolerate those who do."

Matters of academic dishonesty by law students are governed by the Honor System Rules. All students are bound by the Texas A&M University Honor System Rules and Procedures. Law students are also bound by additional rules of the Law School in the Student Handbook. Students are responsible for knowing the Honor Code and Honor System Rules, complying with their requirements, and reporting known violations. Texas A&M University also has a Student Conduct Code regarding nonacademic misconduct that applies to law students.

Course meets:

Thursday, January 8: 9:30-3:30
Friday, January 9: 9:30-3:30
Saturday, January 10: 9:00-1:00

Room: 106

Objective: To develop an understanding of how to evaluate asset purchases and other transactions for signs of fraud and other misconduct. To understand the context and measures to combat corruption.

Upon completion of this course, students will not only understand the types of investigations needed to vet asset purchases but also the larger context in which anti-corruption efforts take place. Those who complete the course will receive a certificate from the International Due Diligence Association.

Schedule
Day One 9:30 am

Introduction

Define Due Diligence – clearly
Address due diligence as a process not a thing or event
Legal requirements for due diligence
The immediate value of this knowledge

Section One – Philosophy

<u>Choice Making</u>
How we make choices
Why we make those choices
Why some make serial wrong choices
Ignoring the feedback
Heuristics and Biases

<u>Economics of Virtue</u>
Asking the right question
When the questions must be asked and answered
Addressing social graces
Lies, white gray and black
Aligning incentives
Importance of "Skin-In-The Game"

<u>Reality of It All</u>
Incentive to lie, cheat, steal, make and offering bribes
Conflicts – internal and external
The weight of dishonesty
Focusing energy toward productivity and good choice making
A graphic look at getting it wrong

Section Two – The Standard of Care

<u>Everyone does it so why do I care?</u>
The industry leaders are the leaders for a reason
Due diligence and risk management
Headlines of why it matters
How Enron, Rite-Aid and WorldCom could have been prevented

<u>We must care?</u>
Competitive reasons
Survival reasons
Litigation, regulatory fine and jail

How to care
Check lists, CRM, Internal Audits, – sure, but that is not all
Feed forward control
Feed back controls
Barney Fyfe is correct
Many skill sets needed
Government, private enterprise, charitable all have approaches
Money, time, choice, reputation are scarce resources.
The tip line you can't control

Lunch Day One 12:00 noon to 1:00 pm

Section 3 – Where Due Diligence Can Thrive or Wither

The Environment for Due Diligence Professionals
Islands v Archipelago
Make Wrong and NIH
Curious George and the Man with the Yellow hat are good role models
Leave the desk behind

Section 4 , Due Diligence Assessments

Into And Out Of The Box
It is a process – Defining the box
Arrival to the box
Functions inside the box
Departure from the box
Looking for risks, supplier process, place, transit, customer…

Some Check Lists, No, no, no, – thought lists
Detailed Background Questionnaire
Detailed Company Questionnaire
Detailed Property Questionnaire
Objective and Subjective Factors

Case Studies With Check Lists
Real Estate Acquisition
Brush and Squire Car Wash
Acquisition of a Technology Company
Acquisition of a Research Company

Section 5 – Tool Kits

<u>Where to find information</u>
Reviewing On Line Free Resources
Reviewing Paid Resources
Assessing information's limits and inaccuracies
Calling and interviewing people
Little though of indicators
Tests for employees
Leaving the desk behind

End of Day One 3:30 pm

Instructor(s) are to make themselves available to be peppered with questions for any reasons until 9:00 pm – in person, by phone by email

Day Two 9:30-3:30

Section 6 – Case Studies

Case studies will be handed out to the participants. The participants will work to develop an approach the case as well as what resources they might need to get answers to the questions they have asked.

Session 7 – Analysis of Case Studies in small groups

Session 8 – Presentation of Case Studies

<u>Presentation</u>
The case studies worked overnight will be shared by students with instructors and class.

Session 9 – Analysis

<u>Using Numbers</u>
Ratios – traditional and non-traditional
Other places to find numbers
Creating numbers to analyze
Limitations of numbers and common oversights
Some Algorithms to play with

Day Two Lunch – 12:00 - 1:00 pm

Session 9 – Internal Measures

Look in and Out
Internal positions that are natural ally's
Data collectors in a business
Data silos
Ways to approach to gather information from territories
Address our numbness to the familiar and stale information

Session 10 – Due Diligence in an Acquisition

Mergers and Acquisitions
Same old Stuff
New Stuff often overlooked
What is a must, Key Employees and Gold Collar Workers
Intangible Assets and OPSEC
Regulators
Management Culture and how to assess
Archipelago not Islands – you are a team

Day 3 – 9:00 to 1:00 p.m.

Session 11 – Quick Case Study Questions, How do we get the answer?

Cab Company
Uzbekistan Bank
The Big Cotton Investor
The New Plastics Company – Post Acquisition Due Diligence
Finger Print Company

Session 12 – Due Diligence Fails

Due Diligence Failures
We learn mostly from failures – why this is a fact/.
Notable Failures and the errors made
Destructive testing in your organization

Session 13 – The Report

Writing and submitting the due diligence report
The report is fact based – period.
Citation of sources – all.
Language

Concluding remarks and certificates handed out.

End 1:00 pm

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☐ Graduate ☑ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Select or Type Department/Program Name School of Law
3. Course prefix, number and complete title of course: LAW- 7402 Pre-Suit Patent Litigation

4. Catalog course description (not to exceed 50 words):
Exploration of issues patent litigators should consider prior to filing a complaint for patent infringement; includes (1) the market for patent enforcement; (2) substantive assessment of cases; (3) valuation of cases and economics of patent litigation; (4) best practices for patent case assessment and pre-litigation ethical considerations; and (5) complaint drafting.

5. Prerequisite(s): One year of law school in the full-time or part time program: LAW 7452, LAW 7131, or LAW 7350

Cross-listed with: ______ Stacked with: ______

Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☑ Yes ☐ No If yes, from 1 to 2
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ______ times.

Will this course be repeated within the same semester? ☐ Yes ☑ No

8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:

a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*

J.D. School of Law

11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
LAW	7402	Pre-Suit Patent Lit

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
1.00	00	00	1	2201010008	1710	16 - 17	0 0 3 6 3 2

Level 7

Approval recommended by:

Maxine M. Harrington [signature] Sept 30, 2015
Department Head or Program Chair *(Type Name & Sign)* Date

Wayne Barnes [signature] 9/30/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Andrew P. Morriss [signature] Sept. 29, 2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date

Effective Date

Texas A&M
School of Law
LAW 7402
Professors Clifford Henson & Donald Puckett
Winter 201X
Pre-Suit Patent Litigation

Introduction: Patent litigation is one of the "hottest" areas of legal practice right now. Patent law is in the midst of a rapid sea change on every front, and there is a heavy supply of this legal work. Patent enforcement strategy has recently moved to the forefront of business decision making – but will it remain there? Patent enforcement strategy involves intricate issues of science, economics, and public policy against the backdrop of a rapidly shifting legal environment.

Course Description: This one credit-hour course explores issues patent litigators should and must consider prior to filing a complaint for patent infringement. Covered topics include: (1) the market for patent enforcement; (2) substantive assessment of cases; (3) valuation of cases and economics of patent litigation; (4) best practices for patent case assessment and pre- litigation ethical considerations; and (5) complaint drafting.

Prerequisite: This is an advanced patent litigation class. Patent Law (LAW-7542), Patent Litigation (LAW-7131) or Intellectual Property (LAW-7350) is a prerequisite. On substantive patent law issues, we will focus our attention on the most recent case developments and trends. It will be assumed that students have a familiarity with settled principles of patent law.

Course goals: By the end of the course, you should be able to develop and assess a patent enforcement litigation plan. You should also be able to draft a litigation plan memo and a complaint for patent infringement.

READINGS

A course packet will be available to download on or about December 22, 2014. You will be able to access the course packet through the course website on Blackboard. If the reading materials are supplemented, you will be notified by email and/or in class.

While the reading list, at first glance, may appear daunting, please note that much of the assigned reading consists of very short (1-2 page) articles. Many of the longer articles and cases have been excerpted for you in the course packet to focus your reading. Also, the reading is a bit front-loaded toward the first two classes.

GRADING

This course follows the grading scale and grading policies outlined in Academic Standards 8.1-8.54, which may be found in the Student Handbook.

Your course grade primarily will be based on a take-home writing project that will consist of 10-20 pages of original writing (plus assembled attachments from research).The written exam will be distributed following class on Tuesday. It will require you to develop and assess a patent litigation plan according to a provided form, with points awarded for each section as designated.

Your completed exam must be submitted electronically **by 2:00pm on Saturday, January 10, 2015.** Late submissions will be penalized absent a compelling excuse.

The professors reserve the right to adjust grades slightly upwards or downwards based on class participation (or lack of participation) in exceptional cases.

CLASS MEETINGS

The class will meet in Room 104. We will meet from 9:30-15:00 Monday and Tuesday, 9:30-12:30 on Wednesday, and 10:00-12:00 on Saturday. Monday and Tuesday will be broken into two sessions, with time for lunch in between, and there will be a short break during each class session. The length of Saturday's class may vary to comply with ABA-imposed time requirements. Instructors will be available for meetings after class, by email, and by appointment (scheduled via email). Professor email addresses:

Prof. Puckett: donald.puckett@skiermontpuckett.com

Prof. Henson: chad.henson@skiermontpuckett.com

CLASS PREPARATION & ATTENDANCE

The ABA requires regular and punctual class attendance. You are required to adhere to the attendance policy as outlined in Texas A&M University School of Law Student Handbook. You are expected to be prepared to discuss the assigned material and your reflections thereon in class.

ACADEMIC INTEGRITY & PROFESSIONALISM

"An Aggie does not lie, cheat or steal, or tolerate those who do."\

You are expected to know, understand, and follow the Texas A&M University Honor System Rules and Procedures and the law school's honor systems rules in the Student Handbook.

Beyond that, you are expected to be a professional. The defining feature of a professional is that the professional exercises independent, reasoned judgment in the pursuit of excellence in his or her field of endeavor.

DISABILITY POLICY

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Assistant Dean of Students, Rosalind Jeffers, Due to the law school's policy of testing anonymity, students should not discuss their disabilities with professors. For assistance, students should consult with Dean Jeffers. For additional information visit http://law.tamu.edu/current-students/student-affairs/exam-accommodation

DAILY COURSE SCHEDULE

Class 1 (Monday, January 5, 2015, 9:30 - 12:00)

Patent Owners and the USPTO

- Dennis Crouch, USPTO Breaks New Ground with 300,000 Patents Issues this Fiscal Year, Patently-O Blog (September 30, 2014).
- Dennis Crouch, USPTO Patent Grants, Patently-O Blog (December 6, 2014).
- Dennis Crouch, The Number of U.S. Patents In Force, Patently-O Blog (October 23, 2014).
- Dennis Crouch, Patent Application Pendency, Patently-O Blog (May 26, 2014).
- **Browse Only:** General Patent Statistics Reports Available for Viewing, USPTO web site. http://www.uspto.gov/web/offices/ac/ido/oeip/taf/reports.htm
- Dennis Crouch, Micro Entity Early Stats, Patently-O Blog (February 13, 2014).
- **Browse Only:** Patenting By Organization, USPTO (2013).
- Dennis Crouch, US Patents: Where are the Inventors Located?, Patently-O Blog (October 6, 2014).
- Dennis Crouch, AIA Shifts USPTO Focus from Inventors to Patent Owners, Patently-O Blog (August 14, 2012).
- Dennis Crouch, Applicant Assignees, Patently-O Blog (May 20, 2014).

Patent Litigation Trends and Statistics

- Timothy B. Lee, The Patent Lawsuit Crisis in 5 charts, Vox.com (May 28, 2014).
- Jason Rantanen, Pending Patent Cases in Decline, Patently-O Blog (Nov. 7, 2014).
- James Bessen, What the Courts did to Curb Patent Trolling – for Now, The Atlantic (Dec. 1, 2014).
- AIA Progress, USPTO.
- USPTO, IPR Petitions Terminated to Date.
- Driscoll and McNamara, Inter Partes Review Initial Filings of Paramount Importance: What is Clear After Two Years of Inter Partes Review under the America Invents Act (AIA), National Law Journal (October 21, 2014).

Patent Quality and Patent Policy

- Dennis Crouch, IP Law Professors Rise-Up Against Patent Assertion Entities, Patently-O Blog (November 25, 2013).
- Adam Mossoff, GAO Report Confirms No "Patent Troll" Litigation Problem, Center for the Protection of Intellectual Property (October 4, 2013).
- Manus Cooney, GAO Report Finds No NPE Patent Litigation Crisis, IPWatchdog Blog (August 25, 2013).
- Cheryl Milone, The Real Problem is Patent Quality, Not NPEs, Intellectual Asset Managers Magazine (Sept / Oct 2013).

Optional

- United States Government Accountability Office, Assessing Factors that Affect Patent Infringement Litigation Could Help Improve Patent Quality (August 2013).

Patent Strategy – The Economics of Patent Ownership

- Florian Muller, Analysis of 222 Smartphone Patent Assertions: More than 90% Go Nowhere, Rest Lacks Impact, FOSS Patents Blog (October 1, 2014).

Optional

- Stuart J.H. Graham, et al., High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey (June 2009).
- Melissa Lipman, FTC Gets Approval to Launch Patent Troll Study, Law360 (August 13, 2014).
- Melissa Lipman, FTC Patent troll Study to Disappoint Some, Wright Says, Law360 (September 4, 2014).

Law Firm Economics in Patent Cases

- AIPLA, Report of the Economic Survey (2013) (**skim only**).
- Janine Dascenzo & Buck DeWolf, *General Electric Company: Successfully Using Alternative Fee Arrangements for Complex Intellectual Property Litigation*, Association of Corporate Counsel (February 2010).

Class 2: (Monday, January 5, 2015, 1:00 – 3:00)

Substantive Analysis of Patents – Case Assessment

- John R. Allison, et al., Understanding the Realities of Modern Patent Litigation, Texas Law Review (May 2014). **(Note: Portions Designated as Optional in Document)**

Process for analyzing patent cases

- No reading.

Research resources

- No reading.

Patent Owner Burden Issues

- Ownership / Standing / Joinder
    - *Pinpoint v. Amazon.com*, 347 F.Supp. 2d 579 (N.D. Ill. 2004).
    - *AsymmetRx v. Biocare Med.*, 582 F.3d 1314 (Fed. Cir. 2009).
    - *Taylor v. Taylor Made Plastics*, 565 Fed. Appx. 888 (Fed. Cir. 2014).

Optional

- *Stanford v. Roche*, 131 S.Ct. 2188 (2011).

Class 3: (Tuesday, January 6, 2015, 9:30 – 12:00)

Patent Owner Burden Issues (Cont.)

- Infringement
  - *Limelight Networks, Inc. v. Akamai Techs., Inc.*, 134 S.Ct. 2111 (2014).
  - *Commil USA v. Cisco,* 720 F.3d 1361 (Fed. Cir. 2013) - **Parts I and II(B) only.**

Defenses to Patent Infringement

- Section 101 – Patentable Subject Matter
  - Brian McCall, Lessons from 4 Months of Post-Alice Decisions, Law 360 (October 31, 2014).
  - Ryan Davis, Federal Circuit Ruling Will Spur Early Alice Attacks, Law 360 (Nov. 14, 2014).
  - Michelle Holoubek, DDR Holdings – A Beacon of Hope for Software Patents?, Law 360 (Dec. 9, 2014).
  - DDR Holdings – Federal Circuit Forges a Sensible Path on Software Patents, Bart Eppenauer, Patently-O Blog (December 14, 2014).

  Optional
  - *Alice Corp. v. CLS Bank Int'l*, 134 S.Ct. 2347 (2014).
  - *Ultramercial v. Hulu*, 2014 U.S. App. LEXIS 21633 (Fed. Cir. 2014).
  - *DDR Holdings v. Hotels.com*, 2014 U.S. App. LEXIS 22902 (Fed. Cir. 2014).

- Indefiniteness
  - Melissa Nott Davis, Post-Nautilus, Post-Interval: Indefiniteness In November, Law 360 (December 4, 2014).

  Optional
  - *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S.Ct. 2120 (2014).

- Inequitable Conduct
  - Francis Lynch, Inequitable Conduct Still Exists After Therasense, Law 360 (December 10, 2014).

  Optional
  - *Therasense, Inc. v. Becton, Dickinson and Co.*, 649 F.3d 1276 (Fed. Cir. 2011).

- Invalidity / PTAB
  - Trends From 2 Years of AIA Post-Grant Proceedings, Joseph Casino, Law 360 (Sept. 29, 2014).

Claim Construction Law and Strategy

- *Thorner v. Sony Computer*, 669 F.3d 1362 (Fed. Cir. 2012).
- *Teva v. Sandoz and Claim Construction Deference*, Dennis Crouch, Patently-O Blog (Oct. 15, 2014).

Class 4: (Tuesday, January 6, 2015, 1:00 – 3:00 pm)

Patent Injunctions

- Justin M. Sobaje, Are Permanent Injunctions Back in Style?, IP Litigation Current Blog (August 21, 2014).
- Jacob S. Sherkow, Preliminary Injunctions Post-Mayo and Myriad, 67 Stanford L. Rev. Online 1 (May 5, 2014) (**skim only**).

Damages / Valuation

- Lost Profits
  - Clifford Henson, A Primer on Available Acceptable Non-infringing Substitutes (unpublished manuscript).
- Reasonable Royalty
  - David McGowan, *Opportunity Lost: Economic Analysis in Apple v. Motorola*, Patently-O Blog (May 1, 2014).
  - Jason Rantanen, *Important Damages Opinion: VirnetX v. Cisco and Apple*, Patently-O Blog (September 16, 2014).
  - Sebastian Zimmeck, *A Game-Theoretic Model for Reasonable Royalty Calculation*, 22 ALB. L.J. SCI. & TECH. 257 (2012).
  - Jason Rantanen, *Ericsson v. D-Link: Standards, Patents, and Damages*, Patently-O Blog (December 4, 2014).

  Optional
  - Fong et al., *Quantified the Georgia-Pacific Factors for Calculating Reasonable Royalties*, 2 REV. INTEGR. BUS. ECON. RES. 261 (2013).
  - Mark A. Lemley & Carl Shapiro, *A Simple Approach to Setting Reasonable Royalties for Standard-Essential Patents*, 28 Berk. Tech. L.J. 1135 (2013).

DISTRIBUTION OF EXAM

Class 5: (Wednesday, January 7, 2015, 9:30 – 12:30)

Damages Wrap-up

Prelitigation strategic decision – patents, parties and venue

- Macedo & Kasdan, AIA's Impact on Multidefendant Patent Litigation (Parts 1 and 2), Law 360 (October 2012).
- Rob Isaackson, How To Get Out of Dodge: Patent Venue Transfer Strategies, Law360 (April 23, 2014).
- Daniel Winston, Inside the 3 Busiest Patent Litigation Forums, Law360 (Aug. 29, 2014).

Discussion of exam

Prelitigation ethical obligations

- *Raylon v. Complus Data Innovations*, 700 F.3d 1361 (Fed. Cir. 2012).
- Gills et al., *Supreme Court Relaxes "Exceptional" Case Standard in Pair of Fee-Shifting Patent Cases*, IP Litigation Current Blog (April 30, 2014).
- *Logic Devices v. Apple*, slip opinion (N.D. Cal. Dec. 4, 2014).

Patent Infringement Complaint Drafting

- In re Bill of Lading, 681 F.3d 1323 (Fed. Cir. 2012).
- Dennis Crouch, Next Steps in Shifting Pleading Standards for Patent Cases, Patently-O Blog (December 10, 2014).

Class 6: (Saturday, January 10, 2015, 2:00-3:00 pm)

Course Evaluations

Exam Discussion

Ethical issues and Complaint Drafting wrap-up

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☐ Graduate ☑ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Select or Type Department/Program Name School of Law
3. Course prefix, number and complete title of course: LAW- 7409 Special Problems in Corporate Law: Offshore Financial ~~Transactions, Cayman Islands~~
4. Catalog course description (not to exceed 50 words):
Combined classroom and field experience in the Cayman Islands: examination of international business, tax strategies, and related policy issues; goals motivating U.S. corporations to organize offshore business entities and policy and legal issues related to the use of such entities; interaction with professionals and policymakers from the Cayman Islands.

LAW 7516

5. Prerequisite(s): One year of law school in the full-time or part time program: LAW 7057, LAW 7362 ~~7361~~ (may be taken ~~concurrently)~~
Cross-listed with: ______ Stacked with: ______
Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times
Will this course be repeated within the same semester? ☐ Yes ☑ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☐ Grade ☑ S/U ☐ P/F (CLMD)
10. This course will be:
a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
J.D. School of Law
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
LAW	7409	Sec Prob Corp Law Cayman Is

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
2	00	00	2	2201010008	1710	16 - 17	0 0 3 6 3 2	7

Approval recommended by:

Maxine M Harrington [signature] Sept 30 2015
Department Head or Program Chair *(Type Name & Sign)* Date

Wayne Barnes [signature] 9/30/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Andrew P Morriss [signature] Sept. 29, 2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

Andrew P. Morriss
LAW 7409 - Special Problems in Corporate Law: Offshore Financial Transactions (J.D)
Spring 20XX

Course Description and Objectives

The Cayman Islands is one of the world's leading providers of institutionally focused, specialized financial services. Cayman is a preferred destination for the structuring and domiciling of sophisticated financial services products. This two-credit course combines classroom and field experiences to introduce students to Cayman Islands financial products. During three course sessions at the School of Law, students are familiarized with the concepts of captive insurance, asset securitizations, hedge funds, and asset protection. The class then spends one week in Grand Cayman. The Cayman experience features presentations by Cayman Islands finance professionals including bankers, attorneys, accountants, and regulators. The course equips students to assist clients in evaluating international business strategies.

Prerequisites / Corequisite

Students must have previously completed or currently be enrolled in one of the following classes: International Business Transactions, Business Associations II, This requirement may be waived for students who can demonstrate experience and competence in these areas.

Course Materials

There is no required text book for this course. Assigned reading will consist of articles available on TWEN.

Class Sessions

- **U.S. Classes:** Four hours of class will be held prior to March 15th. Date(s) and time(s) for this instruction will be announced after all students have registered for the course. It will not conflict with students' other courses. Please note that in order to accommodate everyone's course schedules, the Cayman course instruction might be held at inconvenient times, such as lunch hours, evenings, or Fridays and Saturdays. **Participation in pre-Cayman class is MANDATORY.** Without this background and instruction you will not be able to participate in the Cayman trip.

Class Sessions (cont'd)

- **Cayman Classes:** The class will travel to Grand Cayman on March 15, 2015 and return on March 22, 2015. Class sessions will be held from approximately 8:30 am until 1:30 pm on March 16, 17, 19, and 20. These sessions will be taught by Cayman Islands professionals. Dress for Cayman Class sessions is businesscasual.
- **Networking Event:** Students are expected to attend at least one evening networking event in Grand Cayman. During times when classes are not scheduled, students are free to explore the island.

Grading

This course follows the grading scale and grading policies outlined in Academic Standards 8.1-8.54, which may be found in the Student Handbook.

Student grades for the course will be based on the following components:

- **Class Participation (10%)**: Unexcused missed class sessions will result in a loss of a letter grade per class. Class participation grades are based on your intellectual and practical contributions to classes. Full and active participation in class sessions while traveling is required. Also, each class member will be expected to adopt a community attitude toward the safety and learning of everyone traveling with us. Class participation grades are based on the strong belief that incentives matter as an inducement to productive behaviors. Each student being a responsible and intellectually curious, full participant in the course is central to its success.
- **Personal Journal (20%)**: Students must keep a daily journal with entries of 500-1,000 words per day during the trip. The journal should contain a record of class activities, with a focus on the lessons learned and questions raised. Each entry should include a statement of the legal issues discussed that day and summaries of the foreign and U.S. perspectives on those issues. The journals will be due at 9 a.m. on Monday, March 30th. Submit by e-mail to Dean Morriss's assistant, Sonia Jimenez (simenez@law.tamu.edu).
- **Module Guides (35%)**: The class will be divided into small "module groups," each of which will be required to collectively prepare a resource guide (in the past these have been between approximately 4000 and 5000 words) for the rest of the class on one of the modules covered in the course. These "module guides" will be due at 9 a.m. on Monday, March 30th. Submit by e-mail to Dean Morriss's assistant, Sonia Jimenez (simenez@law.tamu.edu). Assignments will be distributed in Cayman.
- **Law Firm Exercise (35%)**: Working in groups, students will prepare a brief (3-5 page) client letter based on a problem, explaining how offshore financial transactions can be used to address various issues. These will be due at 5 p.m., Monday, April 15th. Submit by e-mail to Dean Morriss's assistant, Sonia Jimenez (simenez@law.tamu.edu). The exercise will be distributed on Monday, March 30th after the module guides are turned in.

Slides

Some presentations may utilize PowerPoint slides. If the presenter agrees, these slides will be available to you after the class on Westlaw's TWEN system. For pedagogical and practical reasons, slides will not be available prior to class.

Recording Devices

The use of recording devices is prohibited without prior written permission.

Office and Contact Information

Office: Office of the Dean
E-mail: sjimenez@law.tamu.edu

I will ask that you schedule an appointment. You may schedule an appointment (either for office hours or another mutually convenient time) by e-mailing me your preferred appointment time.

Accommodation of Disabilities

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Assistant Dean of Students, Rosalind Jeffers, Due to the law school's policy of testing anonymity, students should not discuss their disabilities with professors. For assistance, students should consult with Dean Jeffers. For additional information visit http://law.tamu.edu/current-students/student-affairs/exam-accommodation

Academic Integrity and Conduct

"An Aggie Does Not Lie, Cheat or Steal."

Matters of academic dishonesty by law students are governed by the Honor System Rules. All students are bound by the Texas A&M University Honor System Rules and Procedures. Law students are also bound by additional rules of the Law School. Students are responsible for knowing the Honor Code and Honor System Rules, complying with their requirements, and reporting known violations. Texas A&M University also has a Student Conduct Code regarding nonacademic misconduct that applies to law students. For more information, visit the Law School's website.

Diversity

The University is committed to providing an atmosphere of learning that is representative of a variety of perspectives. In this class, you will have the opportunity to express and experience cultural diversity. Individuality and creative expression are welcome. Take advantage of these opportunities in your own work, but also learn from the information and ideas shared by others.

Attendance

Due to the collaborative and condensed nature of this class, class attendance for all sessions is mandatory. Any class absence for any reason will result in administrative withdrawal from the class. You are required to adhere to the attendance policy as outlined in Texas A&M University School of Law Student Handbook.

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☐ Graduate ☑ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Select or Type Department/Program Name School of Law
3. Course prefix, number and complete title of course: LAW- 7445 Environmental Oil & Gas Law
4. Catalog course description (not to exceed 50 words):
Exploration of federal, state, and local environmental laws that impact the oil and gas industry; current laws that apply to hydraulic fracturing activities as well as current studies and enforcement actions concerning the same; and analyzes typical claims and defenses asserted in recent hydraulic fracturing litigation.
5. Prerequisite(s): One year of law school in the full-time or part time program: LAW 7444

Cross-listed with: ______ Stacked with: ______

Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ____ to ____
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ____ times.

Will this course be repeated within the same semester? ☐ Yes ☑ No

8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:

a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*

J.D. School of Law

11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
LAW	7445	Environ Oil & Gas Law

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
2	00	00	2	2201010008	1710	16 - 17	003632

Level 7

Approval recommended by:

Maxine M. Harrington Maxine M Harrington Sept. 30, 2015
Department Head or Program Chair *(Type Name & Sign)* Date

Wayne Barnes Wayne Barnes 9/30/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Andrew P. Morriss Sept. 29, 2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

ENVIRONMENTAL OIL & GAS LAW
- Spring 20xx -

Course Information

Number/section:	LAW-7445
Prerequisites:	One year of law school in the full-time or part-time program, including Oil & Gas
Schedule:	Thursday, 6:00 p.m. to 7:50 p.m.
Location:	Room 207

Instructor Information

Instructor:	Michael R. Goldman
Campus email:	mrgoldman@law.tamu.ed
Alternate email:	Goldman@gsfpc.com
Office:	By appointment
Office phone:	214.692.0025
Mobile phone:	214.274.6857

Required Materials

Will be provided electronically prior to each class.

Course Description

This course explores federal, state and local environmental laws that impact the oil and gas industry. We will examine current laws that apply to hydraulic fracturing activities as well as current studies and enforcement actions concerning the same. With also analyze typical claims and defenses asserted in recent hydraulic fracturing litigation.

This syllabus is intended to provide basic information concerning the course. It can be viewed as a "blueprint" for the course. As conditions warrant, changes in the syllabus may be made. You will be informed of changes via email, via our course website, or in class.

Instructional Methods

Class lectures will be interspersed regularly with questions posed to students at random. This format is undertaken only to facilitate your learning both the material and those critical analytic skills that are essential to the practice of law. In that light, I expect students to act respectfully toward their peers and I look forward to establishing a comfortable educational environment. If extenuating circumstances arise such that you are not prepared to participate in the class discussion on a given day, please advise me via telephone or email as early as possible before the class session. If you do so, I will not call on you that day. You are entitled to one such "pass" for the semester.

If you have not already done so, you will need to register an active email account through the class website that you will be expected to check regularly, as I may email you assignments or other class information. I also will post on the class website any Power Point slides we use in class.

Evaluation, Grading, and Attendance

This course follows the grading scale and grading policies outlined in Academic Standards 8.1-8.54, which may be found in the Student Handbook.

Except as otherwise noted herein, you will be graded on your performance on a final, open-book, two-hour exam. Your exam will include essay and/or short answer and/or multiple choice questions. In accord with law school policy, I will grade the exams blindly (i.e., without knowing the identity of the test-taker) and conform to the school's grading requirements. All reading assignments and any topics discussed in class, on our class website, or through other electronic correspondence are potential fodder for the final exam.

Because the exam will focus primarily on those readings that we analyze in class, regular class attendance and participation is highly recommended. I reserve the discretionary right to adjust your exam grade by one-third of a point (e.g., from a C+ to a B-, or an A- to a B+) for exceptionally positive or negative contributions to class discussions. Your attendance is expected on a regular basis, and it is to your performance advantage to attend every class this semester. I plan to take attendance via written roll, though it is your responsibility to assure your conformance with the law school's attendance policy by checking the records at Student Services.

You are required to adhere to the attendance policy as outlined in the Texas A&M University School of Law Student Handbook.

Laptops

Laptops are welcome in class, though paying attention to the class discussion will serve you far better on your final exam than mere typing of the class discussion content verbatim. I may, at times, ask the class to close all laptops for a particular discussion or class exercise.

Reading Assignments

What follows is an anticipated reading schedule. As the semester progresses, however, we may fall behind or speed ahead of the schedule requiring that the reading assignments be adjusted. **I therefore reserve the right to change and adjust the assignments based on the pace and progress of the class, the topics of particular interest to the class, and otherwise, as I deem necessary.**

Tentative Course Schedule

Class 1. Overview of Conventional vs. Unconventional Oil and Gas Development, Types and Locations of Oil and Gas Reservoirs, and Overview of Activities Associated with Oil and Gas Development including: (1) Siting and Site Preparation; (2)

Drilling, Casing and Cementing; (3) Hydraulic Fracturing; (4) Well Plugging; (5) Site Reclamation; (6) Waste Management and Disposal; and (7) Managing Air Emissions.

READ:

- *Unconventional Oil and Gas Development, Key Environmental and Public Health Requirements*, GAO-12-874, September 2012, pp. 5-16
- *Shale Gas Primer*, Sections entitled "Natural Gas Basics," "Unconventional Gas," "The Role of Shale Gas in Unconventional Gas," "Shale Gas Development in the United States," pp. 6-24 (Optional reading)
- *Oil and Gas, Information on Shale Resources, Development, and Environmental and Public Health Risks*, GAO-12-732, September 2012, pp. 5-12
- *Shale Gas Primer*, Sections entitled "Hydraulic Fracturing" and "Water Availability," pp. 56-66 (Optional reading)
- *Why is Shale Gas Important*? EIA, Energy in Brief.
- EIA Map, "Major Tight Gas Plays, Lower 48 States"

Class 2. **Overview of Key Federal Environmental Laws and Exemptions Applicable to Oil and Gas Development including: (1) Safe Drinking Water Act; (2) Clean Water Act; (3) Clean Air Act; (4) Toxic Substance Control Act; (5) Resource Conservation and Recovery Act; (6) Comprehensive Environmental Response, Compensation and Liability Act; (7) Emergency Planning and Community Right-to-Know Act; (8) Endangered Species Act; (9) Migratory Bird Treaty Act.**

READ:

- *Environmental Oil and Gas Law*, pages 2-14
- March 8, 2011 letter from EPA
- *Unconventional Oil and Gas Development, Key Environmental and Public Health Requirements*, GAO-12-874, September 2012, pp. 43-44
- *Unconventional Oil and Gas Development, Key Environmental and Public Health Requirements*, GAO-12-874, September 2012, pp. 17-46 (Optional additional reading on overview of environmental statutes)
- *EPA Sees Gaps In State Drilling Waste Programs But Floats Voluntary Fixes,* InsideEPA.com (April 17, 2014)
- *Suit Aims to Force EPA Decision on Adding Oil, Gas Drilling Sector to TRI,* InsideEPA.com (January 7, 2015)
- *Environmental Integrity Project v. EPA,* Case 1:15-cv-00017, in the District Court for the District of Columbia (Complaint for Declaratory and Injunctive Relief). (Optional additional reading)

<u>Class 3</u> Key Exemptions under the Safe Drinking Water Act and Its Application or Non-Application to Hydraulic Fracturing, Saltwater Disposal, and Other Underground Injections; and recent EPA Enforcement Actions under Safe Drinking Water Act.

READ:

- *Environmental Oil and Gas Law*, pp. 2-3 (review exemption under SWDA), also read pp. 14-18
- *Legal Environmental Assistance Foundation, Inc. v. Environmental Protection Agency*, 118 F.3d 1467 (11th Cir. 1997)
- U.S. ENVT'L PROT. AGENCY, Executive Summary, *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs*, Final Report (2004)
- Regulation of Hydraulic Fracturing under the Safe Drinking Water Act
- *U.S. v. Range Production Co., et al.*, 2011 WL 2469731 at *3 (N.D. Tex. June 20, 2011) (*citing* 42 U.S.C. § 300i).
- *Tennessee Valley Authority v. Whitman*, 336 F.3d 1236 (11th Cir.), *cert. denied*, 124 S. Ct. 2096 (2003). (You only need to read section II(B), titled "Finality Doctrine: An Overview," the first paragraph of section V(B), entitled "Constitutional Violations," and section VI, entitled "Conclusion".
- *Sackett v. Environmental Protection Agency*, 132 S. Ct. 1367

<u>Class 4.</u> Recent EPA Enforcement Actions under the Safe Drinking Act (cont'd) as well as under the Comprehensive Environmental Response, Compensation and Liability Act in Pavillion, Wyoming and Dimock, Pennsylvania; and Key Texas Environmental Regulations.

READ:

- *Environmental Oil and Gas Law*, pp. 18-22, 25-28
- U.S. ENVT'L PROT. AGENCY: Press Release, *EPA orders oil companies to monitor public water supply and private wells in Poplar, Montana* (December 16, 2010)
- *Industry, Lawmakers Question EPA Authority to Issue Gas Drilling Orders*, InsideEPA.com (January 28, 2011)
- *Despite Legal Limit, EPA Using Superfund to Address Likely Drilling Waste*, InsideEPA.com (January 21, 2012).
- U.S. ENVT'L PROT. AGENCY: Region 8, Press Release, *Wyoming to Lead Further Investigation of Water Quality Concerns Outside of Pavillion with Support of EPA* (June 20, 2013)
- U.S. ENVT'L PROT. AGENCY: Press Release, *EPA Completes Drinking Water Sampling in Dimock, Pa.* (July 25, 2012)
- *Common Environmental Requirements for Regulated Oil and Gas Operations*, TCEQ Regulatory Guidance, RG-482 (February 2013).

<u>Class 5.</u> **Key Texas Environmental Regulations (cont'd); The Oil Field Cleanup Fund and RRC Voluntary Cleanup Program; and Local Environmental Regulation over noise, odors and other nuisances.**

READ:

- *Environmental Oil and Gas Law*, pp. 23-25, 28-32
- *Environmental Permit Types and Information*, RRC (December 2014)
- Texas Railroad Commission: *Barnett Shale Information, What does the Railroad Commission Not have jurisdiction over and who to contact* (November 26, 2014)

<u>Class 6.</u> **Local Environmental Regulation (cont'd) including a discussion on Ordinances, Moratoriums and Limitations.**

READ:

- *Environmental Oil and Gas Law*, pp. 32-35
- *Northeast Natural Energy v. Morgantown,* No. 11-C-411, 2011 WL 3584276 (W. Va. Cir. Ct. Aug. 12, 2011) (Tucker, J.).
- *Wallach v. Town of Dryden*, 23 N.Y.3d 728 (N.Y. App. 2014).
- *Colorado Oil and Gas Association v. Sierra Club*, 2014 WL 3690665 (Colo. Dist. Ct. 2014).
- *Texas Oil and Gas Association v. City of Denton*, Original Petition (Nov. 5, 2014).
- *Denton Drilling Awareness Group and Earthworks Petition In Intervention* (Dec. 4, 2014).
- *Southern Crushed Concrete, LLC v. City of Houston,* 398 S.W.3d. 676 (Tex. 2013)
- *City of Houston v. BCCA Appeal Group,* 2013 WL 4680224 (Tex. App.—Houston 2013, pet. filed)

<u>Class 7.</u> **EPA's Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources; Fort Worth Natural Gas Air Quality Study; Key University Studies: (1) Is the Greenhouse Gas Footprint of Shale Gas More Than Coal? (2) Does Hydraulic Fracturing Cause Contamination of Groundwater? (3) Does Hydraulic Fracturing Cause Earthquakes? (4) Is there a Public Health Impact of Air Emissions from Unconventional Gas Drilling Operations?**

READ:

- *Environmental Oil and Gas Law*, pp. 35-38, 43, 46-52
- U.S. ENVT'L PROT. AGENCY, *EPA's Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*
- U.S. ENVT'L PROT. AGENCY, *The Hydraulic Fracturing Water Cycle*
- U.S. ENVT'L PROT. AGENCY, *EPA Release Update on Ongoing Hydraulic Fracturing Study*
- *Endangered Species in the Oil Patch* (June 2013)

- *Characterization of an Earthquake Sequence Triggered by Hydraulic Fracturing in Harrison County, Ohio.*
- *Water Use in the Eagle Ford Shale,* pp 1-18.
- No class (Spring Break).

Class 8. Preserving Air Quality: Federal and State Air Quality Regulation

READ:

- *Environmental Oil and Gas Law*, pp. 8-10
- ENVT'L PROT. AGENCY, *Overview of Final Amendments to Air Regulations for the Oil and Natural Gas Industry*, Fact Sheet
- *Changing Air Quality Rules for Hydraulic Fracturing*, Joseph F. Guida, Jean Flores, Michael Goldman, State Bar of Texas, 24th Annual Texas Environmental Superconference (Aug. 2-3, 2012).
- *Fort Worth Natural Gas Air Quality Study*
- *Study Shows Air Emissions Near Fracking Sites May Pose a Health Risk*
- *EPA Eyes Drilling Methane Controls But Sees Limits for Oil Well Regulation,* InsideEPA.com (April 16, 2014).

Class 9 Litigation: Recent Trends, Typical Claims and Typical Causes of Action (Trespass)

READ:

- *Environmental Oil and Gas Law*, pp. 54-57, 60-62
- *Railroad Comm'n v. Manziel*, 361 S.W.2d 560 (Tex. 1962)
- *Coastal Oil & Gas Corp. v. Garza Energy Trust*, 268 S.W.3d 1 (Tex. 2008)
- *FPL Farming Ltd. v. Environmental Processing Systems*, 351 S.W.3d 306 (Tex. 2011)
- *FPL Farming Ltd. v. Environmental Processing Systems, L.C.*, 383 S.W.3d 274, 279-280 (Tex. App.—Beaumont 2012, no pet.).
- *Stone v. Chesapeake*, 2013 WL 2097397 (N.D. W.Va. 2013).

Class 10. Litigation: Typical Causes of action (Nuisance, Negligence and Negligence Per Se, Breach of Contract, Strict Liability, and Fraud)

READ:

- *Environmental Oil and Gas Law*, pp. 58-59, 62-65
- *Walton v. Phillips Petroleum Co.*, 65 S.W.3d 262, 270 (Tex. App.—El Paso 2001, no pet.)
- *Rankin v. FPL Energy, LLC*, 266 S.W.3d 506, 508 n.3 (Tex. App.—Eastland 2008, pet. denied).

- *Hicks v. Humble Oil & Ref. Co.*, 970 S.W.2d 90, 96 (Tex. App.—Houston [14th Dist.] 1998, pet. denied)).
- *North Carolina, ex rel. Cooper v. Tennessee Valley Authority*, 615 F.3d 291, 309 (4th Cir. 2010)
- *Kamuck v. Shell Energy Holdings GP, LLC*, 2012 WL 1463594, at *5-6 (M.D. Pa. 2012).
- *Tucker v. Southwestern Energy Co.*,2012 WL 528253 (E.D.Ark. Feb. 17, 2012).
- *Fiorentino v. Cabot Oil & Gas Corp.*, 750 F.Supp.2d 506, 511–12 (M.D.Pa.2010).
- *Berish v. Southwestern Energy Production Co.*, 763 F.Supp.2d 702, 705 (M.D. Pa. 2011).

<u>Class 11</u>. Litigation: Typical Damages, Key Defenses and Strategies: (1) Surface Estate Owner and Neighboring Property Owner; (2) Causation (Lone Pine Orders).

READ:

- *Environmental Oil and Gas Law*, pp. 65-71
- *Magers v. Chesapeake Appalachia, L.L.C.*, 2013 WL 1558647 (N.D.W.Va.,April 10, 2013).
- *Teel v. Chesapeake Appalachia, LLC*, 906 F.Supp.2d 519 (N.D.W.Va. 2012).
- *Teel v. Chesapeake Appalachia, LLC*, 542 Fed. App. 255 (4th Cir. 2013).
- *Kartch v. EOG Res., Inc.*, 845 F.Supp.2d 995 (D.N.D.2012)
- *Strudley v. Antero Resources Corp.*, 2013 WL 3427901 (Colorado Court of Appeals 2013).
- *Roth v. Cabot Oil & Gas Corp.*, 287 F.R.D. 293, 299-300 (M.D. PA. 2012).

<u>Class 12</u>. Litigation: Key Defenses and Strategies: Causation (State Action Levels, No Evidence, and Collateral Attack)

READ:

- *Environmental Oil and Gas Law*, pp. 71-73
- *Mitchell Energy Corp. v. Bartlett*, 958 S.W.2d 430, 435 (Tex. App.—Fort Worth 1997, pet. denied).
- *FPL Farming v. Environmental Processing*, 2011 WL 3796612 (Tex. 2011).
- *Baker v. Anschutz Exploration Corp.*, 2014 WL 7215153 (W.D. N.Y. 2014).
- *Taco Cabana Inc. v. Exxon Corporation*, 5 S.W.3d 773, 779-780 (Tex. App.—San Antonio 1999, pet. denied).
- *In re Lipsky*, 2013 WL 1715459, at * 1 (Tex. App.—Fort Worth, orig. proceeding).

<u>Class 13</u> Litigation: Key Defenses and Strategies: Temporary and Permanent Injury; Standing; Preemption; Jurisdiction

- *Environmental Oil and Gas Law*, pp. 74-77

- *Mieth v. Ranchquest, Inc.*, 177 S.W.3d 296, 299 (Tex. App.—Houston [14th Dist.] 2005, no pet.).
- *Hues v. Warren Petroleum Co.*, 814 S.W.2d 526, 529 (Tex. App.—Houston [14th Dist.] 1991, writ denied).
- *Walton v. Phillips Petroleum Co.*, 65 S.W.3d 262, 274 (Tex. App.—El Paso 2001, pet. denied)
- *Gilbert Wheeler, Inc. v. Enbridge Pipelines (East Texas), LP*, 2014 WL 4252273 (Tex. 2014).
- *Corbello v. Iowa Production*, 850 So. 2d 686 (La. 2003)
- *Chevron U.S.A., Inc. v. Murphy Exploration & Production Co.*, 151 S.W.3d 306 (Ark. 2004)
- *Cerny v. Marathon Oil Corp.*, 2013 WL 5560483 (W.D. Tex. 2013).
- *Forest Oil Corp. v. El Rucio Land and Cattle Company*, 446 S.W.3d 58 (Tex. App.—Houston [1st Dist.] 2014, pet. granted).

Class 14 .

- What We Know and Don't Know About Methane Emissions Associated With Shale Gas Production, Penn State University, https://meeting.psu.edu/p5tuhsqlek3/?launcher=false&fcsContent=true&pbMode=normal
- Underground Injection Control Program, Penn State University, http://extension.psu.edu/natural-resources/natural-gas/events/underground-injection-wells

Course Objectives

Upon completion of this course, it is expected that you will have developed a baseline understanding that will allow you to both speak and write thoughtfully about the most significant topics encountered in the practice of environmental oil and gas law. First, we will discuss the existing federal laws and regulations and proposed federal laws which apply to hydraulic fracturing activities as well as current studies and enforcement actions concerning the same. We will then discuss Texas statutes and regulations and various activities that are currently being pursued by the regulatory agencies that govern shale gas exploration in Texas. With respect to local matters, we will also briefly consider municipal regulation of the industry. With the rapid growth of shale gas exploration as a result of hydraulic fracturing, increased litigation has likewise grown. Finally, we will review recent litigation trends which relate to hydraulic fracturing, including an analysis of the typical claims asserted as well as the key applicable defenses under Texas law.

Law School Disability Policy

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Assistant Dean of Students, Rosalind Jeffers, Due to the law school's policy of testing anonymity, students should not discuss their disabilities with professors. For assistance, students should consult with Dean Jeffers. For additional information visit http://law.tamu.edu/current-students/student-affairs/exam-accommodation

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

Your actions are governed by the Texas A&M University Honor System Rules and Procedures and the law school's honor systems rules in the Student Handbook.

You are also expected to act with the utmost professionalism, for you indeed are preparing to enter the legal profession. A profession, according to Dean Roscoe Pound, "refers to a group . . . pursuing a learned art as a common calling in the spirit of public service — no less a public service because it may incidentally be a means of livelihood." American Bar Association Commission on Professionalism (1986).

Congratulations

Congratulations on your commitment to legal education. With an admitted bias, I believe your course of study at this law school will prepare you for a wide range of legal and other opportunities in the near future. I am pleased to play a small role in your experience here. I look forward to a wonderful semester with you in this class on Environmental Oil and Gas Law.

43435

Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

• Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☐ Graduate ☑ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Select or Type Department/Program Name School of Law
3. Course prefix, number and complete title of course: LAW- 7646 Sentencing Law & Policy Seminar
4. Catalog course description (not to exceed 50 words):
   The sentencing phase of an offender's contact with the criminal justice system; exploration of the dynamics of the creation, use and impact of sentencing law and policy through the experiences of the key stakeholders at the state and federal level.
5. Prerequisite(s): All lockstep courses except Constitutional Law

   Cross-listed with: ______ Stacked with: ______

   Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ______ to ______
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ______ times.

   Will this course be repeated within the same semester? ☐ Yes ☑ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:

    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*

    J.D. School of Law
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
LAW	7646	Sentencing Law & Policy Sem

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
2	00	00	2	2201010008	1710	16 - 17	0 0 3 6 3 2

Level: 7

Approval recommended by:

Maxine M. Harrington Sept. 30, 2015
Department Head or Program Chair *(Type Name & Sign)* Date

Wayne Barnes 9/30/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Andrew P. Morriss Sept. 29, 2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.

Spring 20xx
Prof. Rich

Texas A&M University School of Law
LAW 7646 – Sentencing Law & Policy

COURSE OVERVIEW & REQUIREMENTS

Professor: **Lisa A. Rich**
Office: Room 108
Office Hours: Tuesdays, 4:00 -- 5:00 p.m.
Thursdays, 3:00 – 4:00 p.m.
By appointment & walk-in
Office Phone: (817) 212-3952
E-mail: larich@law.tamu.edu

COURSE DESCRIPTION

The sentencing phase of an offender's contact with the criminal justice system has become one of the most important aspects of the criminal justice process. This course explores the dynamics of the creation, use, and impact of sentencing law and policy through the experiences of the key stakeholders at the state and federal level.

PREREQUISITE

All lockstep courses except Constitutional Law

COURSE OBJECTIVES

This course will (1) introduce students to the purposes of sentencing; (2) explore how those purposes are integrated into sentencing law and policy; (3) examine the roles of the various stakeholders – including the offender – in the sentencing process; (4) examine how the creation of new offenses or the amending of penalties for existing offenses (including those for white collar and corporate crimes) contribute to sentencing outcomes; (5) consider how sentencing law and policy contributes to or controls levels of incarceration; and (6) explore the impact of sentencing law and policy on different race, economic, and gender classes so that students have a firm understanding of the sentencing phase of the criminal justice process and its impact on an offender and his or her larger community.

REQUIRED TEXTS

Berman, et al., *Sentencing Law & Policy: Cases, Statutes, and Guidelines* (3d ed.)
The Bluebook: A Uniform System of Citation (19th ed.)

RECOMMENDED TEXT

Volokh, E., *Academic Legal Writing: Law Review Articles, Student Notes, Seminar Papers, and Getting on Law Review* (4th ed.)

COURSE OVERVIEW & SYLLABUS

This Overview & the Syllabus are intended to provide students with basic information concerning the course. These materials can be viewed as a "blueprint" for the course; changes to the syllabus can be made by the professor throughout the course, and students will be informed of any substantive changes concerning homework, the grading and attendance policies and changes in project assignments.

READING ASSIGNMENTS AND CLASS PREPARATION

As future lawyers, it is important for you to develop your reading, organizational, and prioritizing skills. Please read the weekly assignments ***before*** class. ***The assignments listed in the syllabus for this course are subject to change and additional assignments may also be distributed.***

COURSE WEBSITE AND E-MAIL

Registration for this class on TWEN is required. This site will be used for posting course materials and additional assignments, making class announcements, submitting electronic versions of assignments, and may be used for other assignments or meetings throughout the semester. Check your school e-mail accounts frequently for announcements regarding the law school and this course.

ASSIGNMENTS & GRADES

Grades in this class will be based on class participation, a formal class presentation, and the completion of analytical writing assignments as outlined below:

Students Seeking Rigorous Writing Credit:

Analytical Research Paper (80 percent of final grade): Students seeking to fulfill a rigorous writing requirement with this class must complete a *minimum* 6,500 word analytical research paper (**exclusive of footnotes**) on a topic selected with the professor's approval. Students who fail to meet the minimum word requirement will receive a 2-letter grade reduction on their paper (e.g., A to C). In addition, the professor will not grant rigorous writing credit to students who fail to meet the minimum word count. Students must comply with all requirements associated with completion of the paper, including submission of topics, outlines, drafts and final papers in accordance with the schedule set forth below. Students who fail to comply with these deadlines shall receive a 1-increment grade deduction for each deadline missed (e.g., A to A-). **LATE PAPERS WILL NOT BE ACCEPTED.**

Students Not Seeking Rigorous Writing Credit:

Two Essay Series Requirement (80 percent of final grade): Students not seeking to fulfill the rigorous writing requirement with this class must complete two (2) analytical research essays throughout the course. The first essay must be a minimum of 2,000 words (**exclusive of**

footnotes); the second essay must be a minimum of 2,500 words (**exclusive of footnotes**) on a topic (or topics) selected with the professor's approval. Students may, but do not have to, add an additional 2,500 words to the first essay to satisfy the second essay requirement. Students who fail to meet the minimum word requirement will receive a 2-letter grade reduction on their paper (e.g., A to C). Students must comply with all requirements associated with completion of the paper, including submission of topics, outlines, and final papers in accordance with the schedule set forth below. Students who fail to comply with these deadlines shall receive a 1-increment grade deduction for each deadline missed (e.g., A to A-). **LATE PAPERS WILL NOT BE ACCEPTED.**

For All Students:

This course follows the grading scale and grading policies outlined in Academic Standards 8.1-8.54, which may be found in the Student Handbook.

In-Class Presentations (20 percent of final grade): Students will be required to give a **20-minute** in-class presentation introducing the topic selected for their analytical research papers or essay(s), including a general overview of the subject and key findings, recommendations, or conclusions. The professor will assign "slots" for these presentations within the first three (3) weeks of the course.

Participation: This seminar class relies on thoughtful exchange and discourse in order to explore the various topics covered. Students are expected to come to class prepared to discuss the topic and materials assigned for that day. As such, the professor will include class participation into the final calculation of your grade. Class attendance, level of engagement, and overall participation can result in the raising or lowering of a student's final grade by one (1) letter increment (B to a B+, or B+ to B). Class participation will be evaluated on a student's attendance record, preparation for the class, demonstrated knowledge of the subjects being discussed, and overall constructive participation in class discussion, as well as demonstrated mastery of the objectives set out for the course.

Questions on Projects: I encourage you to ask questions about assignments if something is unclear to you. A good lawyer will always make sure he or she has the information necessary to produce high quality work. That said, I do adhere to a "48-hour rule" and will not answer *any* questions about a project within 48 hours of its due date.

TEACHING METHOD

This is a seminar course designed to engage students in meaningful dialogue about the subjects being covered during the class meeting time. In addition to the reading or other materials assigned for the class, students will be expected to bring current events and other issues into the discussion after prompts from the professor.

CLASSROOM ETIQUETTE AND ATTENDANCE REQUIREMENTS

Guidelines & Policies

You are required to adhere to the attendance policy as outlined in the Student Handbook and to the policies on classroom conduct (*see* "Code of Conduct"). A student who disrupts the classroom or otherwise interferes with the right of others in the class to learn may be asked to leave the class.

Electronic Devices & Media Access

Please be sure that all electronic devices are silenced prior to the start of class. Laptop computers are permitted in this course for purposes directly related ***to this course***. During class, laptop computers (and other electronic devices) may not be used for any other purpose including, but not limited to, playing games, sending instant message, "surfing" the Internet, reading or sending e-mail messages, or working on assignments for other courses. Cell phones and other electronic devices not being used for in-class purposes must not be on your desks during class.

Violations of classroom etiquette could result in your being asked to leave class, resulting in an unexcused absence for that class. Such absences will count toward the maximum allowed allowances.

DISABILITY POLICY

ACADEMIC INTEGRITY STATEMENT AND POLICY

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"The Aggie Code of Honor is an effort to unify the aims of all Texas A&M men and women toward a high code of ethics and personal dignity. For most, living under this code will be no problem, as it asks nothing of a person that is beyond reason. It only calls for honesty and integrity, characteristics that Aggies have always exemplified. The Aggie Code of Honor functions as a symbol to all Aggies, promoting understanding and loyalty to truth and confidence in each other."

For more information, go to the Texas A&M University Honor System Rules and Procedures and the law school rules found in the Student Handbook.

PROFESSIONALISM

The practice of law is a profession, and we as legal practitioners are required to conduct ourselves with an appropriate level of professionalism. "Professionalism" is conduct consistent with the tenets of the legal profession as demonstrated by a practitioner's civility, honesty, integrity, character, fairness, competence, ethical conduct, public service, and respect for the rule [and spirit] of law, the courts, clients, persons who work within the legal profession, witnesses, and unrepresented parties.[1]

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[1] Commission on Professionalism, State Bar of New Mexico, available at http://www.nmbar.org/Attorneys/commissiononprofessionalism.html.

TENTATIVE COURSE SCHEDULE

Text: *Sentencing Law & Policy*, Berman et al. (3d ed.)

The professor, at her discretion, may change the assignments listed below.

DATE	SUBJECT	PAGES
01.16.2015	Course Overview & The Purposes of Sentencing	Preface; 1-36; skim 37-46; 47-79
01.23.2015	The Stakeholders in the Sentencing Process & Policy	81-84; skim 85-98; 98-129; skim 129-34
01.30.2015	The Role of Offenses in the Sentencing Process & Policy	279-302; 341-48
02.06.2015	**NO CLASS TODAY**[2]	**NO CLASS**
02.13.2015	The Sentencing Process: Federal	139-45; Pull 18 U.S.C § 3553 and 28 U.S.C. §§ 991-998 from a source of your choice; additional materials will be provided
02.20.2015	The Sentencing Process: State	148-61; additional material may be provided
02.27.2015	Race, Gender, and Class Considerations & Impacts	725-88
03.06.2015	Incarceration & Collateral Consequences Part I	558-615
03.13.2015	Incarceration & Collateral Consequences Part II	
03.20.2015	White Collar Crime: Individuals	Material will be provided
03.27.2015	Corporate Crime & Compliance Initiatives	Material will be provided
04.03.2015	Alternatives to Incarceration & Sentencing Policy Reforms	625-73; skim (with care) 674-708
04.10.2015	Presentations	
04.17.2015	Presentations	
04.24.2015	Presentations	
05.01.2015	Make-up Class: Closing Thoughts on Sentencing Law & Policy	

[2] Prof. Rich will be attending a conference on Friday, 6 February 2015. Please use this day to work on your topic selection and research. Topics are due via email on Monday, 9 February 2015.

Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

• Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☐ Graduate ☑ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Select or Type Department/Program Name School of Law
3. Course prefix, number and complete title of course: LAW- 7793 LARW III: Public Policy Drafting
4. Catalog course description (not to exceed 50 words):
   Introduction to the various forms of written (and oral) communication encountered in the public policymaking process, particularly in regulated industries; overview of "public policy" and the various communication strategies and skills necessary to participate in the policymaking process.
5. Prerequisite(s): One year in law school in the full-time or part-time program, including LAW 7001, LAW 7002
   Cross-listed with: ______ Stacked with: ______
   Cross-listed courses require the signature of both department heads.
6. Is this a variable credit course? ☐ Yes ☑ No If yes, from ______ to ______
7. Is this a repeatable course? ☐ Yes ☑ No If yes, this course may be taken ______ times.
   Will this course be repeated within the same semester? ☐ Yes ☑ No
8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☑ Grade ☐ S/U ☐ P/F (CLMD)
10. This course will be:
    a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*
    b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*
    J.D. School of Law
11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
LAW	7793	LARW III: Pub Policy Drafting

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
2	00	00	2	2201010008	1710	16 - 17	0 0 3 6 3 2

Level: 7

Approval recommended by:

Maxine M. Harrington [signature] Sept. 30 2015
Department Head or Program Chair *(Type Name & Sign)* Date

Wayne Barnes [signature] 9/30/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Andrew P. Morriss [signature] Sept. 29, 2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

Prof. Rich
TAMU School of Law Fall
20XX

LAW 7793
LARW-III: DRAFTING FOR PUBLIC POLICY
COURSE OVERVIEW AND SYLLABUS

GENERAL INFORMATION

Professor: **Lisa A. Rich**
Office: Room 108
Office Hours: Tuesdays, 3:30-5:30
Wednesdays, 2:30-400
By appointment & walk-in Office
Phone: (817) 212-3952
E- mail:larich@law.tamu.edu

COURSE OVERVIEW

Welcome to drafting for public policy! According to the American Bar Association, one-eighth of all lawyers practice in the government or public sectors – and even if a lawyer does not practice solely in the public sector their work is impacted by public policy at every turn.
Students will learn specifically about the components of written communication in public policymaking and also will participate in various public policymaking exercises to gain familiarity with the process. Students will demonstrate the skills learned through a series of written exercises that will culminate in a "briefing binder" that highlights the various skills they have developed throughout the course.

The course discussion and in-class exercises will focus on answering and exploring various questions associated with writing in public policy.

COURSE DESCRIPTION

This course introduces students to the various forms of written (and oral) communication encountered in the public policymaking process, particularly in regulated industries. In addition to gaining an overview of "public policy," students will learn about the various communication strategies and skills necessary to participate effectively in the policymaking process.

PREREQUISITE

One year in law school in the full-time or part-time program, including LAW 7001 and LAW 7002

COURSE OBJECTIVES

At the end of this course, students should —

- Have a basic understanding of public policy and what those terms mean;
- Have competency in articulating problems and solutions in a clear, comprehensive, and cohesive manner- both orally and in writing;
- Have a solid understanding about the various types of written and oral communication strategies and techniques in which public policy stakeholders engage;
- Have a solid understanding of legislative and rulemaking processes and how those processes shape public policy that builds upon what they already have learned in Legislation and Regulation;
- Have a portfolio of written work product that demonstrates their skill level and proficiency in drafting various types of "public policy" documents; and
- Have a solid understanding of the role a lawyer plays in the public policy arena and the pressures and expectations that such a lawyer may face in their career.

TEXTBOOK

Writing Public Policy: A Practical Guide to Communicating in the Policymaking Process (3d ed.), Catherine F. Smith

TEACHING METHOD

This course involves a number of teaching methods including the Socratic method, lecture, problem-based discussions, group and individual work, written and oral exercises, and broad discussion of the material covered. The professor expects students to be prepared for class, including having completed a meaningful review of **all** material assigned prior to class.

GRADES

This course follows the grading scale and grading policies outlined in Academic Standards 8.1-8.54, which may be found in the Student Handbook.

Grades for this class will be determined based on the following and will be made in accordance with the Texas A&M School of Law curve for classes of this size:

Project 1 –	5 percent
Project 2 –	10 percent
Project 3 –	15 percent
Project 4 –	10 percent
Project 5 –	20 percent
Project 6 –	30 percent
Class Participation –	10 percent

Please note that this class requires interaction and engagement among students and the professor in order to be the most beneficial. Class participation, therefore, is essential. The professor will include in the participation consideration your preparation for class, your engagement in the discussion, your attentiveness to the discussion, and your willingness to engage in the topic being discussed.

CLASSROOM ETIQUETTE AND ATTENDANCE REQUIREMENTS

Guidelines & Policies

You are required to adhere to the attendance policy as outlined in the Student Handbook and to the policies on classroom conduct (*see* "Code of Conduct"). A student who disrupts the classroom or otherwise interferes with the right of others in the class to learn may be asked to leave the class.

Electronic Devices & Media Access

Research indicates that people retain more information if they "hand write" their notes than if they use computers. Moreover, students tend to spend class time on the Internet rather than paying attention to their professor and/or classmates unless they are "on call." As such, I encourage you to refrain from bringing a laptop or other electronic device to this class for the purposes of taking notes. If I see that electronic devices are being used in class for anything other than for class purposes, I reserve the right to ban them from class.

Please be sure that all other electronic devices are silenced prior to the start of class. All *electronic devices must be removed from your desks during class.*

Violations of classroom etiquette could result in your being asked to leave class, resulting in an unexcused absence for that class. Such absences will count toward the maximum allowed allowances.

DISABILITY POLICY

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Assistant Dean of Students, Rosalind Jeffers, Due to the law school's policy of testing anonymity, students should not discuss their disabilities with professors. For assistance, students should consult with Dean Jeffers. For additional information visit http://law.tamu.edu/current-students/student-affairs/exam-accommodation.

ACADEMIC INTEGRITY STATEMENT AND POLICY

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"The Aggie Code of Honor is an effort to unify the aims of all Texas A&M men and women toward a high code of ethics and personal dignity. For most, living under this code will be no problem, as it asks nothing of a person that is beyond reason. It only calls for honesty and integrity, characteristics that Aggies have always exemplified. The Aggie Code of Honor functions as a symbol to all Aggies, promoting understanding and loyalty to truth and confidence in each other."

For more information, go to the Texas A&M University Honor System Rules and Procedures and the law school rules found in the Student Handbook.

PROFESSIONALISM

"The conduct of a lawyer should be characterized at all times by honesty, candor, and fairness. In fulfilling his or her primary duty to a client, a lawyer must be ever mindful of the profession's broader duty to the legal system.

* * * *

We must always be mindful that the practice of law is a profession. As members of a learned art we pursue a common calling in the spirit of public service. We have a proud tradition. Throughout the history of our nation, the members of our citizenry have looked to the ranks of our profession for leadership and guidance. Let us now as a profession each rededicate ourselves to practice law so we can restore public confidence in our profession, faithfully serve our clients, and fulfill our responsibility to the legal system."[1]

[1] Excerpted from the "Texas Lawyer's Creed- A Mandate for Professionalism" adopted by the Supreme Court of Texas and the Court of Criminal Appeals, November 7, 1989, available at http://www.legalethicstexas.com/Downloads/Texas-Lawyers-Creed/Texas_Lawyers_Creed.aspx.

READING ASSIGNMENTS

The professor reserves the right to change or supplement the reading assignments listed below.

For each week of class, read the material assigned carefully and in the context of the theme questions. The theme questions will frame the class discussion, in-class exercises, and written assignments completed throughout the semester. Students are expected to have completed the reading and engage actively in the class discussions.

Class	Topic & Theme Questions	Reading Assignment
August 27, 2015 1	Public Policy— *What is it?* *What are the dynamics of the policymaking process?* *What skills and strategies are needed for successful public policymaking?* *What is "public interest" and how does it relate to public policy?*	Smith Preface, pp.1-18
September 3, 2015 2	Communicating in the Process— *What are the purposes of policymaking communication?* *What are the different viewpoints that impact policy communication?* *How do stakeholders communicate and to whom?* *How does policymaking writing differ from other types of written communication? How is it the same?*	Smith 19-37
September 10, 2015 3	Framing the Problem— *How does policy get formed?* *Why is defining the "problem" critical to policymaking?* *How does stakeholder viewpoint and interest impact the framing of the problem?* *How does the definition of the problem impact the formulation of the solution?*	Smith 38-64
September 17, 2015 4	Evaluation: Analysis & Advice— *As public policy lawyers, what role do you play in communication?* *What critical thinking and critical awareness skills do you need to communicate effectively?* *What is policy discourse and how is it shaped?*	Smith 65-91
September 24, 2015 5	Knowing the Record— *What is the "record" with respect to public policy?* *Who creates "the record"?* *Why is good public policy and communication thereof formed by "knowing the record"?*	Smith 92-118

October 1 & 8, 2015 6 – 7	Position Papers: Knowing & Articulating the Issues— *What is a position paper?* *What is the purpose of a position paper?* *What considerations go into the drafting of a position paper?* *What types of arguments go into a position paper?* *How do position papers incorporate skills learned throughout the legal writing curriculum?* *Are position papers the same as "white papers" and reports? If not, why not?* *How do you craft a "white paper"?*	Smith 119-60
October 15 & 22, 2015 8 – 9	Communication, Persuasion & Public Policy: Evaluating What Works— *What makes good writing?* *What words best communicate a position?* *What words best communicate core concepts?* *How do you maximize brevity and impact?* *How does your written communication support and promote your oral communication and vice versa?*	Materials to be assigned
October 29, 2015 10	Briefing Memoranda & Opinion Statements— *What are the purposes of a briefing memorandum?* *What kinds of information are necessary to a policymaker/stakeholder?* *How does your target audience impact the content of a briefing memorandum?* *How do briefing memoranda and opinion statements differ?* *How does tone impact the readability of a document?*	Smith 162-73
November 5 & 12, 11 – 12	Testimony: Preparing Impactful Hearing Testimony— *What are the purposes served by receiving testimony in a hearing setting?* *What are the procedures associated with testifying before a governmental body?* *If a body is split among political parties, how does that impact your role as a witness?* *As a witness, what types of testimony must be prepared?* *How do you prepare yourself or your principal for the Q&A portion of the hearing?*	Smith 173-90
November 19 & 30, 2015 13 & 14	The APA & Agency Rulemaking Process— *What is the APA?* *Who/what is covered by the APA's requirements?* *How does the APA interact and impact policymaking?* *What are the purposes and machinations of the "notice and comment process"?* *What types of "comments" can be made to agencies with respect to their rulemaking?* *What are the goals of written communication in the APA setting?*	Smith 191-207

PROJECTS

The various written assignments completed throughout this course follow the material covered in the textbook and result in students having a binder of material that tracks the formation and implementation of their policy.

Project due dates are listed below but the professor reserves the right to change assignment and due dates depending on the flow of the course.

Unless otherwise indicated, all projects will be due via TWEN upload **no later than 10:00 p.m.** on the date assigned.

Project 1: Overview Memorandum To Supervisor (2 pages)
Students will prepare a concise memorandum to a supervisor about an assigned policy issue that outlines (frames) the issue and explains why policy addressing the issue is appropriate. This assignment will be accompanied by a "bibliography" of sources cited and a list of follow-up questions you have.[2]

Concepts covered:	Framing the Issue/Identifying the Problem/Proposing Possible Policy Solution
Date Assigned:	September 10, 2015
Date Due:	September 16, 2015

Project 2: Updated Initial Memorandum (5 pages)
Update of the initial memorandum to supervisor that includes research about the topic, identifies other stakeholders and interest groups, including their positions, identifies next steps in the research process, identifies potential witnesses on the topic, and makes a recommendation about the shape of the proposed policy solution. This project will be accompanied by an email to the supervisor.

Concepts covered:	Evaluating the Issue/Knowing the Record
Date Assigned:	September 24, 2015
Date Due:	September 30, 2015

Project 3: Draft Position Paper (2-3 pages)
Students will prepare a draft position paper based on an assigned issue and facts that demonstrates their ability to identify a problem, synthesize information, and propose a public policy solution in a clear, concise and cohesive fashion.

Concepts covered:	Those from Project 1 & 2/Knowing and Articulating the Issues
Date Assigned:	October 8, 2015
Date Due:	October 14, 2015

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[2] These questions will become part of your next assignment so be sure to hang on to them. ;)

Project 4: Note Taking and Hearing Memo to Supervisor (no page limit)
Students will watch a legislative hearing of their choice taking notes on what they see, including paying attention to all aspects of the hearing from opening statement to witness responses in Q&A and prepare a hearing summary for their supervisor on the hearing based on the notes taken (notes will also be submitted). This project will be accompanied by an email to the supervisor.

Concepts covered:	How To Listen/How To Read Body Language/Understanding The Format And Formalities Of Legislative & Rulemaking Hearings
Date Assigned:	October 22, 2015
Date Due:	October 28, 2015

Project 5: "One Pager" & Hearing Testimony – Preparation for a Hearing (recommended 5 pages for Oral Statement; all caps/double-spaced! PLUS YOUR ONE-PAGER)
Students will prepare a written oral statement that properly—and with impact—summarizes what would be included in full written hearing testimony. In addition, students will prepare "one-pagers" focused on their topic that further summarize the positions and points they wish to make on behalf of their client. **Students may be asked to present their oral statements and/or share their one-pagers in class.**

Concepts covered: Communication/Persuasion/Preparing Impactful Testimony

Date Assigned:	November 12, 2015
Date Due:	November 19, 2015

* This project will be due in hard copy at the beginning of class*

Project 6: Rulemaking Comment (10-15 pages)
Students will prepare a comment on a rule that demonstrates their understanding of the rulemaking process and the role of public comments in that process.

Concepts covered:	Understanding The APA/Communicating Effectively In A Rulemaking Setting.
Date Assigned:	November 30, 2015
Date Due:	Last Day of Finals 2015

Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attach a course syllabus.•

Form Instructions

1. Course request type: ☐ Undergraduate ☐ Graduate ☑ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: Select or Type Department/Program Name School of Law
3. Course prefix, number and complete title of course: LAW- 7851S Wills & Estates Clinic
4. Catalog course description (not to exceed 50 words):

Real-world experience in handling the estate planning needs of low-income clients; under the supervision of licensed attorneys, interview clients, draft documents including wills, powers of attorney, health care advance directives and other instruments; may handle probate matters.

5. Prerequisite(s): One year in law school in the full-time or part-time program; LAW 7076

Cross-listed with: ____ Stacked with: ____

Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☑ Yes ☐ No If yes, from 2 to 3
7. Is this a repeatable course? ☑ Yes ☐ No If yes, this course may be taken 2 times.

Will this course be repeated within the same semester? ☐ Yes ☑ No

8. Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No
9. How will this course be graded: ☐ Grade ☑ S/U ☐ P/F (CLMD)
10. This course will be:

a. required for students enrolled in the following degree programs(s) *(e.g., B.A. in history)*

b. an elective for students enrolled in the following degree program(s) *(e.g., M.S., Ph.D. in geography)*

J.D. School of Law

11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. **Attach approval letters.**
12. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13.

Prefix	Course #	Title (excluding punctuation)
LAW	7851S	Wills & Estates Clinic

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code
3	00	00	3	2201010008	1710	16 - 17	0 0 3 6 3 2

Level 7

Approval recommended by:

Maxine M. Harrington Sept. 30, 2015
Department Head or Program Chair *(Type Name & Sign)* Date

Wayne Barnes 9/30/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Andrew P. Morriss Sept. 29, 2015
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14

Wills and Estates Clinic

Texas A&M University School of Law
1515 Commerce Street
Fort Worth, Texas 76102

1. Course Information:

LAW-7851S, CRS 26408, 2 hours credit
Thursdays, 4-5:50 pm, Spring Semester 2015
Room 106

2. Instructor Information:

Christopher J. Parvin
Board Certified, Estate Planning & Probate
Emmert & Parvin, LLP
1701 N. Market Street, Ste. 404
Dallas, Texas 75202
(469) 607-4503 Direct Voice
(214) 475-1200 cell
chris@emmertparvin.com
www.parvinlaw.com

Monica A. Benson
Certified Elder Law Attorney
Katten & Benson, Attorneys at Law
4763 Barwick Drive, Ste. 100
Fort Worth, Texas 76132
(817) 263-5190 Office Telephone
mbenson@kattenbenson.com
monicabenson@gmail.com
www.kattenbenson.com

Both of us have day jobs, but we will do our best to be available for questions and concerns.

3. Course Description and Prerequisites:

Designed to provide real-world experience, this course allows students the opportunity to assist low-income senior citizens with completion of their simple estate plans. Under the supervision of attorney-professors, students participating in this clinic will interview clients, draft estate planning documents and assist their clients with the execution of their estate plans.

Prerequisites: One year of law school in the full-time or part-time program; Wills and Estates.

4. Textbook and Other Instructional Materials:

Johanson's Texas Estates Code Annotated, 2014 Edition Stanley Johanson. (Thomson-West, 2014)

5. Course Objectives:

- Assist student participants in learning how to properly explain estate planning documents and strategies for use with clients;

- Provide students the experience of interviewing clients and identifying specific estate planning needs and strategies for use with the client;

- Provide students the opportunity to professionally interact with clients;

- Provide students the know-how to correctly prepare and execute estate planning documents with clients.

6. Course Grading and Attendance:

This is a pass/fail course. Students must demonstrate a proficiency in the above Course Objectives to obtain a passing grade. Participation is mandatory in all aspects of the Clinic (including classroom exercises, interviewing clients, drafting documents and execution of documents with clients).

Attendance is mandatory and roll will be taken. Students are solely responsible for ensuring their attendance in class is recorded. You are required to adhere to the attendance policy as outlined in Texas A&M University School of Law Student Handbook. **Since the Clinic deals with actual clients, students will not be allowed to *Drop* the course after the second week. Students who do not participate or otherwise show up for all classes and course meetings will be given a failing grade.**

There is no final exam for this class.

7. Class Schedule and Assignments:

Professors are providing this schedule as a general outline. Professors reserve the right to alter, amend or revise this schedule at their sole, absolute and unreviewable discretion.

Date of Class	**Topic**	**Instructor**
January 15, 2015	Overview of Class Professionalism and Ethics Execution of Documents Coordination with other assets Identifying special issues	Parvin & Benson
January 22, 2015	Interview Skills Mock Interviews Overview of Community & Separate Property	Parvin & Benson
January 29, 2015	Wills and Statutory Durable Powers of Attorney	Parvin
February 5, 2015	Medical Power of Attorney and Advance Directives	Benson
February 12, 2015	Presentation Preparation	Parvin & Benson
February 19, 2015	Presentations and Critique Create Master Presentation	Parvin & Benson

9. Disability Policy:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Assistant Dean of Students, Rosalind Jeffers, Due to the law school's policy of testing anonymity, students should not discuss their disabilities with professors. For assistance, students should consult with Dean Jeffers. For additional information visit http://law.tamu.edu/current-students/student-affairs/exam-accommodation.

10. Academic Integrity Statement and Policy:

"*An Aggie does not lie, cheat or steal, nor tolerate those who do.*" Please remember that your actions are governed by the Texas A&M University Honor System Rules and Procedures and the law school's honor systems rules in the Student Handbook.

11. Statement on Professionalism:

"*What is Professionalism? 'Professionalism is conduct consistent with the tenets of the legal professional as demonstrated by a lawyer's civility, honesty, integrity, character, fairness, competence, ethical conduct, public service, and respect for the rule of law, the courts, clients, persons who work within the legal profession, witnesses and unrepresented parties.*'" Commission on Professionalism, State Bar of New Mexico. Available at: http://www.nmbar.org/Attorneys/commissiononprofessionalism.html.

As our class will be interacting with actual clients, it is important that each student recognize his/her appearance, conduct and preparation reflects not only on the student-lawyer in question but also Texas A&M University Law School and the profession of law, in general. In interacting with clients, each participant will be expected to be present themselves (and their work) with the utmost professionalism, care and diligence.

12. Class Rules (from the Professors):

- No cell phone, social media, email or other distractions in class or dealing with clients. This is a "real" law firm environment and you will be expected to act accordingly.

- This class is all about gaining experience. No question is dumb or should be avoided. If you want to ask any question, please do.

- Finish what you start. As we are dealing with actual clients, we have an ethical duty to them to correctly complete the work we promise to perform.

Change in Courses

Texas A&M University
Departmental Request for a Change in Course
Undergraduate • Graduate • Professional
• Submit original form and attachments •

Form Instructions

1. Course request type: ☐ Undergraduate ☐ Graduate ☑ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: School of Law
3. Course prefix, number and complete title of course: LAW-7839 Residency Externship

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ____ To: ____
   b. Withdrawal (reason): ____
   c. Cross-list with: ____

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ____
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:
   Legislative Externship. (12-0). Credit 12 The Legislative Externship is an immersion experience in the Texas Legislature for a small number of carefully selected law students (1-4). These students will earn 12 pass/fail academic credit hours by working full-time during the legislative session in Austin, Texas on either a legislative committee or in the office of a house or senate member. In addition to this fieldwork component, participating students will also work directly with a professor on substantive, procedural, and ethical topics relating to their
10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):
    Residency Externship. Credit 9 to 12
    Immersion experience; work full-time in legislature,state or federal government offices, nonprofit organizations, or in-house counsel; work with professor on substantive, procedural and ethical topics relating to externship; development of experience and understanding in particular policy and legal areas.
11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
Law	7839	Legislative Externship

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
12.00				2201010008	1710	0 0 3 6 3 2	7

b. Change to:

Prefix	Course #	Title (excluding punctuation)
Law	7839	Residency Externship

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
12.00			12.00	220100008	1710	16 - 17	0 0 3 6 3 2	7

Approval recommended by:

Maxine M. Harrington Sept 30 2015
Department Head or Program Chair *(Type Name & Sign)* Date

Wayne Barnes 9/30/2015
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Andrew P. Morriss
Dean of College Date

Submitted to Coordinating Board by:

Chair, GC or UCC Date

Associate Director, Curricular Services

Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.

Justification Statement   Law- 7839 Residency Externship

The change includes a new title and course description. The scope of the residency externship is expanded to include not only public policy and legal field placements in the legislature but also federal and state government offices, nonprofit organizations, and in-house counsel. The credit hours were changed from 12 hours to 9-12 hours variable credit to take into consideration the variety of externships.

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

Form Instructions

1. Course request type: ☐ Undergraduate ☐ Graduate ☑ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: School of Law
3. Course prefix, number and complete title of course: Law 7865S

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ______ To: ______
   b. Withdrawal (reason): ______
   c. Cross-list with: ______

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ______
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:

   Law Clinic

10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):

    Family Law & Benefits Clinic

11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
Law	7856S	Law Clinic

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
3			3	2201010008	1710	0 0 3 6 3 2	

b. Change to:

Prefix	Course #	Title (excluding punctuation)
Law	7856S	Family Law & Benefits Clinic

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
3			3	2201010008	1710	16 - 17	0 0 3 6 3 2	7

Approval recommended by:

Maxine M. Harrington [signature] 10/27/15
Department Head or Program Chair *(Type Name & Sign)* Date

Wayne Barnes [signature] 10-27-15
Chair, College Review Committee Date

Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Andrew P. Morriss [signature] 10/28/15
Dean of College Date

Chair, GC or UCC Date

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.

Justification Statement: LAW-7437 Family Law & Benefits Clinic: new title

The prior title "Law Clinic" is misleading since the law school has multiple law clinics. The change in title accurately reflects the particular legal specialty engaged in by this clinic and distinguishes it from other law school clinics.

Texas A&M University
Departmental Request for a Change in Course
Undergraduate ♦ Graduate ♦ Professional

• Submit original form and attachments •

Form Instructions

1. Course request type: ☐ Undergraduate ☐ Graduate ☑ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: School of Law
3. Course prefix, number and complete title of course: LAW-7932 Journal of Property Law Board

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ______ To: ______
   b. Withdrawal (reason): ______
   c. Cross-list with: ______

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ______
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:
   Journal of Real Property Law Board. (2-0). Credit 2. The Journal of Real Property Law is a scholarly publication dedicated to promoting academic discussions of real property law. The organization explores the relationships arising from ownership, possession, and use of real property. The Board of Editors is responsible for the operation, supervision, editing, and publication of the Journal of Real Property with faculty cooperation.
10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):
   Journal of Property Law Board. (2-0). Credit 2. Scholarly publication Journal of Property Law dedicated to promoting academic discussions of real property law; exploration of the relationships arising from ownership, possession, and use of real property; Board of Editors responsible for the operation, supervision, editing, and publication of the Journal of Property Law with faculty cooperation.
11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
Law	7932	Journal of Real Prop Law BRD

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
2			2	2201010008	1710	0 0 3 6 3 2	7

b. Change to:

Prefix	Course #	Title (excluding punctuation)
Law	7932	Journal of Prop Law BRD

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
2			2	220100008	1710	16 - 17	0 0 3 6 3 2	7

Approval recommended by:

Maxine M. Harrington Sept. 30, 2015
Department Head or Program Chair *(Type Name & Sign)* Date

Wayne Barnes 9/30/2015
Chair, College Review Committee Date

Andrew P. Morriss Sept. 29, 2015
Dean of College Date

______
Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Submitted to Coordinating Board by:

______
Chair, GC or UCC Date

______
Associate Director, Curricular Services

Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.

Curricular Services – 08/14

Justification Statement Law - 7932 Journal of Property Law Board

The change includes a new title and course description. The change to the course description reflects only the title change. The title was changed to expand the scope of the Journal of Property Law to include articles not only in the area of real property but also in property law generally, including intellectual property.

Texas A&M University
Departmental Request for a Change in Course
Undergraduate • Graduate • Professional
• Submit original form and attachments •

Form Instructions

1. Course request type: ☐ Undergraduate ☐ Graduate ☑ First Professional *(DDS, MD, JD, PharmD, DVM)*
2. Request submitted by *(Department or Program Name)*: School of Law
3. Course prefix, number and complete title of course: LAW-7933 Journal of Property Law

Attach a brief supporting statement for changes made to items 4a thru 4d, and 10 below.

4. Change requested
   a. Prerequisite(s): From: ______ To: ______
   b. Withdrawal (reason): ______
   c. Cross-list with: ______

   Cross-listed courses require the signature of both department heads.

   d. Change in course title and description. Enter complete current course title and current course description in item 9; enter proposed course title and proposed course description in item 10. Complete item 11a and b for a change in title.
   e. Change in course number, contact hours (lab & lecture), and semester credit hours. Complete item 11a and b. **Attach a course syllabus.**
5. Is this an existing core curriculum course? ☐ Yes ☑ No
6. If grade type is changing for existing course, indicate the new grade type: ☐ Grade ☐ S/U ☐ P/F (CLMD)
7. If this course will be stacked, please indicate the course number of the stacked course: ______
8. ☑ I verify that I have reviewed the FAQ for *Export Control Basics for Distance Education* (http://vpr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
9. Complete current course title and current catalog course description:
   Journal of Real Property Law (1-0). Credit 1. The Journal of Real Property Law is a scholarly publication dedicated to promoting academic discussions of real property law. The organization explores the relationships arising from ownership, possession, and use of real property. Participation is limited to those who meet specific academic requirements and those who are selected through a writing competition.
10. Complete proposed course title and proposed catalog course description (not to exceed 50 words):
    Journal of Property Law (1-0). Credit 1. Scholarly publication Journal of Property Law dedicated to promoting academic discussions of real property law; exploration of the relationships arising from ownership, possession, and use of real property. Participation limited to those who meet specific academic requirements and selected through a writing competition
11. a. As currently in course inventory:

Prefix	Course #	Title (excluding punctuation)
Law	7933	Journal of Real Prop Law

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	FICE Code	Level
1			1	2201010008	1710	0 0 3 6 3 2	7

b. Change to:

Prefix	Course #	Title (excluding punctuation)
Law	7933	Journal of Prop Law

Lect.	Lab	Other	SCH	CIP and Fund Code	Admin. Unit	Acad. Year	FICE Code	Level
1			1	220100008	1710	16 - 17	0 0 3 6 3 2	7

Approval recommended by:

Maxine M. Harrington [signature] Sept. 30, 2015
Department Head or Program Chair *(Type Name & Sign)* Date

Wayne Barnes [signature] 9/30/2015
Chair, College Review Committee Date

______
Department Head or Program Chair *(Type Name & Sign)* Date
(if cross-listed course)

Andrew P. Morriss [signature] Sept. 29, 2015
Dean of College Date

______
Chair, GC or UCC Date

Submitted to Coordinating Board by:

______
Associate Director, Curricular Services

______ Date ______ Effective Date

Justification Statement Law - 7933 Journal of Property Law

The change includes a new title and course description. The change to the course description reflects only the title change. The title was changed to expand the scope of the Journal of Property Law to include articles not only in the area of real property but also in property law generally, including intellectual property.