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 (M.D., D.D.S., J.D., etc.)
2. Request submitted by (Department or Program Name): Department of Educational Psychology
3. Course prefix, number and complete title of course: BIED 621: Methods for Bilingual Research
4. Catalog course description (not to exceed 50 words): Understanding educational research and research methodologies: use of research findings to appropriately inform school and classroom practices; overview of the research methodology to develop skills as future researchers and consumers of research; examination of qualitative and quantitative research methodologies and mixed methods in relation to their application to diverse populations.

5. Prerequisite(s): Graduate Classification, Approval of Department Head

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 program(s) (e.g., B.A. in history)
      Master's students in BIED, PHD Students in Educational Psychology with emphasis in BIED
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)
      Master's and PHD students Educational Psychology
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: BIED  Course #: 621  Title (excluding punctuation): METHODS FOR BIED RESEARCH
   Lect. Lab Other SCH IP# and Fund Code Admin Unit Acad Year Effect Code Level
   3.00 0.00 0.00 3.00 1302010004 920 15 - 16 0 0 3 6 3 2

Approval recommended by:

Victor Willson, Ph.D.
Department Head or Program Chair (Type Name & Sign) Date

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

Submitted to Coordinating Board by:

Associate Director, Curricular Services

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

Fall 2014
BIEED 621-600
Methods for Bilingual Research

Bilingual Education Programs
Department of Educational Psychology
College of Education and Human Development

Dr. Héctor H. Rivera
Harrington Tower, 107 E
Office Tel. 979.862.4663
Email: hhrivera@neo.tamu.edu
Class Time: Tuesday from 5:30 to 8:30 pm
Office Hours: Tuesdays from 4-5 pm

Course Description

This course has two primary goals. Goal one is to focus on understanding the intent of educational research as well as the research methodologies so that graduate students can appropriately use research findings to inform school and classroom practices. The second goal is to provide an overview of the research methodology (e.g., experimental, quasi-experimental, ethnographic, case study, etc.) in an effort to develop graduate students’ skills as future researchers and consumers of research. In an age of accountability, the course emphasizes how school can be focused around the use and understanding of scientifically based teaching practices. This course examines qualitative and quantitative research methodologies and discusses mixed methods in relation to their application to diverse populations such as those represented within bilingual programs.

Prerequisites: Graduate Classification; Approval of department head

Required Readings


* Other articles on bilingual studies and studies with other ELLs will be chosen and provided from the research literature by the professor. Articles will focus on
quantitative and qualitative methodologies relevant to the teaching and learning of bilingual children.

**Course Objectives:**

The purpose of this class is for you to learn how to interpret research finding and distill applicable principles for the teaching and learning of bilingual children and other ELLs. It is also intended so you can develop research skills from qualitative and quantitative methodologies. By the end of the semester you should be able to answer the following questions:

1. What is educational research and how it can be distinguished from other sources of information (opinions, and anecdotes)?
2. How should the quality and importance of an educational research report be evaluated, and why is such evaluation critical to teaching and learning?
3. Where can educational research be found, and how is it disseminated, and what role does it play in our educational system and in the classroom?
4. How can educational research benefit the classroom environment and the classroom instruction?

<table>
<thead>
<tr>
<th>Objectives/Learning Outcomes</th>
<th>How learning objectives will be achieved?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Students will learn the parameter for qualitative and quantitative research methodologists.</td>
<td>Textbook and related articles will be used so students and instructor can discuss elements of research design and methods and their application to classroom instruction.</td>
</tr>
<tr>
<td>2. Students will develop their <strong>scholarship</strong> by learning about the predominant research methodologies and the steps and methods (quantitative and qualitative designs) necessary to interpret and apply research-based evidence in their classrooms.</td>
<td>Students will form small groups and discuss selected topics, by instructor, using the steps and methods presented to them. In the small groups, students will be asked to connect educational research to their experiences in the classroom and to discuss areas of weakness and strength of the different research methodologies.</td>
</tr>
<tr>
<td>4. Student will learn the two basic approaches for educational research (qualitative and quantitative methods) and connect this new knowledge to their teaching or research. This will allow for their continuous efforts to become <strong>experts</strong> on research-based instructional practices for diverse populations in their respective fields.</td>
<td>The professor will present current research examples to students. He will address issues of research design, methodology and theory as they relate to research with diverse community settings such as Greenland, the Zunis Tribe in New Mexico as well as current research in Mexico, Peru and Guatemala on capacity building.</td>
</tr>
<tr>
<td>5. Students will learn ethical issues related to the practice of educational research as well as to the rights of study participants in accordance to federal and state laws (e.g., special education, bilingual education,</td>
<td>In small groups, students will discuss the personal values professionals bring into the classroom as well as laws set to support the effective teaching and learning of at-risk populations. They will also be introduced</td>
</tr>
</tbody>
</table>
University Internal Review Board (IRB) process). to issues of confidentiality and issues of practitioners' integrity in research (IRB).

**Major Course Activities:**

Your grade is based on 6 activities for the semester: (1) a mid-term examination (exam 1) based on the readings and lectures up to that point, (2) a reflection paper (5 pages in length) examining a quantitative research article and/or a topic provided by the professor, (3) a second exam based on the qualitative chapters studies and lectures given, (4) a final written research proposal for a study – 15 to 20 pages in length (guidelines will be provided), (5) a class presentation based on a research topic chosen by student and approved by professor and (6) class participation: this last activity involves your overall quality of participation in class, your class attendance as well as the successful completion of any homework assignment given by the professor.

**GRADE SCALE**

<table>
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<tr>
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<tbody>
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<td>A 100-90</td>
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<td>B 89-80</td>
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<tr>
<td>C 79-70</td>
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<td>D 69-60</td>
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<tr>
<td>F --below 59</td>
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**Grading Activities**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Exam 1</td>
<td>25%</td>
</tr>
<tr>
<td>Reflection Paper</td>
<td>10%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>25%</td>
</tr>
<tr>
<td>Final Paper</td>
<td>20%</td>
</tr>
<tr>
<td>Class Presentation</td>
<td>17%</td>
</tr>
<tr>
<td>Class Participation</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
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</table>

**Participation in Class:** The participation grade is based on the extent of your engagement in class discussion, your attendance and completion of any homework assignment. It is worth 3 points of your total grade.

**Class Attendance:** Unexcused absences negatively impact your grade. Role will be taken for each class session. One (unexcused) absence will reduce grade by 5 points (See section below on attendance and participation). For more information regarding attendance and absences please review student rule 7 at: [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07)

**Final Paper:** Your final paper will involve a written research proposal for a study. In this case, students have the choice to design their study according to their focus of work in their respective departments. For example, this could be a great opportunity to begin designing your dissertation proposal. Further details and guidelines will be given in class.
**Individual Presentation:** Each oral presentation should be 20 minutes. Points will be deducted if your presentation is too short or too long. Audiovisual support is not required. However, it is expected for groups (or individuals) to present in PowerPoint format. Further details about presentations will be discussed in class. Unexcused absences, by individuals, during the presentations will result in zero points for your (individual) presentation grade. As part of the presentation and work, students will be required to turn-in an electronic copy of their PowerPoint presented.

**Reflection Paper:** There is one reflection paper required for this course. It is a short paper that is focused on demonstrating understanding of quantitative research concept/methodology presented in class as it applies to classroom, school issues or district policies. Students will research and identify a quantitative study and examine its research soundness from a methodological perspective. Guidelines as well as a grading rubric will be provided for each assignment.

**COURSE POLICIES:**

**Special Services:** 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](http://disability.tamu.edu)

**Cell Phones:** Please do not make or receive calls in class. If you have a cell phone, turn it off. If because of an emergency, you feel you must make a call, please let me know ahead of time. If you forget to turn your phone off and it rings, please stop the ringing as quickly as possible. Under no circumstances should you begin a phone conversation in the classroom. The use of computers during lectures is allowed if you have a disability for which you need accommodations. Computers may be used during small group activities that may require their usage.

**Classroom Discussions:** During class, avoid “side” conversations. These are distracting to professor and your classmates. Professional respect and courtesy for each other are expected at all times.

**Quality of your work:** All written work and presentations must meet the high quality standards expected of a classroom teacher. Present your assignments as you would if they were to be reviewed by an administrator or member of the school board.

**Missing 2 classes will result in automatic failure,** unless absences are determined to be excused under University policy. Documentation must be presented to the instructor. Additionally, the instructor may require an extra assignment to make up for classes missed (partial points will be given).

**PLAGIARISM STATEMENT**
The handouts used in this course are copy-rights. By “handouts,” I mean all materials generated for this class, which 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 them, unless I expressly grant permission.

As commonly defined, plagiarism consists of passing off as one’s own 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 worse 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/

**ACADEMIC INTEGRITY**

“An Aggie does not lie, cheat, or steal or tolerate those who do.” For additional information, please visit: http://aggiehonor.tamu.edu.

All exams MUST be turned in with the following statement typed on them and signed by the student:

“On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work.”

[Signature of Student]

**Helpful Links:**
Academic Calendar: http://admissions.tamu.edu/registrar/general/calendar.aspx
Final Exam Schedule: http://admissions.tamu.edu/registrar/general/finalschedule.aspx
On-Line Catalog: http://www.tamu.edu/admissions/catalogs/
Religious Observances: http://dof.tamu.edu/faculty/policies/religiousobservance.php
## Class Schedule

<table>
<thead>
<tr>
<th>Dates</th>
<th>Reading assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/2/14</td>
<td>Chapter 1 – Educational Research in an Age of Accountability</td>
</tr>
<tr>
<td>9/9/14</td>
<td>Chapter 2 – Randomized-Experimental Designs</td>
</tr>
<tr>
<td>9/16/14</td>
<td>Chapter 3 – Quasi-Experiments</td>
</tr>
<tr>
<td>9/23/14</td>
<td>Chapter 4 – Time Series Designs</td>
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<tr>
<td>9/30/14</td>
<td>Chapter 5 – Non-experimental Quantitative Designs</td>
</tr>
<tr>
<td>10/7/14</td>
<td>Chapter 6 – Survey Research</td>
</tr>
<tr>
<td></td>
<td><strong>Reflection Paper #1 due</strong></td>
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<tr>
<td></td>
<td>*Review for exam 1</td>
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<tr>
<td>10/14/14</td>
<td><strong>Exam 1</strong></td>
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<tr>
<td>10/21/14</td>
<td>Chapter 7 – Introduction to Qualitative Research</td>
</tr>
<tr>
<td>10/28/14</td>
<td>Chapter 8 – Qualitative Designs</td>
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<tr>
<td>11/4/14</td>
<td>Chapter 9 - Action Research</td>
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<tr>
<td>11/11/14</td>
<td>Chapter 10 – Measurements</td>
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<tr>
<td></td>
<td>*Independent Group Work in Preparation for Presentations</td>
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<tr>
<td>11/18/14</td>
<td>Chapter 11 – Threats to Internal and External Validity</td>
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<tr>
<td></td>
<td>Chapter 12 – Planning and Implementing the Study</td>
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<tr>
<td></td>
<td>*Independent Group Work in Preparation for Presentations</td>
</tr>
<tr>
<td></td>
<td>*Review for exam 2</td>
</tr>
<tr>
<td>11/25/14</td>
<td><strong>Exam 2</strong></td>
</tr>
<tr>
<td>12/2/14</td>
<td><strong>Class Presentations</strong></td>
</tr>
<tr>
<td>12/9/14</td>
<td><strong>Class Presentations (continued)</strong></td>
</tr>
<tr>
<td>12/16/14</td>
<td><strong>Final Exam Week – Final Paper due</strong></td>
</tr>
</tbody>
</table>
MEMORANDUM

TO: Graduate Instruction Committee, CEHD

THROUGH: George Cunningham, Ph.D.
Associate Dean, College of Education and Human Development

FROM: Victor Willson, Ph.D.
Professor and Head

SUBJECT: New Courses – BIED 621 and EPSY 650

Attached, please find the appropriate paperwork for establishing two new courses, BIED 621 - Methods for Bilingual Research and EPSY 650 - Multiple Regression and Other Linear Models in Education Research in the Department of Educational Psychology.

Pursuant to the directives of the College, the following information is provided:

1. Rationale: BIED 621 has become a required course for all bilingual education graduate students. It will also be an available elective option for those graduate students pursing degrees in other EPSY programs and other university departments. This course was taught as an EPSY 689 in the spring 2014 semester and had thirteen enrollees.

   EPSY 650 has become a required course for doctoral students pursuing the research, measurement, and statistics emphasis of the educational psychology doctoral program. This course will also be an option for students in other doctoral programs university wide, and would also be a viable option for the College’s ARM certificate.

2. Vote by the Program: This course has been reviewed by the Executive Committee and was given unanimous support.

We appreciate your consideration of this course. Please contact us should you require any additional information.
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:  ☑ Graduate   ☐ Undergraduate   ☐ 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 704 VLSI CIRCUIT DESIGN
4. Catalog course description (not to exceed 50 words):
   Analysis and design of monolithic analog and digital integrated circuits using NMOS, CMOS and bipolar technologies; device modeling; CAD tools and computer-aided design; design methodologies for LSI and VLSI scale circuits; yield and economics; test and evaluation of integrated circuits.

5. Prerequisite(s): Graduate classification.
   Cross-listed with:  
   Stacked with: ECEN 474
   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.E.N., M.S., Ph.D. in Electrical 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  704  VLSI CIRCUIT DESIGN

<table>
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<th>Lect.</th>
<th>Lab</th>
<th>Other</th>
<th>SCH</th>
<th>CP and Fund Code</th>
<th>Admin Unit</th>
<th>Acad. Year</th>
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<td>0936</td>
<td>15 - 16</td>
<td>0 0 3 6 3 2</td>
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</tr>
</tbody>
</table>

Approval recommended by:

Krishna Narayanan
Department Head or Program Chair (Type Name & Sign) Date
Chair, College Review Committee Date
Dean of College Date
Chair, GC or UCC Date

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14
Course title and number: ECEN 704 VLSI CIRCUIT DESIGN
Term: Fall 2015
Meeting times and location: TBD

Course Description and Prerequisites

Analysis and design of monolithic analog and digital integrated circuits using NMOS, CMOS and bipolar technologies; device modeling; CAD tools and computer-aided design; design methodologies for LSI and VLSI scale circuits; yield and economics; test and evaluation of integrated circuits. Prerequisite: Graduate classification.

Learning Outcomes or Course Objectives

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

- Understand basic and advanced transistor models.
- Understand layout techniques for analog integrated circuits.
- Analyze and design basic building blocks in CMOS technologies.
- Design analog integrated circuits given a set of specifications considering practical limitations.
- Use IC design tools such as Cadence to design, simulate, and verify analog integrated circuits.

Instructor Information

Name: Aydin I. Karsilayan
Telephone number: (979) 458-3555
Email address: karsilay@ece.tamu.edu
Office hours: TBD
Office location: WEB 318-C

Textbook and/or Resource Material

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

Grading Policies

All exams and the final project are required for a passing grade.
Midterm exam 1: 20%
Midterm exam 2: 20%
Final exam: 20%
Final project: 10%
Labs: 20%
Homeworks: 10%

Grading: A: 100-90  B: 89-80  C: 79-70  D: 69-60  F: <60

Lab reports are due one week after the completion of a lab. Unexcused late homeworks and lab reports will not be accepted.
For information on university excused absences visit http://student-rules.tamu.edu/rule07.
Course Topics, Calendar of Activities, Major Assignment Dates

Week | Topic |
--- | --- |
1-2 | IC Devices and Modeling |
3-4 | CMOS Processing and Layout |
5-6 | Midterm Exam 1 |
7 | Current Sources and Amplifiers |
8-9 | Midterm Exam 2 |
10-11 | Frequency Response |
12 | Feedback, Stability and Compensation |
13-14 | Midterm Exam 2 |
12 | Opamp and CMFB Design |
13-14 | Biasing, References and Regulators |
13-14 | Noise and Linearity Analysis |
Final Exam | Final Project Report Due |

Americans with Disabilities Act (ADA)
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Academic Integrity

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For additional information please visit: [http://aggiehonor.tamu.edu](http://aggiehonor.tamu.edu)
ECEN 474 VLSI CIRCUIT DESIGN

Fall 2015

TBD

Course Description and Prerequisites

Analysis and design of monolithic analog and digital integrated circuits using NMOS, CMOS and bipolar technologies; device modeling; CAD tools and computer-aided design; design methodologies for LSI and VLSI scale circuits; yield and economics; test and evaluation of integrated circuits. Prerequisite: ECEN 326.

Learning Outcomes or Course Objectives

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

- Understand basic and advanced transistor models.
- Understand layout techniques for analog integrated circuits.
- Analyze and design basic building blocks in CMOS technologies.
- Design analog integrated circuits given a set of specifications considering practical limitations.
- Use IC design tools such as Cadence to design, simulate, and verify analog integrated circuits.

Instructor Information

Name: Aydin I. Karsilayan
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Textbook and/or Resource Material

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

Grading Policies

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Midterm exam 2: 20%
Final exam: 25%
Labs: 20%
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<td>IC Devices and Modeling</td>
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<td>3-4</td>
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<td><strong>Midterm Exam 1</strong></td>
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<td>5-6</td>
<td>Current Sources and Amplifiers</td>
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<td>7</td>
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<td>8-9</td>
<td>Feedback, Stability and Compensation</td>
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<td><strong>Midterm Exam 2</strong></td>
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<tr>
<td>10-11</td>
<td>Opamp and CMFB Design</td>
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<tr>
<td>12</td>
<td>Biasing, References and Regulators</td>
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<td>13-14</td>
<td>Noise and Linearity Analysis</td>
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<td><strong>Final Exam</strong></td>
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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 Electrical and Computer Engineering
3. Course prefix, number and complete title of course: ECEN 714 DIGITAL INTEGRATED CIRCUIT DESIGN
4. Catalog course description (not to exceed 50 words):
   Analysis and design of digital devices and integrated circuits using MOS and bipolar technologies and computer aided simulation.

5. Prerequisite(s):
   Graduate classification.
   Cross-listed with: [ ] Stacked with: ECEN 454
   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
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M.E.N., M.S., M.D. in Electrical and Computer Engineering

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13. Prefix Course # Title (excluding punctuation)

<table>
<thead>
<tr>
<th>ECEN</th>
<th>Course #</th>
<th>DIGITAL INTEGRATED CIRCUIT DESIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lect.</td>
<td>2.00</td>
<td>Lab</td>
</tr>
</tbody>
</table>

Approval recommended by: Krishna Narayanan
Department Head or Program Chair (Type Name & Sign) Date 10/10/14
Chair, College Review Committee

Department Head or Program Chair (Type Name & Sign) Date 11/21/14
Dean of College

Submitted to Coordinating Board by: Chair, GC UCC

Associate Director, Curricular Services Date

Questions regarding this form should be directed to SandraWilliams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14
Course title and number  ECEN 714 DIGITAL INTEGRATED CIRCUIT DESIGN
Term                     Fall 2015
Meeting times and location TBD

Course Description and Prerequisites

Analysis and design of digital devices and integrated circuits using MOS and bipolar technologies and computer aided simulation. Prerequisites: Graduate classification.

Learning Outcomes or Course Objectives

Upon completion of the course, students will be able to:
- Understand basic transistor models.
- Understand layout techniques for digital integrated circuits.
- Analyze and design digital building blocks in CMOS technologies.
- Design digital integrated circuits given a set of specifications considering practical design constraints.
- Use IC design tools such as Cadence/Synopsys to design, simulate, and verify digital integrated circuits.

Instructor Information

Name: Peng Li  
Telephone number: (979) 845-1612  
Email address: pli@tamu.edu  
Office hours: TBD  
Office location: WEB 334-J

Textbook and/or Resource Material

References (not required):

Grading Policies

Grading: A: 100-90 B: 89-80 C: 79-70 D: 69-60 F: <60
Midterm exam: 17%
Final exam: 33%
Lab: 36%
Homework: 10%
Project: 5%

Late homework and lab submissions (counting weekends and breaks):
Homework: 50% penalty/day due to unexcused absences
Lab: 20% penalty/day due to unexcused absences
Lab reports are due one week after the completion of a lab.
For information on university excused absences visit http://student-rules.tamu.edu/rule07.
**Course Topics, Calendar of Activities, Major Assignment Dates**

<table>
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<th>Week</th>
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<tbody>
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</tr>
<tr>
<td>2</td>
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</tr>
<tr>
<td>3</td>
<td>Fabrication and layout</td>
</tr>
<tr>
<td>4</td>
<td>MOS transistor IV characteristics and parasitics</td>
</tr>
<tr>
<td>5</td>
<td>DC and transient characteristics</td>
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<td>6</td>
<td>Delay and power estimation</td>
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<tr>
<td>7</td>
<td>Logic effort and gate sizing</td>
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<td>8</td>
<td><strong>Midterm Exam</strong></td>
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<td>9</td>
<td>Interconnect</td>
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<td>10</td>
<td>SPICE simulation</td>
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<td>11</td>
<td>Combinational circuits</td>
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<tr>
<td>12</td>
<td>Sequential circuits</td>
</tr>
<tr>
<td>13</td>
<td>Clock distribution</td>
</tr>
<tr>
<td>14</td>
<td>Semiconductor memories</td>
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<tr>
<td></td>
<td>Package, power, I/O</td>
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<td></td>
<td><strong>Final Exam</strong></td>
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<tr>
<td></td>
<td><strong>Project Report Due</strong></td>
</tr>
</tbody>
</table>

**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](http://disability.tamu.edu)

**Academic Integrity**

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

For additional information please visit: [http://aggiehonor.tamu.edu](http://aggiehonor.tamu.edu)
Course title and number: ECEN 454 DIGITAL INTEGRATED CIRCUIT DESIGN
Term: Fall 2015
Meeting times and location: TBD

Course Description and Prerequisites

Analysis and design of digital devices and integrated circuits using MOS and bipolar technologies and computer aided simulation. Prerequisites: ECEN 214 and ECEN 248.

Learning Outcomes or Course Objectives

Upon completion of the course, students will be able to:
- Understand basic transistor models.
- Understand layout techniques for digital integrated circuits.
- Analyze and design digital building blocks in CMOS technologies.
- Design digital integrated circuits given a set of specifications considering practical design constraints.
- Use IC design tools such as Cadence/Synopsys to design, simulate, and verify digital integrated circuits.

Instructor Information

Name: Peng Li
Telephone number: (979) 845-1612
Email address: pli@tamu.edu
Office hours: TBD
Office location: WEB 334-J

Textbook and/or Resource Material

References (not required):

Grading Policies

Grading: A: 100-90  B: 89-80  C: 79-70  D: 69-60  F: < 60
Midterm exam: 17%
Final exam: 33%
Lab: 40%
Homework: 10%

Late homework and lab submissions (counting weekends and breaks):
Homework: 50% penalty/day due to unexcused absences
Lab: 20% penalty/day due to unexcused absences
Lab reports are due one week after the completion of a lab.
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For additional information please visit: [http://aggiehonor.tamu.edu](http://aggiehonor.tamu.edu)
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: ☑ Graduate
   ☐ Undergraduate ☐ 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 749 MICROPROCESSOR SYSTEMS DESIGN

4. Catalog course description (not to exceed 50 words): Introduction to microprocessors; 16/32 bit single board computer hardware and software designs; chip select equations for memory board design, serial and parallel I/O interfacing; ROM, static and dynamic RAM circuits for no wait-state design; assembly language programming, stack models, subroutines and I/O processing.

5. Prerequisite(s): Graduate classification.
   Cross-listed with: ECEN 449
   Stacked with: ECEN 449
   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
   Will this course be submitted to the Core Curriculum Council? ☐ Yes ☑ No

8. How will this course be graded? ☑ Grade ☐ S/U ☐ P/F (CLMD)

9. This course will be:
   a. required for students enrolled in the following degree program(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.E.N., M.S., Ph.D. in Electrical 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)

<table>
<thead>
<tr>
<th>ECEN</th>
<th>749</th>
<th>MICROPROCESSOR SYSTEMS DESIGN</th>
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<tbody>
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<td>Lab</td>
<td>Other</td>
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</table>

Approval recommended by: Krishna Narayanan
Department Head or Program Chair (Type Name & Sign) Date 9/24/14
Chair, College Review Committee Date 10/10/14

Department Head or Program Chair (Type Name & Sign) Date 11/21/14
Dean of College Date

Submitted to Coordinating Board by: Associate Director, Curricular Services Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services - 07/14
Course title and number: ECEN 749 MICROPROCESSOR SYSTEMS DESIGN
Term: Fall 2015
Meeting times and location: TBD

Course Description and Prerequisites
Introduction to microprocessors; 16/32 bit single board computer hardware and software designs; chip select equations for memory board design, serial and parallel I/O interfacing; ROM, static and dynamic RAM circuits for no wait-state design; assembly language programming, stack models, subroutines and I/O processing. Prerequisite: Graduate classification.

Learning Outcomes or Course Objectives
Upon completion of the course, students will be able to:

- Obtain an in-depth knowledge of digital circuit design using a microprocessor-based single-board embedded platform as an implementation method for digital systems.
- Understand hardware and software co-design, using a commercial FPGA (for hardware implementation) with an embedded on-chip microprocessor (for software implementation).
- Understand and become familiar with using the Verilog HDL (Hardware Description Language) as a means of implementing digital designs.
- Become familiar with a FPGA hardware platform to implement reconfigurable designs, including a single-board computer running the Linux operating system
- Understand and gain expertise in interfacing to on-chip RAM memory, and gain knowledge of memory-mapped parallel I/O.
- Understand and implement different methods of serial I/O using pulse code modulation (PCM) techniques.
- Implement I/O drivers to interface hardware with software running on a single-board computer running Linux.
- Learn and implement display drivers to manipulate a VGA display, including timing signals for the display.
- View the design of digital systems from an embedded hardware/software perspective and obtain a set of fundamental concepts and design skills that can be applied to a wide variety of digital design problems.

Instructor Information
Name: Sunil Khatri
Telephone number: (979) 845-8371
Email address: sunilkhatri@tamu.edu
Office hours: TBD
Office location: WEB 333-F

Textbook and/or Resource Material
No required textbook. The course is taught from a set of class notes, which are derived from multiple contemporary sources.
Grading Policies

Grading: A: 100-90  B: 89-80  C: 79-70  D: 69-60  F: <60

Test 1: 20%
Test 2: 20%
Lab: 35%
Homeworks: 15%
Project: 10%

Both tests are open-notes, and have lab-related questions. Lab reports must be turned in individually one week after the lab is completed.
For information on university excused absences visit http://student-rules.tamu.edu/rule07.

Course Topics, Calendar of Activities, Major Assignment Dates

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<td>6</td>
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<td></td>
<td>Test 1</td>
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<td>Linux Introduction</td>
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<td>11</td>
<td>Reconfigurable Computing Frameworks</td>
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<td>12</td>
<td>Transmission Lines</td>
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<td>13</td>
<td>Memories</td>
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<tr>
<td>14</td>
<td>Exam Review Discussions</td>
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<tr>
<td></td>
<td>Test 2</td>
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Academic Integrity

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For additional information please visit: http://aggiehonor.tamu.edu
Course title and number  ECEN 449 MICROPROCESSOR SYSTEMS DESIGN
Term  Fall 2015
Meeting times and location  TBD

Course Description and Prerequisites
Introduction to microprocessors; 16/32 bit single board computer hardware and software designs; chip select equations for memory board design, serial and parallel I/O interfacing; ROM, static and dynamic RAM circuits for no wait-state design; assembly language programming, stack models, subroutines and I/O processing. Prerequisite: ECEN 248.

Learning Outcomes or Course Objectives
Upon completion of the course, students will be able to:
- Obtain an in-depth knowledge of digital circuit design using a microprocessor-based single-board embedded platform as an implementation method for digital systems.
- Understand hardware and software co-design, using a commercial FPGA (for hardware implementation) with an embedded on-chip microprocessor (for software implementation).
- Understand and become familiar with using the Verilog HDL (Hardware Description Language) as a means of implementing digital designs.
- Become familiar with a FPGA hardware platform to implement reconfigurable designs, including a single-board computer running the Linux operating system
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Instructor Information
Name  Sunil Khatri
Telephone number  (979) 845-8371
Email address  sunilkhatri@tamu.edu
Office hours  TBD
Office location  WEB 333-F

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No required textbook. The course is taught from a set of class notes, which are derived from multiple contemporary sources.
Grading Policies

Grading: A: 100-90  B: 89-80  C: 79-70  D: 69-60  F: <60

Test 1: 25%
Test 2: 25%
Lab: 35%
Homeworks: 15%

Both tests are open-notes, and have lab-related questions. Lab reports must be turned in individually one week after the lab is completed.
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Academic Integrity

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
For additional information please visit: http://aggiehonor.tamu.edu
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, Allied Health, or ED
2. Request submitted by (Department or Program Name): Department of Educational Psychology
   EDTC 642: Designing for Mobile Learning
3. Course prefix, number and complete title of course: 

4. Catalog course description (not to exceed 50 words):
   Introduction to basics of designing educational applications for mobile devices; emphasis on instructional, visual, and
   human-computer interaction design principles; hands-on design and development work combined with a theoretical
   approach to designing learning experiences; previous programming experience is not required.

5. Prerequisite(s):
   Graduate classification; approval of department head
   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)
      MED in Educational Technology and Ph.D. in EPSY - Learning and Technology emphasis.
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S. Ph.D. in geography)
      Master’s and Ph.D. programs in EPSY.

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://vr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).

13. Prefix  Course #  Title (excluding punctuation)
       EDTC  642  Design for Mobile Learning

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<th>Lab</th>
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<th>Admin. Unit</th>
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<td>0</td>
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Approval recommended by:

Victor Wilson, Ph.D.
Department Head or Program Chair (Type Name & Sign) Date

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

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu.
Curricular Services – 07/14
EDTC 642 Designing for Mobile Learning  
Spring 2015

Syllabus & Course Schedule

Course Description:

Introduction to the basics of designing educational applications for mobile devices. Emphasis on instructional, visual, and human-computer interaction design principles. Hands-on design and development work combined with a theoretical approach to designing learning experiences. No previous programming experience is required.

Prerequisites: Graduate Classification; approval of department head.

Instructor:

Noelle Wall Sweany, Ph.D.  
Clinical Associate Professor  
Educational Technology Program  
Harrington 724  
979-862-2086  
sweany@tamu.edu (quickest response)

Office Hours:

You are welcome to make an appointment to meet with me to discuss your progress, work, or evaluation at any time. We can arrange to discuss by phone, Skype/Google Hangouts, or meet in person.

Course Objectives:

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

- List benefits and challenges of using mobile technologies for learning
- Identify instructional objectives that would benefit from a mobile approach
- Evaluate educational apps according to pedagogical and interface design principles
- Discuss the current m-learning trends in K-12, Higher Ed, and Corporate contexts
- Describe the strengths and weaknesses of various mobile platforms
- Apply instructional, visual, and usability design principles to the development of a mobile app

Texts:


- Other readings as assigned. These will be available on eCampus for download.
Course Web Page

We will use eCampus as our learning platform. You can access our course section by logging into http://ecampus.tamu.edu/ and clicking on our course title under My Courses. Student Tutorials for eCampus can be found under ITS Docs on the Help menu or at http://ecampus.tamu.edu/student-help.php

Course Assignments and Evaluation:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly Discussions &amp; Activities</td>
<td>45 points</td>
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<tr>
<td>Design Proposal</td>
<td>10 points</td>
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<tr>
<td>Storyboard &amp; Interface Design</td>
<td>15 points</td>
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<tr>
<td>Working App</td>
<td>30 points</td>
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</table>

Letter Grade Scale:

A = 90 to 100 points
B = 80 to 89 points
C = 70 to 79 points
F = 0 to 69 points
Weekly Participation Requirement (45 pts.)

The success of this course depends on active participation from all of us. Weekly participation is required. Students are responsible for completing the assigned readings, completing the weekly online activities, and responding to peers’ posts and comments.

For the online discussion, typically, you will be asked to post your first response to the discussion area by Tuesday (end of day). To earn FULL credit, you will post on at least 2 different days throughout the week. Your comments should demonstrate that you have thought about the material at a deeper level and they should add value/insight to our discussion. A simple “I agree” or “Good point” will not earn full credit. Substantive comments may include personal examples, provide a counter-argument, incorporate outside sources, ask follow-up questions, etc. A few other helpful guidelines:

- A week is defined as 7 days between Sunday and Saturday
- Think about the questions first before you read the responses of your classmates.
- **View the discussion not as a writing assignment but as a dialogue between yourself and the members of the class.**
- Keep your responses concise, but provide enough information to get your point across.
- Ask open-ended questions that invite the response of your classmates.
- Make sure you title the post so that classmates can follow the threads of the discussion.
- Check back to see if any of your classmates have responded to your posting.

In my role as a facilitator, I really enjoy seeing the discussion unfold and the connections that are made. To keep the discussion flowing, I will post follow-up questions/comments to specific posts, but I will not respond to every post. Please do not assume that if I don’t respond to your individual post that I have not read it or do not agree with it. I typically wait for at least one other person to respond to a particular comment before I reply.

**Note:** Each week will have different activities and requirements so be sure and check in early in the week to see what is required.
**Weekly Participation Evaluation Rubric:**

The following table outlines the 3 criteria that I will be looking at in our Weekly Discussions -- Critical Thinking, Interaction, and Contributions. Each of these criteria is worth 1 to 3 points. (I consider your posts as a whole, not individually.) I will average the 3 criteria to assign you a weekly grade. If I notice you veering off track, I'll provide some written comments as well. You'll notice that the Weekly Discussion is worth 45% of your grade which is an indication of the value I place on these discussions.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Levels of Attainment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Thinking</td>
<td>• Posts demonstrate clear understanding of assigned reading</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>o (Often includes a personal example or outside source that clearly relates to content being discussed)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Posts written with basic understanding of material, but need more detail</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>• Posts are brief; tend to be &quot;I agree&quot; or &quot;Yes&quot;</td>
<td>1</td>
</tr>
<tr>
<td>Interaction</td>
<td>• Initiated several interactions and responded to most/all questions asked by peers</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>• Rarely initiated interaction; Responded to direct questions asked of them</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>• Little or no interaction with peers; Did not ask questions of peers; Did not respond to questions asked of them</td>
<td>1</td>
</tr>
<tr>
<td>Contributions</td>
<td>• Posts were made on 2 or more days (initial deadline met)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>• Posts were only made on one day (Initial deadline met) OR</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Posts made on 2 or more days (initial deadline not met)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Posts were only made on one day (Initial deadline not met)</td>
<td>1</td>
</tr>
</tbody>
</table>
Relevant Policies

Copyright/Plagiarism

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 under Part I. Academic Rules, Academic Misconduct.

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.”

CEHD Statement on Diversity

We, the faculty of the College of Education and Human Development, value and respect diversity and the uniqueness of each individual. The faculty affirms its dedication to non-discrimination in our teaching, programs, and services on the basis of race, color, religion, gender, age, sexual orientation, domestic partner status, ethnic or national origin, veteran status, or disability. The College of Education and Human Development at Texas A&M University is an open and affirming organization that does not tolerate discrimination, vandalism, violence, or hate crimes, and we insist that appropriate action be taken against those who perpetrate such acts. Further, the College is committed to protecting the welfare, rights, and privileges of anyone who is a target of prejudice or bigotry. Our commitment to tolerance, respect, and action to promote and enforce these values embraces the entire university community.
## Course Schedule

**Contents of the schedule are subject to change. Any changes will be announced in class in advance.**

IF THE LINKS DON'T WORK, TRY COPYING AND PASTING THE URL INTO YOUR BROWSER

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Topic</th>
<th>Readings/Due Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – Jan. 20</td>
<td>Introduction to the course</td>
<td></td>
</tr>
<tr>
<td>2 – Jan. 26</td>
<td>mLearning and Cognition: Opportunities and Challenges</td>
<td>M&amp;D, Ch. 1, 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peters, Ch. 1, 2, 9</td>
</tr>
<tr>
<td>3 – Feb. 2</td>
<td>mLearning Trends in K-12, Higher Ed, and Corporate Learning</td>
<td>M&amp;D, Ch. 5, 9, 11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peters, Ch. 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ch. 5, 6 from Clark Quinn’s ‘Designing mLearning: Tapping into the Mobile Revolution for Organizational Performance</td>
</tr>
<tr>
<td>4 – Feb. 9</td>
<td>Introduction to LiveCode</td>
<td>LiveCode Beginner’s Guide</td>
</tr>
<tr>
<td>5 – Feb. 16</td>
<td>Creating your first app</td>
<td>LiveCode Tutorials</td>
</tr>
<tr>
<td>6 – Feb. 23</td>
<td>mLearning Design Guidelines</td>
<td>M&amp;D, Ch. 6, 7, 8</td>
</tr>
<tr>
<td>7 – Mar. 2</td>
<td>Designing for various mobile platforms</td>
<td>LiveCode Mobile Guide</td>
</tr>
<tr>
<td>8 – Mar. 9</td>
<td>Writing a Design Proposal</td>
<td>Due 3/14: Design Proposal</td>
</tr>
<tr>
<td>9 – Mar. 16</td>
<td>SPRING BREAK</td>
<td></td>
</tr>
<tr>
<td>10 – Mar. 23</td>
<td>User Interface Design Principles</td>
<td>Peters, Ch. 4,5, 10</td>
</tr>
<tr>
<td>11 – Mar. 30</td>
<td>mLearning and Collaboration</td>
<td>M&amp;D, Ch. 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peters, Ch. 6, 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Due 4/2: Storyboard &amp; Interface Design</td>
</tr>
<tr>
<td>12 – Apr. 6</td>
<td>Evaluation and Accessibility Issues</td>
<td>M&amp;D, Ch. 12, 13</td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
<td>Notes</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>13 – Apr. 13</td>
<td>Field Testing your App</td>
<td></td>
</tr>
<tr>
<td>14 – Apr. 20</td>
<td>Work Week</td>
<td></td>
</tr>
<tr>
<td>15 – Apr. 27</td>
<td>Future of mLearning</td>
<td>M&amp;D, Ch. 21</td>
</tr>
<tr>
<td>16 – May 4</td>
<td>Final Week</td>
<td>Course Wrap-Up</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Due 5/8: Final Working App</td>
</tr>
</tbody>
</table>
October 13, 2014

MEMORANDUM

TO: Graduate Instruction Committee, CEHD

THROUGH: George Cunningham, Ph.D.
Associate Dean, College of Education and Human Development

FROM: Victor Willson, Ph.D.
Professor and Head

SUBJECT: New Course – EDTC 642 Designing for Mobile Learning

Attached, please find the appropriate paperwork for creating the new course EDTC 642: Designing for Mobile Learning.

Pursuant to the directives of the College, the following information is provided:

1. Rationale: This course is a new course that will be required for students in the EDTC Master's program as well as the Ph.D. program in EPSY with an emphasis in Learning and Technology. The course reflects the use of mobile applications in the new era of mobile learners and education. This new course assists in keeping our program up to date in teaching our students the latest technology and offering an effective and comprehensive educational experience.

2. Vote by the Executive Committee: The changes have the unanimous support of our executive committee.

We appreciate your consideration of this course. Please contact us should you require any additional information.
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 (MD, JD, PharmD, DVM)

2. Request submitted by (Department or Program Name):
   Department of Educational Psychology

3. Course prefix, number and complete title of course:
   EPSY 650: Multiple Regression and Other Linear Models in Education Research

4. Catalog course description (not to exceed 50 words):
   Overview of basic and advanced topics in regression analysis; equal emphasis on developing
   procedural knowledge, statistical theory, research designs, and practical issues and methods using
   statistics in empirical research; basics of linear regression models and logistic regression models.

5. Prerequisite(s):
   EPSY 641 or STAT 652 or SOCI 631; Graduate Classification; Approval of department head

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 submitted 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 program(s) (e.g., B.A. in history)
       Doctoral Program in Educational Psychology with an emphasis in Research, Measurement, and Statistics (RMS)
    b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)
       Those completing the ARM certificate, MS in EPSY with RMS emphasis, PHD students in EPSY, CPSY, and SPSY

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)
    EPSY  650  MULTI REG & OTHER LM IN ED RES

    Lec.  Lab  Other  SCH  CIP and Fund Code  Admin. Unit  Acad. Year  FICE Code
    3.00  0.00  0.00  3.00  1306030004  920  15  -  16  0  0  3  6  3  3  2

Approval recommended by:

Victor Willson, Ph.D.  ☑  George Cunningham, Ph.D.
Department Head or Program Chair (Type Name & Sign)  Date  Chair, College Review Committee

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

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
EPSY 650: Multiple Regression and Other Linear Models in Educational Research
Spring 2014

Instructor:  Wen Luo, Ph.D.
Telephone:  979-845-9250
Email:      wluo@tamu.edu
Office:     718A
Office Hours: By Appointment
Meeting Time: TBD
Location:  TBD

Course description:

This course is designed to provide students with a solid overview of basic and advanced topics in regression analysis. Equal emphasis is placed on developing procedural knowledge, including general computer skills, and statistical theory, research designs, and practical issues and methods in using statistics in empirical research. This course will cover the basics of linear regression models and logistic regression models.

Learning Outcomes

After completing this course, students should be able to: (1) understand the purpose, rationale, and uses of the various regression analyses and (2) conduct and interpret regression analyses using statistical software such as SPSS and SAS.

Prerequisites
Students are expected to have taken: EPSY641, or STAT652, or SOCI631, or any equivalent courses. Students are expected to have some knowledge on ANOVA and Multiple Regression. Students who have not taken the required courses have to meet with me before they register for this course. Graduate classification and approval of the department head are also required.

Assigned texts:


Grading
Grades will be based on the following:
a) Assignments (60%)

Note. You can discuss assignments with other students; however, you should do the analysis and write up the answers on your own. Copying others' work (including syntax, output, and report) is considered as academic misconduct and will have severe consequences.
Each problem will be graded on a three-point scale to indicate the level of accuracy and understanding reflected in the answer:

<table>
<thead>
<tr>
<th>Points</th>
<th>Evaluation of answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Complete, correct and clear.</td>
</tr>
<tr>
<td>2</td>
<td>Some mistakes and/or misconceptions, somewhat unclear or incomplete.</td>
</tr>
<tr>
<td>1</td>
<td>Serious mistakes and/or misconceptions, very unclear or incomplete.</td>
</tr>
<tr>
<td>0</td>
<td>Not done or barely attempted.</td>
</tr>
</tbody>
</table>

b) Final in-class presentation (40%)
Note: You will work with a partner on the final presentation. You may analyze your own data or data which were collected by other individual (as long as that individual has not analyzed the data addressing the same research questions you are attempting to answer). The final presentation should include the following four sections: Introduction, method, results, and discussion. You should apply the techniques you learn from this course to your final project. You and your partner should schedule a meeting with me to talk about your final presentation at least one month before the final presentation.

**Letter Grade Conversion Chart**

- 90-100      A
- 80-89       B
- 70-79       C
- 65-69       D
- Below 65    F

**Tentative class schedule**

<table>
<thead>
<tr>
<th>Date</th>
<th>Week</th>
<th>Topic</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/22</td>
<td>1</td>
<td>Introduction &amp; Review of Correlation and simple regression</td>
<td>1-2</td>
</tr>
<tr>
<td>1/29</td>
<td>2</td>
<td>Multiple regression model; Partial and semi-partial correlations</td>
<td>3</td>
</tr>
<tr>
<td>2/5</td>
<td>3</td>
<td>Diagnosing and solving regression problems (I): Assumptions Checking</td>
<td>4</td>
</tr>
<tr>
<td>2/12</td>
<td>4</td>
<td>Diagnosing and solving regression problems (II): Outliers and multicollinearity</td>
<td>10</td>
</tr>
<tr>
<td>2/19</td>
<td>5</td>
<td>Data analytic strategies</td>
<td>5</td>
</tr>
<tr>
<td>2/26</td>
<td>6</td>
<td>Mediation analysis</td>
<td></td>
</tr>
<tr>
<td>3/5</td>
<td>7</td>
<td>Modeling curvilinear relationships; Transformation</td>
<td>6</td>
</tr>
<tr>
<td>Date</td>
<td>#</td>
<td>Topic</td>
<td>Page</td>
</tr>
<tr>
<td>-------</td>
<td>---</td>
<td>--------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>3/12</td>
<td>8</td>
<td>Interaction among continuous variables</td>
<td>7</td>
</tr>
<tr>
<td>3/26</td>
<td>9</td>
<td>Probing interaction effect</td>
<td></td>
</tr>
<tr>
<td>4/2</td>
<td>10</td>
<td>Categorical independent variables</td>
<td>8</td>
</tr>
<tr>
<td>4/9</td>
<td>11</td>
<td>Interaction with categorical variables</td>
<td>9</td>
</tr>
<tr>
<td>4/16</td>
<td>12</td>
<td>Logistic regression</td>
<td>13</td>
</tr>
<tr>
<td>4/23</td>
<td>13</td>
<td>Longitudinal regression methods</td>
<td>15</td>
</tr>
<tr>
<td>4/30</td>
<td>14</td>
<td>Project final presentation (reports due)</td>
<td></td>
</tr>
</tbody>
</table>

University Policies:

**Attendance and Make-up Policies:** The university views class attendance as an individual student responsibility. Please see TAMU student rules on Attendance for details. Please note that to receive in-class participation points which count toward your final grade, you must be present and actively engaged in class each week. Excused absences will be taken into consideration in accordance with university attendance policy. Please refer to student rule 7: http://student-rules.tamu.edu/rule07

**Students with Special Needs:** 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

Any student who could require assistance in the event of a necessary evacuation of the building in which this class is taught are asked to notify the instructor so that individuals can be identified to assist him/her during an evacuation.

**Academic Dishonesty:** "An Aggie does not lie, cheat, or steal, or tolerate those who do."

As commonly defined, plagiarism consists of passing off as one’s own 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 Honor Council Rules and Procedures on the web at aggiehonor.tamu.edu

**Handouts:** The handouts used in this course are copyrighted. By "handouts" I mean all materials generated for this class, which include but are not limited to syllabi, quizzes, 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 I expressly grant permission.
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 (JD, MD, PharmD, DVM)
2. Request submitted by (Department or Program Name):  Department of Finance
3. Course prefix, number and complete title of course:  FINC 641 Valuation
4. Catalog course description (not to exceed 50 words):  Theory and application of various approaches to valuation; measuring and managing the value of corporations; principles of value creation; fundamental valuation methodology; application of value creation principles to managerial problems; special cases and complex valuation issues.

5. Prerequisite(s):  ACCT 229 or ACCT 610 or ACCT 640; FINC 351 or FINC 632; FINC 361 or FINC 629
Cross-listed with:  Stacked with:  
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
   Will this course be submitted to the Core Curriculum Council?  □ Yes  □ No
8. How will this course be graded:  □ Grade  □ S/U  □ P/F (CLMD)
   □ P/F (CLMD)
9. 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)
      master's programs at Mays Business School
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)
      FINC  641  VALUATION
      Lec.  Lab  Other  SH  GPH and Fund Code  Admin. Unit  Acad. Year  HIC Code
      3.00  3.00  5208010016  1110  15  -  16  0  0  3  6  3  2
      Approval recommended by:  
      R. T. Yee  6/12/14
      Department Head or Program Chair (Type Name & Sign)  Date
      Chair, College Review Committee  Date
      Department Head or Program Chair (Type Name & Sign)  Date
      Dean of College  Date
      Submitted to Coordinating Board by:  
      Chair, GC or UCC  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
Class Meets: TBD
Class Website: http://ecampus.tamu.edu
Instructor: TBD
Office Hours: TBD
Phone: 979.845.xxxx (voice), 979.845.3884 (fax), 979.845.3514 (FINC Department)

Email: TBD
Office: TBD

Course Description and Learning Objectives
Finance 641 is an intensive course covering three different approaches to valuation: intrinsic valuation, relative valuation, and option pricing valuation. These methods will be applied to various types of real-world companies—public and private, small and large, domestic and international, start-up and established—by building Excel models and using the models to identify sources of value creation. Students who successfully complete the course will be able to select and implement an appropriate valuation strategy for any type of business and use the results of their analysis to prescribe a course of action to maximize corporate value.

Prerequisites
ACCT 229 or ACCT 610 or ACCT 640; FINC 351 or FINC 632; FINC 361 or FINC 629

You also should be quite comfortable with computer applications, especially Excel.

Required Material

No textbook is required for this course. Lecture notes and external course references will be available on the course website. The class project requires access to Microsoft Excel.

Optional Material
The following books may be useful reference resources.


Academic Integrity

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

The Aggie Honor Code affirms that honesty, truthfulness, trust, fairness, respect, moral conduct, and individual responsibility guide the conduct of the Texas A&M community. Commitment to these ideals produces in each of us integrity, which fosters the will to make difficult choices, to accept responsibility for and consequences of our actions, even at great personal cost.
It is the responsibility of both students and instructors to maintain academic integrity by refusing to participate in or tolerate academic misconduct. Committing any of the following acts constitutes academic dishonesty. This list is not exclusive of any other acts that may reasonably be said to constitute scholastic dishonesty.

**Cheating:** Intentionally using or attempting to use unauthorized materials, information, notes, study aids, or other devices or materials in any academic exercise.

**Complicity:** Intentionally or knowingly helping (or attempting to help) another to commit an act of academic dishonesty.

**Plagiarism:** Failing to give appropriate credit for or presenting as your own another person’s words, ideas, results, or processes.

**Multiple Submission:** Submitting substantial portions of the same work (including oral reports) for credit more than once without authorization from the second instructor.

**Falsification:** Changing or omitting data or results, or manipulating research materials, equipment, or processes such that the research is not accurately represented in the research record.

**Fabrication:** Recording or reporting made up data or results, or submitting fabricated documents.

I will proactively promote academic integrity and adhere to the Aggie Honor System Office’s policies pertaining to reporting and adjudication of violations of the Aggie Honor Code. For detailed definitions of academic misconduct and complete Honor Council Rules and Procedures, please visit [http://aggiehonors.tamu.edu](http://aggiehonors.tamu.edu).

**Classroom Care**

We have beautiful, state-of-the-art classrooms in the Wehner Building. We want to maintain the high quality conditions of these classrooms for students in future years. Thus it is necessary for you to adhere to the established policy of no beverages, food, or tobacco products or animals (unless approved) in WCBA classrooms. Please do not leave trash in the room. If you bring newspapers, etc., to class, either carry them out again or put them in the trash containers. Thank you for observing this policy.

**Attendance**

I expect you to attend class regularly, in accordance with university policy. I will routinely check attendance. You will be held responsible for any assignments, material covered, amendments to the syllabus, or announcements made in class, whether you are present or not.

If you miss an exam without a valid, documented university excuse, you will receive a grade of zero on that exam. According to university policy, there are exactly eight types of excused absences. These are listed in Texas A&M University Regulations and on the TAMU website at [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07):

1) Participation in an activity appearing on the university authorized activity list. (see [List of Authorized and Sponsored Activities](http://student-rules.tamu.edu/rule07)).

2) Death or major illness in your immediate family.

3) Illness of a dependent family member.

4) Participation in legal proceedings or administrative procedures that require your presence.

5) Religious holy day. (See Student Rules Appendix IV).

6) Injury or Illness that is too severe or contagious for you to attend class.
a) For injury or illness that requires you to be absent from classes for three or more business days, you should obtain a medical confirmation note from your medical provider. The Student Health Center or an off-campus medical professional can provide a medical confirmation note for you. The medical confirmation note must contain the date and time of the illness and medical professional’s confirmation of needed absence.

b) Confirmation is required for injury or illness that causes you to be absent from class for less than three business days. Illness confirmation may be obtained by one or both of the following methods:

- Texas A&M University Explanatory Statement for Absence from Class form available at [http://attendance.tamu.edu](http://attendance.tamu.edu) (if you do not see a doctor).

- Confirmation of visit to a health care professional affirming date and time of visit.

c) An absence for a non-acute medical service does not constitute an excused absence.

7) Required participation in military duties.

8) Mandatory admission interviews for professional or graduate school which cannot be rescheduled.

**Makeup Policy**

You can make up an exam only if an absence is excused. To be considered excused, you must notify me in writing (acknowledged e-mail message is acceptable) prior to the date of absence, and provide appropriate documentation for the absence. In cases where advance notification is not feasible (for example, accident or emergency) you 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. The fact that these are university-excused absences does not relieve you 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.

**Grading**

Course grades for Finance 641 will be determined as follows.

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two Exams</td>
<td>25%</td>
</tr>
<tr>
<td>Semester Project</td>
<td>25%</td>
</tr>
<tr>
<td>Attendance</td>
<td>5%</td>
</tr>
<tr>
<td>Class Participation</td>
<td>5%</td>
</tr>
<tr>
<td>Harvard Simulation (M&amp;A in Wine Country)</td>
<td>10%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Like exams, the maximum possible scores for attendance and class participation is 100 points. Your class participation score will be based on an assessment of your level of preparedness for each class, as indicated by the quality of your responses to questions directed to you in class (rated either satisfactory or unsatisfactory). Even incorrect responses can demonstrate a satisfactory level of preparation. Your class participation score will be equal to 100, times the percentage of satisfactory ratings received as a percentage of total ratings. Participation ratings will be updated on the course website after each class meeting.
Unexcused absences will lower your attendance score:

<table>
<thead>
<tr>
<th>Number of Unexcused Absences</th>
<th>Attendance Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 or 1</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td>4</td>
<td>70</td>
</tr>
<tr>
<td>5</td>
<td>60</td>
</tr>
<tr>
<td>6 or more</td>
<td>0</td>
</tr>
</tbody>
</table>

Course grades will follow the standard 90/80/70/60 scale:

<table>
<thead>
<tr>
<th>Points Collected (PC)</th>
<th>Course Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC ≥ 90</td>
<td>A</td>
</tr>
<tr>
<td>90 &gt; PC ≥ 80</td>
<td>B</td>
</tr>
<tr>
<td>80 &gt; PC ≥ 70</td>
<td>C</td>
</tr>
<tr>
<td>70 &gt; PC ≥ 60</td>
<td>D</td>
</tr>
<tr>
<td>60 &gt; PC</td>
<td>F</td>
</tr>
</tbody>
</table>

Graded assignments must be turned in before the deadline to be eligible for full credit. Late assignments are subject to the following penalties:

<table>
<thead>
<tr>
<th>If the assignment is submitted...</th>
<th>Penalty</th>
<th>Maximum Possible Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>before deadline</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; 24 hours after deadline</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; 24 hours after deadline</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt; 24 hours after deadline</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>4&lt;sup&gt;th&lt;/sup&gt; 24 hours after deadline</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>5&lt;sup&gt;th&lt;/sup&gt; 24 hours after deadline</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Even if you have a documented excused absence, please arrange to submit your assignment by its due date unless an emergency situation makes this impossible. Late assignments accompanied by a documented university excuse will not be subject to penalty.

When any graded work is return to you, you have one week from the date it is returned to bring any grading errors to the instructor’s attention. After the one-week deadline has passed, no further grade changes will be made for that particular item. The purpose of this deadline is not to discourage grade changes due to errors, but to ensure that any necessary ones are promptly made.

**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](http://disability.tamu.edu).
## Course Schedule

### The Value Creation Process

<table>
<thead>
<tr>
<th>Session</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction and Overview</td>
</tr>
<tr>
<td>2</td>
<td>Approaches to Valuation: Intrinsic Valuation, Relative Valuation, Option-Based Valuation</td>
</tr>
</tbody>
</table>

### Intrinsic Valuation

<table>
<thead>
<tr>
<th>Session</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Applying Intrinsic Valuation Principles: M&amp;A in Wine Country Simulation</td>
</tr>
<tr>
<td>4</td>
<td>The Cost of Equity Capital: The Risk-Free Rate and Equity Risk Premiums</td>
</tr>
<tr>
<td>5</td>
<td>The Cost of Equity Capital: Using Beta to Estimate Risk Premiums</td>
</tr>
<tr>
<td>6</td>
<td>The Cost of Equity Capital: Estimating Betas</td>
</tr>
<tr>
<td>7</td>
<td>Forecasting Cash Flows: Dividends, Earnings, and Free Cash Flow to Equity (FCFE)</td>
</tr>
<tr>
<td>8</td>
<td>Forecasting Cash Flows: Taxes, CAPEX, and Working Capital</td>
</tr>
<tr>
<td>9</td>
<td>Exam 1</td>
</tr>
<tr>
<td>10</td>
<td>Forecasting Cash Flows: Historical and Estimated Earnings Growth</td>
</tr>
<tr>
<td>11</td>
<td>Forecasting Cash Flows: Growth Drivers and the Role of Reinvestment</td>
</tr>
<tr>
<td>12</td>
<td>Forecasting Cash Flows: Terminal Value</td>
</tr>
<tr>
<td>13</td>
<td>Forecasting Cash Flows: Research and Development, Corporate Governance</td>
</tr>
<tr>
<td>14</td>
<td>Forecasting Cash Flows: Start-up Firms and Young Companies</td>
</tr>
<tr>
<td>15</td>
<td>Forecasting Cash Flows: Distressed Companies</td>
</tr>
<tr>
<td>16</td>
<td>Exam 2</td>
</tr>
</tbody>
</table>

### Relative Valuation

<table>
<thead>
<tr>
<th>Session</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>Relative Valuation Versus Intrinsic Valuation</td>
</tr>
<tr>
<td>18</td>
<td>PE and PEG Ratios</td>
</tr>
<tr>
<td>19</td>
<td>Enterprise Value Multiples</td>
</tr>
<tr>
<td>20</td>
<td>Price to Book Ratios, Revenue Multiples, and Forward Multiples</td>
</tr>
<tr>
<td>21</td>
<td>Choosing A Multiple</td>
</tr>
</tbody>
</table>

### Option Based Valuation

<table>
<thead>
<tr>
<th>Session</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Principles of Option Pricing and Real Options</td>
</tr>
<tr>
<td>23</td>
<td>The Option to Delay, Patents as Options</td>
</tr>
<tr>
<td>24</td>
<td>Valuing a Natural Resource Company: Option to Expand and Option to Abandon</td>
</tr>
<tr>
<td>25</td>
<td>Valuing Aggregate Equity as an Option</td>
</tr>
</tbody>
</table>

### Special Cases of Valuation

<table>
<thead>
<tr>
<th>Session</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Valuing Private Companies</td>
</tr>
<tr>
<td>27</td>
<td>Acquisition Valuation</td>
</tr>
<tr>
<td>28</td>
<td>Value Enhancement</td>
</tr>
</tbody>
</table>
**Semester Project Overview**

- This project is designed to apply the valuation techniques learned in class to companies in the real world.
- It is a group project, with each person in the group picking one company to value.
- The project analysis is due in two parts:
  1) The discounted cash flow valuations are due in Session 16. They will not be graded, but will be reviewed and returned with comments.
  2) The entire project report is due in the last session of class.

**Step 1: Pick the companies**

Select a group of companies (one for each person in the group), making sure you have at least
- one company which currently has negative earnings;
- one company which has high-growth potential;
- one non-U.S. company;
- one service company (retail firm, financial services firm, etc.).

**Step 2: Intrinsic Valuation**

Value the stock of each company using a discounted cash flow model. Select the model that you think is most appropriate for that company.

- Estimate how sensitive your value estimates are to changes in your assumptions.
- What are the key drivers of value for your company? Identify the key assumption or variable that you would focus on in doing your discounted cash flow valuation (e.g., growth rate assumption, growth period assumption, net capital expenditure assumption, etc.).
- Present your valuation in a picture, summarizing the assumptions that you have made.

**Step 3: Relative Valuation (Comparable Firms)**

- Prepare a list of "comparable" companies, using criteria that you think are appropriate.
- Choose a multiple that you will use in comparing firms across the group. Several iterations may be necessary.
- Evaluate your company against the comparable firms using the multiple that you have chosen
  1) using simple techniques
  2) using a sector regression.

**Step 4: Relative Valuation (Aggregate Market)**

Using the latest regression for the market and the multiple you chose in step 3, evaluate whether your firm is under or overvalued.

- If you have a non-U.S. company which has an ADR listed on it, you can use the U.S. regression.
- While I will not require it, I will be very impressed if you run a regression of the multiple in your foreign market (use the 50 largest firms, if you want to reduce your work load) against the variables that determine that multiple.
Step 5: Option-Based Valuation

Identify one company from your group that is suitable for an option-based valuation and use the approach to value the company's common stock.

-- If your negative earnings firm has high leverage, value it using the option pricing model. If it does not, do not use the option pricing model.

Step 6: Final Value Estimate and Recommendation

Consider the values you have obtained from the intrinsic, relative, and option valuation models.

--How would you reconcile the different estimates of value?

--Make a final recommendation for each stock in your group.
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 (DO, MD, JD, PharmD, DVM)
2. Request submitted by (Department or Program Name):  Department of Finance
3. Course prefix, number and complete title of course:  FINC 646 Technical Analysis of Financial Markets
4. Catalog course description (not to exceed 50 words):  Use of price, volume, and other non-fundamental, market, and behavioral data to analyze and predict security prices; emphasis on pattern recognition and correlation analysis over theory and causal analysis; application of technical analysis as an investment discipline for institutional portfolio management; principles, terminology, techniques, and emerging theories of technical analysis.

5. Prerequisite(s):  FINC 351 or FINC 632; FINC 361 or FINC 629
Cross-listed with:  
Stacked with:  

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 program(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)
    master's programs at Mays Business School
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)
     FINC  646  TECHNICAL ANALYSIS FINC MKTS

<table>
<thead>
<tr>
<th>Lect.</th>
<th>Lab</th>
<th>Other</th>
<th>S/N</th>
<th>GP</th>
<th>Fund Code</th>
<th>Admin. Unit</th>
<th>Year</th>
<th>HCL Code</th>
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<td>15</td>
<td>16 0 0 3 6 3 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Approval recommended by:  
R. T. Dre  11/17/14  
Department Head or Program Chair (Type Name & Sign)  
Date  

Chair, College Review Committee  10/31/14  
Date  

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

Dean of College  11/17/14  
Date  

Submitted to Coordinating Board by:  
Chair, GC or GCC  11/17/14  
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
Class Meets: TBD
Instructor: Kevin M. Moore, CFA, CMT
Office Hours: TBD
Phone: 832-415-7000 (Mobile)

Class Website: eCampus.tamu.edu
Email: kmoore@mays.tamu.edu
Office: WCBA 341C
Teaching Assistant: TBD
TA Email: TBD

Course Description and Objectives
Technical analysis is a method of evaluating the investment attractiveness of securities by analyzing statistics generated by market activity. It is arguably the most popular methods used by investment industry practitioners. It uses price, volume and other non-fundamental or market “behavioral” data to analyze and predict security prices. Like the “big data” revolution that is currently sweeping the general business landscape, technical analysis emphasizes pattern recognition and correlation analysis over theory and causal analysis. Both are used to analyze/predict human behavior and to solve problems. A primary benefit of technical analysis is that it gives investors the tools to overcome the practical shortcomings of modern portfolio theory.

The objective of this course is to provide students with an introduction to technical analysis as an investment discipline within the context of institutional/professional portfolio management. It will introduce the basic principles, terminology and techniques, and emerging theories. However, it will emphasize application. The course will include guest speakers, case studies, class participation/discussion exercises and problem sets focused on the equity markets.

The capstone of the course will be a portfolio management project. The project will allow students to implement technical analysis and will also introduce students to the real-life issues of managing money while under the pressure to both solicit money from investors and to deliver superior investment results. This course is designed for students who are seriously considering a career in money management.

In summary, philosophically this class will be:
- Focused on the application of all concepts taught (not just the knowledge of concepts)
- Focused on the institutional/professional use of all concept taught (as opposed to for individual investing)
- Focused on simulating the levels of both competition and cooperation present in the investment industry

Learning Outcomes
Successful investing utilizing technical analysis or any other discipline requires many years of experience. This course is only an introduction. Upon successful completion of this course, students will have the basic knowledge to:
- Define and explain the basic terminology of technical analysis.
- Define, and explain and perform various methods of charting.
- Determine price trends and recognize basic market patterns.
- Establish price targets using technical analysis.
- Perform basic analysis of equity markets utilizing technical analysis.
- Define and explain the basics of how technical analysis applies to bonds, currencies, futures, and options.
- Manage a “paper” portfolio based on technical analysis.
- Design and back test a basic trading system using Bloomberg.

Prerequisites
FINC 351 or FINC 632 and FINC 361 or FINC 629. Students should be quite comfortable with computer applications, especially Excel. Familiarity with computer programming will be helpful but not required.
Required Materials

- The instructor will provide PDF copies of all case study readings.
- The project will utilize paper-trading accounts provided by Interactive Brokers. The instructor will facilitate the setting up of accounts and a basic introduction, but students will be primarily responsible for learning the tool on their own.
- Students must have access to and become familiar with a charting service/software/website (i.e., Bloomberg, freestockcharts.com, stockcharts.com).
- Students will be required to become familiar and become certified with Bloomberg.
- MTA Code of Ethics (provided by the professor).
- Students will need a calculator to solve problems in this course. Students will not be allowed to share a calculator during exams.

Suggested Material

- Investor’s Business Daily ([www.investors.com](http://www.investors.com)).
- Technical Analysis of Stocks and Commodities Magazine ([www.traders.com](http://www.traders.com)).
- 2014 CMT Level I Sample Exam ([www.mta.org](http://www.mta.org)).
- Traders Magazine ([www.tradersmagazine.com](http://www.tradersmagazine.com))

Optional Material

- Students are encouraged to seek out additional resources to enhance both their understanding of technical analysis and to improve the quality of their project.

Academic Integrity

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

The Aggie Honor Code affirms that honesty, truthfulness, trust, fairness, respect, moral conduct, and individual responsibility guide the conduct of the Texas A&M community. Commitment to these ideals produces in each of us integrity, which fosters the will to make difficult choices, to accept responsibility for and consequences of our actions, even at great personal cost.

It is the responsibility of both students and instructors to maintain academic integrity by refusing to participate in or tolerate academic misconduct. Committing any of the following acts constitutes academic dishonesty. This list is not exclusive of any other acts that may reasonably be said to constitute scholastic dishonesty.

**Cheating:** Intentionally using or attempting to use unauthorized materials, information, notes, study aids, or other devices or materials in any academic exercise.

**Complicity:** Intentionally or knowingly helping (or attempting to help) another to commit an act of academic dishonesty.

**Plagiarism:** Failing to give appropriate credit for or presenting as your own another person’s words, ideas, results, or processes.

**Multiple Submission:** Submitting substantial portions of the same work (including oral reports) for credit more than once without authorization from the second instructor.

**Falsification:** Changing or omitting data or results, or manipulating research materials, equipment, or processes such that the research is not accurately represented in the research record.

**Fabrication:** Recording or reporting made up data or results, or submitting fabricated documents.

I will proactively promote academic integrity and adhere to the Aggie Honor System Office’s policies pertaining to reporting an adjudication of violations of the Aggie Honor Code. For detailed definitions of academic misconduct and complete Honor Council Rules and Procedures, please visit [http://aggiehonor.tamu.edu](http://aggiehonor.tamu.edu).
Classroom Care

We have beautiful, state-of-the-art classrooms in the Wehner Building. We want to maintain the high quality conditions of these classrooms for students in future years. Thus it is necessary for you to adhere to the established policy of no beverages, food, or tobacco products or animals (unless approved) in WCBA classrooms. Please do not leave trash in the room. If you bring newspapers, etc., to class, either carry them out again or put them in the trash containers. Thank you for observing this policy.

Attendance

I expect you to attend class regularly, in accordance with university policy. I will routinely check attendance. You will be held responsible for any assignments, material covered, amendments to the syllabus, or announcements made in class, whether you are present or not.

If you miss an exam without a valid, documented university excuse, you will receive a grade of zero on that exam. According to university policy, there are exactly eight types of excused absences. These are listed in Texas A&M University Regulations and on the TAMU website at http://student-rules.tamu.edu/rule07:

1. Participation in an activity appearing on the university authorized activity list. (See List of Authorized and Sponsored Activities).

2. Death or major illness in your immediate family.

3. Illness of a dependent family member.

4. Participation in legal proceedings or administrative procedures that require your presence.

5. Religious holy day. (See Student Rules Appendix IV).

6. Injury or illness that is too severe or contagious for you to attend class.

   a. For injury or illness that requires you to be absent from classes for three or more business days, you should obtain a medical confirmation note from your medical provider. The Student Health Center or an off-campus medical professional can provide a medical confirmation note for you. The medical confirmation note must contain the date and time of the illness and medical professional's confirmation of needed absence.

   b. Confirmation is required for injury or illness that causes you to be absent from class for less than three business days. Illness confirmation may be obtained by one or both of the following methods:

      i. Texas A&M University Explanatory Statement for Absence from Class form available at http://attendance.tamu.edu (if you do not see a doctor).

      ii. Confirmation of visit to a health care professional affirming date and time of visit.

   c. An absence for a non-acute medical service does not constitute an excused absence.

7. Required participation in military duties.

8. Mandatory admission interviews for professional or graduate school, which cannot be rescheduled.

It is noteworthy that job interviews are not considered excused absences. It’s never too soon to begin practicing managing your calendar in a professional manner. Arrange your job interviews and any necessary travel on dates other than those on which class meets. Please plan unexcused absences around the following exam dates:
Exam 1  October 15 (1 Hour – 60-70 Multiple Choice Questions)
Final Project Presentation December 3 (All Students must attend and remain for every presentation)
Final Project Report December 10 (Must be turned in by this date to receive credit)

Makeup Policy
You can make up an exam only if an absence is excused. To be considered excused, you must notify me in writing (acknowledged e-mail message is acceptable) prior to the date of absence, and provide appropriate documentation for the absence. In cases where advance notification is not feasible (for example, accident or emergency) you 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. The fact that these are university-excused absences does not relieve you 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.

Grading
Course grades will be determined as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Max Points</th>
<th>Collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor Bonus (subject to class-wide limit)</td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>General Class Participation</td>
<td>5</td>
<td>None</td>
</tr>
<tr>
<td>Quizzes</td>
<td>7</td>
<td>None</td>
</tr>
<tr>
<td>Quant Homework</td>
<td>10</td>
<td>Individual Submission – Group Collaboration</td>
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<tr>
<td>Systematic Trading – Bloomberg</td>
<td>9</td>
<td>None</td>
</tr>
<tr>
<td>Case Study Participation</td>
<td>8</td>
<td>None</td>
</tr>
<tr>
<td>Individual Trading Project</td>
<td>10</td>
<td>None</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>25</td>
<td>None</td>
</tr>
<tr>
<td>Group Trading Project</td>
<td>25</td>
<td>Groups will be assigned</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Course grade will follow the standard 90/80/70/60 scale as a minimum. However, a curve may be applied to the total point score at the end of the semester.

<table>
<thead>
<tr>
<th>Points Collected (PC)</th>
<th>Course Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC ≥ 90</td>
<td>A</td>
</tr>
<tr>
<td>90 &gt; PC ≥ 80</td>
<td>B</td>
</tr>
<tr>
<td>80 &gt; PC ≥ 70</td>
<td>C</td>
</tr>
<tr>
<td>70 &gt; PC ≥ 60</td>
<td>D</td>
</tr>
<tr>
<td>60 &gt; PC</td>
<td>F</td>
</tr>
</tbody>
</table>

The Finance Department expects grades to accurately reflect the University’s published grading system: Excellent = A, Good = B, Satisfactory = C, Passing = D, and Failing = F. To implement this philosophy and to promote a culture of excellence among finance majors, the department has adopted a target overall GPA of 3.20-3.50 for FINC 646. The complete departmental grading guideline document has been disseminated to all finance majors.

Graded assignments must be turned in before the deadline to be eligible for full credit. Late assignments are subject to the following penalties:

<table>
<thead>
<tr>
<th>If the assignment is submitted...</th>
<th>Penalty</th>
<th>Maximum Possible Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>On/before deadline</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Up to one week after deadline</td>
<td>20%</td>
<td>80%</td>
</tr>
<tr>
<td>Beyond 1 Week</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Even if you have a documented excused absence, please arrange to submit your assignment by its due date unless an emergency situation makes this impossible. Late assignments accompanied by a documented university excuse will not
be subject to penalty. Note that due to grade reporting requirements, no late final project write-ups will be accepted.

When any graded work is returned to you, you have one week from the date it is returned to bring any grading errors to the instructor’s attention. After the one-week deadline has passed, no further grade changes will be made for that particular item. The purpose of this deadline is not to discourage grade changes due to errors, but to ensure that any necessary ones are promptly made.

**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](http://disability.tamu.edu).
<table>
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<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Reading/Homework</th>
<th>Project Milestone</th>
<th>Guest Speaker</th>
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<tr>
<td>1</td>
<td>Sept 3</td>
<td>Class Member Intro/Survey Course Intro</td>
<td>Chapters 1-6, Quiz next week</td>
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<td>Course Survey due by next class</td>
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<td></td>
<td></td>
<td>Intro to Technical Analysis Overview of Markets/Dow Theory</td>
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<td>2</td>
<td>Sept 10</td>
<td>Quiz Market Update Trend Analysis</td>
<td>Chapters 11-14, Quiz next week</td>
<td>Project Introduction IBDemo</td>
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<td>3</td>
<td>Sept 17</td>
<td>Quiz Market Update Chart Pattern Analysis</td>
<td>Chapters 15-17 and Appendix B IB Webinar – Intro to TWS (Classic TWS) Quiz next week</td>
<td>Log into IB Account</td>
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<td>4</td>
<td>Sept 24</td>
<td>Quiz Market Update Market Strength, Confirmation, Selection of Markets</td>
<td>Chapters 8, 18, 21 IB Webinar – TWS Configuration Quiz next week</td>
<td>Individual Trading Starts next week!</td>
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<td>CMT Level 1 Exam Registration Closes – Sept 23 (Optional) MTA.orgs</td>
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<td>5</td>
<td>Oct 1</td>
<td>Quiz Market Update Sentiment and Cycles</td>
<td>Chapters 7, 9, 10, 19</td>
<td>Individual Trading starts October 1</td>
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<td>6</td>
<td>Oct 8</td>
<td>Quiz Market Update Presentations Exam Review</td>
<td>Chapters 20, 22, 23, and Appendix A. EXAM NEXT WEEK</td>
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<td>7</td>
<td>Oct 15</td>
<td>Market Update Quant Homework Intro Presentation MIDTERM EXAM</td>
<td>Quant Homework Due EOC Oct 22.</td>
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<td>8</td>
<td>Oct 22</td>
<td>Quiz Market Update Presentations</td>
<td>Quant Homework Due EOC. PM Presentations next week.</td>
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<td>CMT Level 1 Exam – Oct 23, 24, 25.</td>
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<td>9</td>
<td>Oct 29</td>
<td>Quiz Market Update Presentations (Individual and PM)</td>
<td>Case study due next week. Group Trading starts Nov 31</td>
<td>PM Presentations. Philosophy and Allocation Worksheets Due by Nov 1</td>
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<td>10</td>
<td>Nov 5</td>
<td>Market Update Team Presentations Case Studies, Team Time</td>
<td>Case Study</td>
<td>Weekly Update Updated Allocations (EOC)</td>
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<td>Market Update Team Presentations Case Studies, Team Time</td>
<td>Case Study</td>
<td>Weekly Update Updated Allocations (EOC)</td>
<td>Phil Roth</td>
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<td>12</td>
<td>Nov 19</td>
<td>Market Update Team Presentations Case Studies</td>
<td>Case Study</td>
<td>Weekly Update Updated Allocations (EOC)</td>
<td>TBO</td>
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<tr>
<td>13</td>
<td>Nov 26</td>
<td>Market Update Team Presentations Case Studies</td>
<td>Case Study</td>
<td>Weekly Update Updated Allocations (EOC)</td>
<td>TBO</td>
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<td>14</td>
<td>Dec 3</td>
<td>Market Update Final Team Presentations Case Studies</td>
<td>Case Study</td>
<td>Final Weekly Update</td>
<td>David Keller</td>
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<tr>
<td>15</td>
<td>Dec 10</td>
<td>Final Report Due</td>
<td></td>
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</table>

EOC = End of Class
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  X Graduate  □ First Professional (DDS, MD, JD, PharmD, DVM)
2. Request submitted by (Department or Program Name): Department of Finance
3. Course prefix, number and complete title of course: FINC 648 Advanced Investments
4. Catalog course description (not to exceed 50 words): Application of finance theory to complex investment problems; implementation of asset pricing models, portfolio theory, and arbitrage strategies; implications of principles of market efficiency and behavioral finance for selection of individual securities and portfolios.

5. Prerequisite(s): FINC 351 or FINC 632; FINC 361 or FINC 629
Cross-listed with:  Stacked with: 

6. Is this a variable credit course? □ Yes  X No If yes, from ________ to ________
7. Is this a repeatable course? □ Yes  X 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  X 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 program(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)
   master's programs at Mays Business School

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. X I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://ypr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).

13. Prefix  Course #  Title (excluding punctuation)  
FINC  648  ADVANCED INVESTMENTS

<table>
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<tr>
<th>Lect.</th>
<th>Lab.</th>
<th>Other</th>
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<th>Admin. Unit</th>
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</tbody>
</table>

Approval recommended by:
R. T. Dye  10/17/14
Department Head or Program Chair (Type Name & Sign)  Date
Chair, College Review Committee  10/24/14
Date

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

Dean of College  11/21/14
Date
Chair, GC or ACC  11/21/14
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
Professor: Yong Caien  
Office: WCBA 360J  
Phone: (979) 845-3870  
Email: ychen@mays.tamu.edu  
Class Schedule: TBD  
Office Hours: TBD  
Course Website: http://ecampus.tamu.edu

Course Description  
This course provides an in-depth understanding of investments through a combination of advanced finance theory and real-world application with the focus on the application part. In particular, students will see application of finance theory from working on projects and case studies as well as class discussions. The main topics include application of portfolio theory, asset pricing models and arbitrage strategy, market efficiency and behavioral finance, liquidity, mutual funds and hedge funds.

Learning Outcome  
Upon successfully completing the course, the student should gain a solid understanding of investments in modern financial markets. In addition, the student should have the enhanced skill to analyze and manage the risk and evaluate the performance of financial investments.

Pre-Requisites  
1. FINC 351 or FINC 632 and FINC 361 or FINC 629.

2. You should already be familiar with basic statistical concepts such as mean, variance, covariance, and correlation as well as regression techniques. We will review some of these concepts in class, though I encourage you to read a basic statistics book if you lack such background.

3. You should either be familiar with or be willing to teach yourself how to use Microsoft Excel.

Communication  
My office hours are indicated above, and besides regular office hours you may schedule an appointment with me by phone or e-mail. Although I welcome questions via e-mail, if you have a question that requires a detailed, elaborate answer, please drop by instead. I will regularly post handouts, assignments, and announcements on course website. Please make sure to check the course site frequently. I may sometimes send e-mail notifications to the whole class.
Course Materials

(1) Lecture Handouts
   My lecture handouts will be posted on course website. The handouts are directly related to my class lectures. All handouts are required readings.

(2) Case Studies
   Dimensional Fund Advisors (HBS Case 9-203-026)
   Long Term Capital Management, L.P. (A) (HBS Cases 9-200-007)
   Long Term Capital Management, L.P. (B) (HBS Cases 9-200-008)
   Long Term Capital Management, L.P. (C) (HBS Cases 9-200-009)
   (All the cases are available for purchase with discount price from the course link at Harvard Business Publishing https://cb.hbsp.harvard.edu/cbmp/access/20438313)

(3) Suggested Textbooks
   Note: (a) Not-too-old editions are fine.
   (b) The course will not stringently follow either of the books. Our class discussions and assignments are beyond the books, but the books are still helpful to get a good understanding of course contents.

(4) Recommended Readings
   The Wall Street Journal
   Lewis, Michael, The Big Short, W.W. Norton & Company, 2010
   Various articles distributed through course website.

(5) Calculator and Computer
   You will need a calculator that has a logarithm function and the function to raise a number to a power (e.g., $(1.1430)^{122}$). Whichever calculator you choose, it is your responsibility to learn how to use it. You also need to have access to a computer (with software like Adobe Reader, Microsoft Word and Excel) and a printer.

Grading
(1) Assignments (6 projects/cases): 30%
(2) Midterm exam I: 20%
(3) Midterm exam II: 20%
(4) Final exam: 30%

Course grades will follow the standard 90/80/70/60 scale: $90 \leq A \leq 100$, $80 \leq B < 90$, $70 \leq C < 80$, $60 \leq D < 70$, $F < 60$.

Teams
For course assignments, you should work with a team of 3 or 4 people. You need to form a team by Monday of the second week. All members within a team will receive the same grade on the assignments. For each assignment, each team only needs to hand in one “hard copy” of their homework with all members’ names listed on the front page. Electronic submissions will not be considered. All projects and especially case reports are expected to be written in a professional way, and a guidance on how to write a case report will be provided.
Case Studies
The questions/issues that need to be addressed for each case will be posted on course website. For each case, in addition to submitting a case report from every team, there will be 2-3 teams (depending on the level of complexity of the case) assigned to present the case. Presenting teams are required to email their presentations of the case to me before the presentation day. Presenting teams may submit their presentation in lieu of a case report. All other non-presenting students will act as “challengers” who are expected to ask questions, bring up different viewpoints and clarify some issues. I will perform the same role as a challenger. Presenting teams are encouraged to see me during the office hours before the presentation. Performance of presenting teams will be reflected in the grades of case studies.

Problems to Think About (PTA)
For students who desire more practical questions, additional problems-to-think-about (PTA) will be provided besides the assignments. PTAs are not your assignments, but are useful for better understanding course contents and preparing for the exams. I will not collect your answers to PTAs, but will post a solution key on course website.

Class Participation
Class participation is very important for understanding the course concepts. You are encouraged to actively take part in class discussions and to raise questions to promote class understanding. You are not expected to correctly answer every question since everybody is wrong part of the time. For students with good class participation (e.g., often volunteer to answer questions and/or ask stimulating questions) I reserve the right (but no obligation) to raise their final grades. Through the semester I will randomly take attendance for 6 times, a student who misses 3 or more of attendance will automatically lose the opportunity of raising his/her final grade.

Examinations
The exams will cover all material assigned or discussed in class. The final exam will cover the entire course. The format of exams is a combination of calculation questions and short essay questions. If you miss a midterm exam for a legitimate reason (see Attendance Policy below for details), the weight of the midterm will automatically go to your final exam (i.e., the weight of your final exam becomes 50%) unless an alternative way (e.g. pre-take the midterm) is approved by me. You need to bring your calculator to exams. A formula sheet will be provided to you in exams.

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. 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/

Attendance Policy
To be excused the student must notify the instructor in writing (acknowledged e-mail message is acceptable) prior to the date of absence, and provide appropriate documentation for the absence. In cases where advance 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.
The reasons absences are considered excused by the university are listed below. See Student Rule 7 for details (http://student-rules.tamu.edu/rule07.htm). 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.
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) Illness that is too severe or contagious for the student to attend class.
   a) 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)
   b) Injury or illness of less than three class days -- student will provide the following, within one week of the last date of the absence: (i.)Texas A&M University Explanatory Statement for Absence from Class form available at http://attendance.tamu.edu or (ii.) Confirmation of visit to a health care professional affirming date and time of visit
7) Required participation in military duties.
8) 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.

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 listed below. See Student Rule 7 for details (http://studentrules.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.

Mays Food & Beverage Policy
We have beautiful and state-of-the-art classrooms in the Wehner Building and Cox Hall. We want to maintain the high quality of these classrooms for the students in future years. Thus, it is necessary for you to adhere to the established policy of no beverages, food, tobacco products, or animals (unless approved) within the Wehner Building and Cox Hall classrooms. Your assistance is greatly appreciated.
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 Disability Services, visit http://disability.tamu.edu, call 845-1637, or go to Cain Hall, Room B118.
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Readings and Assignments</th>
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</thead>
</table>
| 1    | Quantitative Analysis of Stock Returns: Statistical Properties, Risk, Return, and Stock Market Indexes | BKM Chapter 5.4-5.5 (skim 5.6-5.8)  
Project 1: Analyzing Stock Returns with Real Data |
| 2    | Modern Portfolio Theory: Mean Variance Algebra and Diversification    | BKM Chapter 6, 7 (skip 7.5), skim 8.1-8.3, 9  
Malkiel Chapter 8 |
| 3    | Modern Portfolio Theory: Minimum Variance Frontier, Two Fund Separation, and Implementations | Project 2: Managing Socially Responsible Portfolios |
| 4    | Capital Asset Pricing Model: Inclusion of the Risk-Free Asset and Theoretical Development | BKM Chapter 9  
Malkiel Chapter 9 |
| 5    | Capital Asset Pricing Model: Applications                              | Midterm Exam I |
| 6    | Arbitrage Pricing Theory: Factor Models and Arbitrage with Tracking Portfolios | BKM Chapter 10  
Malkiel Chapter 9 |
| 7    | Arbitrage Pricing Theory: Theoretical Development and Implementation   |                                                                                                           |
| 8    | Market Efficiency and Behavioral Finance: Tests of Efficiency and Anomalies | BKM Chapter 11, 12, 13 (skip 13.5)  
Malkiel Chapter 1-7, 10, 11  
| 9    | Market Efficiency and Behavioral Finance: Event Studies and Limits to Arbitrage | Case 3: Dimensional Fund Advisors (HBS Case 9-203-026) |
| 10   | Liquidity, Arbitrage Liquidity Limits, and Liquidity Management        | BKM Chapter 9.6  
Project 3: Understanding Liquidity and Limits of Arbitrage  
Midterm Exam II |
| 11   | Mutual Funds: Industry Review and Fees, Expenses, and Tax Status       | BKM Chapter 4, 24  
| 12   | Mutual Funds: Performance Evaluation and Managerial Incentives         | Project 4: Design Your Own Market Timing Strategy |
| 13   | Hedge Funds: History, Background, and Strategies                      | BKM Chapter 26  
Lowenstein, *When Genius Failed: The Rise and Fall of Long-Term Capital Management*  
Lewis, *The Big Short*, W. W. Norton & Company, 2010 |
| 14   | Hedge Funds: Risk and Return, Fraud and Due Diligence                  | Case 2: Long-Term Capital Management (HBS Cases 9-200-007/008/009) |

FINC 648 Advanced Investments
Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional
Submit original form and attach a course syllabus.

1. Course request type: ☑ Graduate    ☐ Undergraduate    ☐ 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 631 Seismic Data Processing

4. Catalog course description (not to exceed 50 words):
Methods used to image the Earth using seismic reflection data, including deconvolution, f-k filtering, velocity analysis, and migration; processing software; emphasis on field data.

5. Prerequisite(s): Graduate standing or permission of instructor.

6. Is this a variable credit course? ☑ No    ☐ Yes    If yes, from ______ to ______

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

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

8. Will this course be submitted to the Core Curriculum Council? ☑ No    ☑ Yes

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)

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Approval recommended by:

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

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

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu.
Curricular Services – 07/14
Course title and number: Seismic Data Processing  GEOP 631
Term: TBA
Meeting times and location: TBA

Course Description and Prerequisites:
Survey of basic methods used to image the Earth using seismic reflection data, including deconvolution, $f-k$ filtering, velocity analysis, and migration; introduction to processing software; exercises emphasize developing experience with field data.

Prerequisites: Graduate standing or approval of instructor.

Learning Outcomes:
Students will be able to:
- explain the major processing steps required from field data acquisition to generation of seismic images
- design and test data processing work flows to apply seismic data to answer geologic questions
- apply quantitative tests to choose optimal data processing methods depending on acquisition geometry, signal-to-noise ratio and other variations in data quality
- distinguish artifacts associated with data processing steps from features indicating important geological structures
- discuss and interpret seismic processing results to communicate corresponding geological insights to other scientists and engineers

Instructor Information
Name: Richard L. Gibson, Jr.
Telephone number: 979-462-8653
Email address: gibson@tamu.edu
Office hours: TBA
Office location: Halbouty 351

Textbook and/or Resource Material
Practical Seismic Data Analysis, by H.-W. Zhou (Cambridge University Press, 2014 ISBN: ). The syllabus, course announcements, and some other supplementary materials will be posted during the semester on the course web site. The syllabus, course announcements, and some other supplementary materials will be posted during the semester on the course web site.

Grading Policies:
The most important course component for grade assignment will be completion of data processing tasks on field data provided for each student. Each student will also prepare an oral report on the assigned data and the results of the processing tasks, including a description of the final seismic image obtained during the semester. A midterm and final exam will also be given to test comprehension of processing methods.

The grade will be determined as follows:
- Processing assignments and homework: 50%
- Term project presentation: 20%
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<th>Required Reading</th>
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<tr>
<td>9/1/14-9/5/14</td>
<td>Introduction – summary of seismic reflection data and data acquisition</td>
<td>1.1-1.3</td>
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<td>9/8/14-9/12/14</td>
<td>Introduction continued – overview of typical processing sequence; visualizing data (gain control, display methods)</td>
<td>1.3-1.6</td>
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<tr>
<td>9/15/14-9/19/14</td>
<td>Seismic data quality control and static corrections; near surface issues</td>
<td>2.1-2.6</td>
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<td>9/22/14-9/26/14</td>
<td>Overview of Fourier transform and filters; tests on synthetics</td>
<td>3.1-3.2, 3.4; 5.1-5.3</td>
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<td>9/29/14-10/3/14</td>
<td>Time spectral analysis; filters and deconvolution; application of filters and decon to field data</td>
<td>3.3; 6.5</td>
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<td>10/6/14-10/10/14</td>
<td>Survey of velocity analysis methods; applications to synthetic seismograms</td>
<td>Review 2.2; 8.1-8.2</td>
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<tr>
<td>10/13/14-10/17/14</td>
<td>Advanced velocity analysis; evaluation of velocity analysis applied to field data</td>
<td>8.4-8.6</td>
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<tr>
<td>10/20/14-10/24/14</td>
<td>Introduction to methods for noise and multiple attenuation, e.g., $f-k$ filters, slant-stack, Radon transform</td>
<td>5.4-5.5; 10.2</td>
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<tr>
<td>10/27/14-10/31/14</td>
<td>Data stacking; resolution of data; attenuation; generation of unmigrated images from field data</td>
<td>4.1-4.5; 7.1</td>
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<tr>
<td>11/3/14-11/7/14</td>
<td>Introduction to migration methods</td>
<td>7.2-7.3</td>
</tr>
<tr>
<td>11/10/14-11/14/14</td>
<td>Continued introduction to migration methods; application of post-stack migration to synthetic seismograms</td>
<td>7.4</td>
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<tr>
<td>11/17/14-11/21/14</td>
<td>Pre-stack migration and imaging; migration velocity analysis; application of post-stack migration to field data</td>
<td>8.3</td>
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<tr>
<td>11/24/14-11/28/14</td>
<td>Overview of multicomponent processing and anisotropy</td>
<td>10.3-10.4</td>
</tr>
<tr>
<td>12/1/14-12/5/14</td>
<td>Completion of field data analysis and presentations of term projects</td>
<td></td>
</tr>
</tbody>
</table>

The grade scale is: 90-100=A  80-89=B  70-79=C  60-69=D  0-59=F.

Student Absences: Absences will be administered in accordance with Student Rule #7 [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07)

Course Topics, Calendar of Activities, Major Assignment Dates

Tentative course outline, including required reading from sections in course textbook:

The midterm exam is tentatively scheduled for 16 October 2014; the final exam will be held on the university-assigned schedule.
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."

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 Aggie Honor Code site (http://aggiehonor.tamu.edu) or the latest issue of the Texas A&M University Student Rules, http://studentrules.tamu.edu.
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 (e.g., DVM, JD, MD, etc.)
2. Request submitted by (Department or Program Name):  Interdisciplinary Curricular Program in Energy, ICPE
3. Course prefix, number and complete title of course:  ICPE 601: Environmental Issues of Energy Systems
4. Catalog course description (not to exceed 50 words):  Introduction to energy-related engineering principles and energy conservation and efficiency; basic processes and chemicals/materials used in the current and emerging energy systems; impact on the environment; approaches for minimizing contaminants released by usage of energy sources.

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. This course will be:
   a. required for students enrolled in the following degree programs(s) (e.g., B.A. in history)
      Executive Master of Science in Energy
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

11. I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-control/export-controls-basics-for-distance-education.html).

12. Prefix  
    Course #  
    Title (excluding punctuation)

<table>
<thead>
<tr>
<th>Lec</th>
<th>Lab</th>
<th>CSH</th>
<th>CIP and Fund Code</th>
<th>Admin. Unit</th>
<th>Acad. Year</th>
<th>HRN Code</th>
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</thead>
<tbody>
<tr>
<td>1</td>
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<td>14070100000</td>
<td>00151505</td>
<td>15-16003632</td>
<td>9/22/14</td>
<td></td>
</tr>
</tbody>
</table>

Approval recommended by:
Dr. Costas N. Geophiades  
Department Head or Program Chair (Type Name & Sign)  
Date 9/22/14
Chair, College Review Committee  
Date 9/22/14

Department Head or Program Chair (Type Name & Sign)  
Date 9/22/14
Dean of College  
Date 10/20/14

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 – 04/14
ICPE-601: Environmental Issues of Energy Systems

Term: Fall 2015
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructor:
Dr. Mustafa Akbulut
Texas A&M University
Artie McFerrin Department of Chemical Engineering
230 Jack E. Brown Engineering Building
3122 TAMU
College Station, TX 77843-3122
Tel:(979)-847-8766
Email: mabulut@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
While all energy sources affect the environment, some have a greater impact than others. First, this module will seek to provide a short introduction to energy-related engineering principles and energy conservation and efficiency. Then, it will aim to familiarize students with the basic processes and chemicals/materials used in the current and emerging energy systems; and discuss their impact on the environment in detail. The next objective of the module will be to describe approaches for minimizing contaminants released by usage of energy sources. In addition, the module will seek to provide the knowledge and understanding of traditional and novel environmental remediation technologies for spills and accidents that are related to the energy systems.

Course content:
1. Introduction (2 × 2hr)
   1a. Forms of Energy, Energy Transformation
   1b. Conservation Law for Energy, Net Energy Analysis, Thermodynamic Efficiency
   1c. Methods and Techniques in Environmental Science
   1d. Health and Hazard Risk Evaluation Process
2. Oil/Natural Gas (3 × 2hr)
   2a. Principles of Oil and Natural Gas Recovery
   2b. Materials and Chemicals Used in Oil and Natural Gas Recovery
   2c. Environmental Impact of Oil and Natural Gas Recovery
2d. Oil Spills and Natural Gas Accidents
2e. Strategies for Oil Spill Remediation
2f. Environmental Impact of Oil and Natural Gas Usage
2g. Emission Reduction Techniques for Oil and Natural Gas Activities
3. Coal (1 × 2hr)
3a. Basics of Coal Mining
3b. Environmental Impact of Coal Mining
3c. Operation of Coal Power Plants
3d. Environmental Effects of Coal Power Plants
3e. Technologies for Reducing Environmental Impacts of Coal-Fired Plants
4. Biomass and Biofuel (0.5 × 2hr)
4a. Biomass Power Plants
4b. Conversion of Biomass into Biofuel
4c. Environmental Issues of Biomass Power Plants and Biomass Production
5. Nuclear Energy (0.5 × 2hr)
5a. Introduction to Nuclear Power Generation
5b. Effects of Radiation on Environment and Health
5c. Approaches for Radioactive Cleanup
6. Geothermal Energy (0.5 × 2hr)
6a. Sources of Geothermal Energy
6b. Geothermal Power Generating Systems
6c. Geothermal Power Plant Case Studies
6d. Environmental Effects of Geothermal Power Plants
7. Hydropower (0.5 × 2hr)
7a. Fundamentals of Hydropower
7b. Environmental Issues of Hydroelectric Power
8. Wind Energy (0.5 × 2hr)
8a. Introduction to Wind energy
8b. Environmental Issues of Wind Energy
9. Solar Energy (0.5 × 2hr)
9a. Principles of Solar Energy
9b. Solar Energy Materials and Their Environmental Impact
9c. Solar Power Plants and Their Environmental Issues
10. Battery, Fuel Cells, Supercapacitors (1 × 2hr)
10a. Basics of Batteries, Fuel Cells, and Supercapacitors
10b. Chemicals and Materials Used in Batteries, Fuel Cells, and Supercapacitors
10c. Environmental Impacts of Materials Used in Batteries and Supercapacitors


**Suggested Reading:**
- Material (e.g., articles) from instructor(s).
Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded on a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

"Take home exam": due by 4:00pm two days after the last lecture. One letter grade will be deducted for each day past the deadline.

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. Please pay close attention to guidelines on avoiding plagiarism: http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx

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

<table>
<thead>
<tr>
<th>U.S. ENERGY CONSUMPTION BY SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biomass</strong> renewable (2.9%)</td>
</tr>
<tr>
<td><strong>Hydropower</strong> renewable (2.7%)</td>
</tr>
<tr>
<td><strong>Geothermal</strong> renewable (0.3%)</td>
</tr>
<tr>
<td><strong>Wind</strong> renewable (0.1%)</td>
</tr>
<tr>
<td><strong>Solar &amp; Other</strong> renewable (0.1%)</td>
</tr>
<tr>
<td><strong>Petroleum</strong> nonrenewable (38.1%)</td>
</tr>
<tr>
<td><strong>Natural Gas</strong> nonrenewable (22.9%)</td>
</tr>
<tr>
<td><strong>Coal</strong> nonrenewable (23.2%)</td>
</tr>
<tr>
<td><strong>Uranium</strong> nonrenewable (8.1%)</td>
</tr>
<tr>
<td><strong>Propane</strong> nonrenewable (1.7%)</td>
</tr>
</tbody>
</table>
Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional
Submit original form and attach a course syllabus.

1. Course request type: □ Undergraduate  ☑ Graduate  □ First Professional (e.g., DVM, JD, MD, etc.)
2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy
3. Course prefix, number and complete title of course: ICPE 602: Reservoir Characterization and Modeling
4. Catalog course description (not to exceed 50 words): Application of geostatistical techniques to build reservoir models through the integration of geological, core/well log, seismic and production data to generate a consistent reservoir description; background and insights to geostatistical modeling techniques and situations where the application of geostatistics could add value.

5. Prerequisite(s):

<table>
<thead>
<tr>
<th>Cross-listed with:</th>
<th>Graduate classification</th>
<th>Stacked with:</th>
</tr>
</thead>
</table>

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. This course will be:
   a. required for students enrolled in the following degree programs(s) (e.g., B.A. in history)
      Executive Master of Science in Energy
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

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

12. Prefix  Course #  Title (excluding punctuation)
    ICPE  602  RESERVOIR CHARACTERIZATION AN

<table>
<thead>
<tr>
<th></th>
<th></th>
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<tr>
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<td>15</td>
<td>1425010006a</td>
<td>15-16003632</td>
<td>Level 5</td>
<td></td>
</tr>
</tbody>
</table>

Approval recommended by:
Dr. Costas N. Georgiades
Department Head or Program Chair (Type Name & Sign)  9/22/14
Date
Chair, College Review Committee
9/22/14
Date

Department Head or Program Chair (Type Name & Sign)  9/22/14
(if cross-listed course)
Dean of College
10/20/14
Date

Submitted to Coordinating Board by:
Associate Director, Curricular Services

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 04/14
ICPE-602: Reservoir Characterization and Modeling

Term: Fall 2015
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5Credits

Instructors:
Dr. Akhil Datta-Gupta
Harold Vance Department of Petroleum Engineering
401G Richardson
Texas A&M University, TAMU 3116
Phone: (979) 847-9030
Fax: (979) 862-1272
Email: a.datta-gupta@pe.tamu.edu
Office hours: by appointment

Dr. Michael King
Harold Vance Department of Petroleum Engineering
401E Richardson
Texas A&M University, TAMU 3116
Phone: (979) 845-1488
Email: mike.king@pe.tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
This course addresses the application of geostatistical techniques to build reservoir models through the integration of geological, core/well log, seismic and production data to generate a consistent reservoir description. It will introduce reservoir modeling workflow from construction of the 3D static reservoir model through upscaling and dynamic reservoir simulation. The course provides background and insights to geostatistical modeling techniques and the situations where the application of geostatistics could add value. It will also provide guidance in the assembly and analysis of the required data for geostatistical techniques and the resulting numerical models.

Day 1
- Morning
  - Geostatistical Reservoir Modeling - An Overview
  - Heterogeneity Measures /Decision Making Under Uncertainty
- Afternoon
  - Review of Probability/Distributions
Day 2
- Morning
  - Covariance and Variograms
  - Variogram Modeling and Interpretation
- Afternoon
  - Simple and Ordinary Kriging
  - Cross-validation

Day 3
- Morning
  - Co-kriging/Collocated Co-kriging
  - Conditional Simulation/Sequential Methods
- Afternoon
  - Indicator Simulation of Lithofacies
  - Boolean/Object-based Models
  - Multipoint Geostatistics
  - Software Applications

Day 4
- Morning
  - Multidisciplinary Data Integration
  - Data Correlation/Electrofacies Classification
  - Integration of Seismic Data
- Afternoon
  - Upscaling
  - Experimental Design and Applications

Day 5
- Morning
  - Flow Simulation Through Geologic Models
  - Streamline Simulation: Applications
- Afternoon
  - Streamline Simulation: Applications (contd.)
  - Conclusions

Course Goals and Objectives
- Understand the reservoir modeling workflow from construction of the 3D static reservoir model through upscaling for dynamic reservoir simulation
- Review basic concepts of univariate and bi-variate statistics
- Improve awareness of geostatistics and the situations where the application of geostatistical techniques could add value
- Learn how to gather and analyze the required data for geostatistical techniques
- Appreciate the limitations of the resulting geocellular models and the geostatistical techniques
- Outline a systematic approach to a reservoir modeling study (layering, rocktype modeling, porosity modeling, permeability modeling)
- Get an introduction to flow simulation through geologic models

Required Textbook: There is no required textbook.

Suggested Reading:
Articles and book chapters will be assigned by the instructors and made available via email or during class.
Course requirements:
  - Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
  - Read all required material.
  - Participate actively in discussions.
  - Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.
  Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

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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 (e.g., DVM, JD, MD, etc.)
2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy, ICPE
3. Course prefix, number and complete title of course: ICPE 603: Bioenergy
4. Catalog course description (not to exceed 50 words): Introduction to the fundamentals of biomass (biochemistry and resources); basics of important processing technologies for the pre-treatment and conversion of biomass to useful products.

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. This course will be:
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)
      Executive Master of Science in Energy
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments.
    Attach approval letters.

11. □ I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-controls/export-control-basics-for-distance-education).

12. Prefix Course #: Title (excluding punctuation)
    ICPE 603 BIOENERGY
    Lect Lab SEC CIP and Land Code Admin Unit Acad Year CEE Code
    1 • 5 1 • 5 14 07 01 00 00 0
    Approval recommended by:
    Dr. Costas N. Georgiades 9/22/14
    Department Head or Program Chair (Type Name & Sign) Date Chair, Graduate Committee Date
    Department Head or Program Chair (Type Name & Sign) Date Dean of College Date
    (if cross-listed course)

    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 – 04/14

RECEIVED
SEP 23 2014
GRADUATE STUDIES
ICPE-603: Bioenergy

Term: Fall 2015
Day: MTuWThF
Time: TBD (4.4hrs/day)

Location: TBD
Number of Credits: 1.5 Credits

Instructors:
Dr. Mark T. Holtzapple
Department of Chemical Engineering
200 Jack E. Brown Engineering Building
Texas A&M University
College Station, TX 77843
Phone: (979) 845-9708
Email: m-holtzapple@mail.che.tamu.edu
Office hours: by appointment

Dr. Sergio Capareda
Department of Biological and Agricultural Engineering
303D Scoates Hall
Texas A&M University
College Station, TX 77843
Phone: (979) 458-3028
Email: scapareda@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
This course will introduce the students to the basics of biochemistry, elemental cycles, biomass resources, physical processing, thermal processing, biological processing and separations technologies. The specific topics are presented below:

<table>
<thead>
<tr>
<th>Topics</th>
<th>Instructor</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry</td>
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<td>4</td>
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<tr>
<td>Basics (e.g., sugars, starch, cellulose, hemicellulose, lignin, fats, proteins, enzymes)</td>
<td>Holtzapple</td>
<td></td>
</tr>
<tr>
<td>Plant structure</td>
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<td></td>
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<tr>
<td>Cell structure</td>
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<tr>
<td><strong>Photosynthesis (C3, C4)</strong></td>
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<tr>
<td>-----------------------------</td>
<td>------------</td>
<td></td>
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<tr>
<td><strong>Aerobic metabolism</strong></td>
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<tr>
<td><strong>Anaerobic metabolism</strong></td>
<td>Holtzapple</td>
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<tr>
<td><strong>Elemental cycles</strong> 1.5</td>
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<tr>
<td><strong>Carbon</strong></td>
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<td><strong>Nitrogen</strong></td>
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<td><strong>Phosphorous</strong></td>
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<tr>
<td><strong>Biomass resource</strong> 2</td>
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<tr>
<td><strong>Plants (production, crop selection, yields, storage)</strong></td>
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<td></td>
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<tr>
<td><strong>Starch crops</strong></td>
<td>Holtzapple</td>
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<tr>
<td><strong>Oil crops</strong></td>
<td>Holtzapple</td>
<td></td>
</tr>
<tr>
<td><strong>Lignocellulose crops (woody, herbaceous)</strong></td>
<td>Holtzapple</td>
<td></td>
</tr>
<tr>
<td><strong>Algae</strong></td>
<td>Holtzapple</td>
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<tr>
<td><strong>Wastes (e.g., municipal solid waste, sludge, manure, ag residues)</strong></td>
<td>Holtzapple</td>
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</tr>
<tr>
<td><strong>Biomass characteristics (e.g., composition, heat of combustion, density)</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Physical processing 0.5</strong></td>
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<td><strong>Grinding</strong></td>
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<tr>
<td><strong>Pelleting</strong></td>
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<td><strong>Thermal processing 6</strong></td>
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<tr>
<td><strong>Torrefaction</strong></td>
<td>Capareda</td>
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<tr>
<td><strong>Pyrolysis</strong></td>
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<tr>
<td><strong>Gasification</strong></td>
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<tr>
<td><strong>Advanced gasification</strong></td>
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<tr>
<td><strong>Biomass liquefaction</strong></td>
<td>Capareda</td>
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<tr>
<td><strong>Combustion</strong></td>
<td>Capareda</td>
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<tr>
<td><strong>Biological processing 6</strong></td>
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<tr>
<td><strong>Starch processing (dry mill, wet mill)</strong></td>
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<tr>
<td><strong>Lignocellulose pretreatment</strong></td>
<td>Holtzapple</td>
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<td><strong>Saccharification (enzymatic, acid)</strong></td>
<td>Holtzapple</td>
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<td><strong>Direct microbial conversion</strong></td>
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<td><strong>Separation technology 2</strong></td>
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<tr>
<td><strong>Distillation and evaporation</strong></td>
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<td><strong>Ion exchange</strong></td>
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<td><strong>Adsorption</strong></td>
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**Required Textbook:** There is no required textbook.

**Suggested Reading:**
Articles and book chapters will be assigned by the instructors and made available via email or during class.
Course requirements:

- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm two days after the last lecture. One letter grade will be deducted for each day past the deadline.

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. Please pay close attention to guidelines on avoiding plagiarism: http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
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 (e.g., DMA, JD, MD, etc.)
2. Request submitted by (Department or Program Name):  Interdisciplinary Curricular Program in Energy
3. Course prefix, number and complete title of course:  ICPE 604: Energy Systems Engineering I
4. Catalog course description (not to exceed 50 words):  State-of-the-art topics for energy systems engineering, including modeling of energy systems, mixed integer and continuous optimization techniques for the analysis of energy systems, model based control & interactions of design, control and scheduling of power and energy systems.

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?  ☑ No
7. Is this a repeatable course?  ☑ No
Will this course be repeated within the same semester?  ☑ No
If yes, this course may be taken _____ times.
If yes, from _____ to _____

8. Will this course be submitted to the Core Curriculum Council?  ☑ Yes  ☑ No

9. This course will be:
a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)
   Executive Master of Science in Energy
b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.
11. ☑ 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).

12. Prefix  Course #  Title (excluding punctuation)
    ICPE  604  ENERGY SYSTEMS ENGINEERING I

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Approval recommended by:
Dr. Costas N. Georgiades
Department Head or Program Chair (Type Name & Sign)  Date  9/22/14
Chair, College Review Committee  Date  9/22/14

Department Head or Program Chair (Type Name & Sign)  Date  9/22/14
(department cross-listed course)
Dean of College  Date  10/20/14

Submitted to Coordinating Board by:
Associate Director, Curricular Services  Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu
Curricular Services – 04/14
ICPE-604: Energy Systems Engineering I

Term: Fall 2015  
Day: MTuWThF  
Time: TBD (4.4hrs/day)  
Location: TBD  
Number of Credits: 1.5 Credits

Instructors:
Professor Christodoulos A. Floudas (Effective February 1, 2015)  
Department of Chemical Engineering  
225 Brown Building  
Texas A&M University  
College Station, TX 7843-3122  
Email: floudas@tamu.edu  
Office hours: by appointment

Professor Efstratios N. Pistikopoulos (Effective January 1, 2015)  
Department of Chemical Engineering  
217 Brown Building  
Texas A&M University  
College Station, TX 7843-3122  
Email: stratos@tamu.edu  
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
This course covers state-of-the-art topics for energy systems engineering, including modelling of energy systems, mixed integer and continuous optimization techniques for the analysis of energy systems, model based control & interactions of design, control and scheduling of power and energy systems.

The course will focus on:

- Modelling principles for the synthesis, design, analysis and control of energy systems - modelling with 0-1 variables
- Continuous optimization
- Mixed integer linear and nonlinear programming
- Heat exchanger network synthesis and optimization
- Optimization under uncertainty - design for flexibility & operability
Suggested books and Reading
- Articles and book chapters will be assigned by the instructors and made available via email or during class.

Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07).
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final exam 50%.
Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm two days after the last lecture. One letter grade will be deducted for each day past the deadline.

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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 (e.g., DVM, JD, MD, etc.)  
2. Request submitted by (Department or Program Name):  
   Interdisciplinary Curricular Program in Energy, ICPE  
3. Course prefix, number and complete title of course:  
   ICPE 605: Energy Systems Engineering II  
4. Catalog course description (not to exceed 50 words):  
   State-of-the-art topics for energy systems engineering, including modelling of hybrid feedstock energy systems, energy supply chain networks, polygeneration systems, model predictive control, fuel cells, and combined heat and power systems.  

5. Prerequisite(s):  
   ICPE-604  
   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. This course will be:  
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)  
      Executive Master of Science in Energy  
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)  

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

12. Prefix  
    Course #  
    Title (excluding punctuation)  
    ICPE 605  
    ENERGY SYSTEMS ENGINEERING II  

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Approval recommended by:  
Dr. Costas N. Georgiades  
Department Head or Program Chair (Type Name & Sign)  
Date  
Chair, College Review Committee  
Date  
Dean of College  
Date  
Chair, GC for UCR  
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 – 04/14
ICPE-605: Energy Systems Engineering II

Term: Spring 2016
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructors:
Professor Christodoulos A. Floudas (Effective February 1, 2015)
Department of Chemical Engineering
225 Brown Building
Texas A&M University
College Station, TX 7843-3122
Email: floudas@tamu.edu
Office hours: by appointment

Professor Efstratios N. Pistikopoulos (Effective January 1, 2015)
Department of Chemical Engineering
217 Brown Building
Texas A&M University
College Station, TX 7843-3122
Email: stratos@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: ICPE-604, Graduate classification.

Total contact hours: 22hrs

Course description:
This course covers state-of-the-art topics for energy systems engineering, including modelling of hybrid feedstock energy systems, energy supply chain networks, polygeneration systems, model predictive control, fuel cells, and combined heat and power systems.

The course will focus on:
- Hybrid Feedstock Energy Processes: Supply Chain Network
- Synthesis, design and optimization of flexible poly-generation energy systems
- Model predictive control; multi-parametric programming and control
- Fuel cell energy systems – modelling, optimization and design & control
- Residential Combined Heat and Power (CHP) energy systems – design, optimization, control and scheduling aspects
Suggested books and Reading


- Articles and book chapters will be assigned by the instructors and made available via email or during class.

Course requirements:

- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.

- Read all required material.

- Participate actively in discussions.

- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm two days after the last lecture. One letter grade will be deducted for each day past the deadline.

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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  X Graduate  □ First Professional (e.g., DVM, JD, MD, etc.)
2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy, ICPE
3. Course prefix, number and complete title of course: ICPE 606: Introduction to Optimization
4. Catalog course description (not to exceed 50 words): Basics of deterministic optimization, with focus on modeling and computer solutions; practical examples to develop understanding of modeling and solution techniques that can be used to improve decision-making; linear, nonlinear, mixed integer, combinatorial, and network optimization problems

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  X No  If yes, from ________ to ________
7. Is this a repeatable course? □ Yes  X No  If yes, this course may be taken ________ times.
   Will this course be repeated within the same semester? □ Yes  X No
8. Will this course be submitted to the Core Curriculum Council? X Yes  □ No
9. This course will be:
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)
      Executive Master of Science in Energy
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)
10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.
11. X I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-control-basics-for-distance-education).

12. Prefix  Course #  Title (excluding punctuation)
    ICPE  606  INTRODUCTION TO OPTIMIZATION

    Lec.  Lab  STH  NUM  P and Fund Code  Admin. Unit  Acad. Year  HU Code
    1 5  1 5 1 4 3 5 0 1 0 0 0 6

    Approval recommended by:  Level 5

    Dr. Costas N. Georgiades  9/21/14
    Department Head or Program Chair (Type Name & Sign)  Date
    Chair, College Review Committee  9/22/14

    Department Head or Program Chair (Type Name & Sign)  Date
    Dean of College  10/28/14
    (if cross-listed course)

    Submitted to Coordinating Board by:
    Chair, GC or UGC
    Date  Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 04/14
ICPE-606: Introduction to Optimization

Term: Fall 2015
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructor:
Dr. Sergiy Butenko
Department of Industrial and Systems Engineering
Texas A&M University
4037 Emerging Technologies Building,
TAMU-3131, College Station, TX 77843-3131
Phone: 979-458-2333
Fax: 979-458-4299
Email: butenko@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course Description:
This short course will introduce basics of deterministic optimization, with focus on modeling and computer solutions. Using practical examples, the course will develop understanding of modeling and solution techniques that can be used to improve decision-making. The types of problems to be discussed include linear, nonlinear, mixed integer, combinatorial, and network optimization problems.

Topics
1. Formulating an optimization model
2. Understanding complexity and implications of the model choice
3. Brief overview of solution methods
4. Solving optimization problems of a computer
5. Interpreting solutions of optimization models

Required Textbook: There is no required textbook.

Suggested Reading:
Articles and book chapters will be assigned by the instructor and made available via email or during class.
Course requirements:

- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm two days after the last lecture. One letter grade will be deducted for each day past the deadline.

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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 (e.g., DVM, JD, MD, etc.)
2. Request submitted by (Department or Program Name):  
   Interdisciplinary Curricular Program in Energy, ICPE
3. Course prefix, number and complete title of course:  
   ICPE 607: Energy Accounting
4. Catalog course description (not to exceed 50 words):  
   Exploration of the financial aspects of the energy industry; emphasis on oil and gas
   with additional attention placed on all sources of power generation, including alternatives; interactive with cases worked in each session;
   advanced preparation guided by the instructor.

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. This course will be:  
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)
      Professional Master of Science in Energy
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. 
    Attach approval letters.
11. 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).

12. Prefix  
    Course #  
    Title (excluding punctuation)  
    ICPE 607  
    ENERGY ACCOUNTING

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Approval recommended by:  
Dr. Costas N. Georgiades  
Department Head or Program Chair (Type Name & Sign)  
Date  
Chair, College Review Committee  
Date  
Dean of College  
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 – 04/14
ICPE-607: Energy Accounting

Term: Fall 2015
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5

Instructor:
Shannon Deer, CPA
Mays Business School
Texas A&M University
487 Wehner Building, 445D
College Station 77843
Tel.: 979-575-3851
Email: sdeer@mays.tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course Description:
This course will explore the financial aspects of the energy industry. Emphasis will be placed on oil and gas with additional attention placed on all sources of power generation, including alternatives. The course will be interactive with cases worked in each session. The course format will require advanced preparation, which will be guided by the instructor.

Learning Outcomes:
By the end of the course students should be able to:

- Bridge the communication gap between operational experts (engineers, geoscientists, etc.) and business professionals in an energy company.
- Identify the differences in upstream, midstream, downstream, and integrated energy companies from a financial perspective.
- Use net present value analysis to evaluate potential energy projects in oil and gas, nuclear, and alternatives.
- Determine the impact of reserves on an upstream company’s annual report and on project evaluations, while recognizing the differences between the two.
- Evaluate the profitability of key financial decisions and potential projects within an energy company.
- Evaluate common hedging strategies used by energy companies and analyze the cash flow implications of a specific hedging strategy on a company’s cash flow.
- Determine the impact of mark-to-market accounting on a company’s financial statements as a result of specific hedging strategies.
- Develop a financing strategy for the expansion of an energy company.
Class Schedule:

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<th>Topic</th>
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<td>Course &amp; industry introduction</td>
<td>Case #1 preparation</td>
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<tr>
<td>2</td>
<td>Acquisition valuation (NPV)</td>
<td>Case #2 preparation and online Quiz #1</td>
</tr>
<tr>
<td>3</td>
<td>Acquisition valuation continued, including reserves</td>
<td>Online Quiz #2</td>
</tr>
<tr>
<td>4</td>
<td>Derivatives – strategy and financial statement impact</td>
<td>Case #3 preparation and online Quiz #3</td>
</tr>
<tr>
<td>5</td>
<td>Energy financial statement impact</td>
<td>Company analysis</td>
</tr>
</tbody>
</table>

Required Course Materials:


Suggested Reading:

Articles and book chapters will be assigned by the instructor and made available via email or during class.

Course requirements:

- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading:

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<td>Company analysis</td>
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<td><strong>Total</strong></td>
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</table>

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

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://aggiehonors.tamu.edu. Please pay close attention to guidelines on avoiding plagiarism: http://aggiehonors.tamu.edu/Descriptions/Plagiarism.aspx

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

I Promise To:
1) Lead by being a content expert
2) Organize the course effectively and guide time on task
3) Communicate by being responsive to questions and responding quickly
4) Facilitate learning through active engagement
5) Demonstrate genuine interest in your learning
6) Assess fairly and quickly
7) Provide challenge with support
8) Emphasize relevance using real-world examples
9) Reflect and adapt appropriately based on your feedback
10) Provide a reasonable amount of work outside of class with clear guidance
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 (Ph.D., MD, etc.)
2. Request submitted by (Department or Program Name):  Interdisciplinary Curricular Program in Energy, ICPE
3. Course prefix, number and complete title of course:  ICPE-608: Beyond Science and Technology: The Role of Policy in the Future of Energy in the U.S.
4. Catalog course description (not to exceed 50 words):  Introduction to the history of U.S. science and technology policy with a specific emphasis on energy; focus on regulatory rules, the key government agencies at the national level, the role states and localities play, how government funds are allocated in research and technology transfer related to energy innovations, the role of universities, the threats and opportunities to energy-related educational success at all levels.

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. This course will be:
   a. required for students enrolled in the following degree programs(s) (e.g., B.A. in history)
      Executive Master of Science in Energy
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)
10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.
11. □ I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-control/export-control-basics-for-distance-education).

12. Prefix Course # Title (excluding punctuation)

<table>
<thead>
<tr>
<th>ICPE</th>
<th>608</th>
<th>BEYOND SCIENCE AND TECHNOLOGY:</th>
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</table>

Approval recommended by:  
Dr. Costas N. Georgiades
Department Head or Program Chair (Type Name & Sign)  9/22/14
Date  9/22/14

Chair, College Review Committee  9/22/14
Date  9/22/14

Department Head or Program Chair (Type Name & Sign)  9/22/14
(Date of cross-listed course)

Chair, GC or UCE  10/20/14
Date  10/20/14

Submitted to Coordinating Board by:
Associate Director, Curricular Services
Date  04/14

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu
Curricular Services – 04/14
ICPE-608: Beyond Science and Technology: The Role of Policy in the Future of Energy in the US

Term: Fall 2015
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructor(s):
Dr. Arnold Vedlitz
The Bush School of Government & Public Policy
Texas A&M University
Allen Room 1113A
College Station, TX 77843
Tel.: 979-845-2929
Email: avedlitz@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
This course will focus on the role and impact of U.S. government and policy decisions in the future of energy. The following topics will be covered.

Day 1
1. What is Science and Technology and why is it important
2. What is the history of U.S. Science and Technology Policy with a specific emphasis on energy policy
3. Who are the main participants in the making of U.S. Energy policy
4. What role does the public play

Day 2
1. Who supports and opposes government spending on energy research and why
2. What is the regulatory rule making process related to the development of energy policy
3. What are the key government agencies at the national level in the development of energy policy
4. What role do states and localities play in the development and implementation of energy policies
5. How is government money allocated in research and technology transfer related to energy innovations
Day 3
1. How do science and technology discoveries about energy affect other government policies
2. What is the role of scientist and engineers with energy expertise in crafting laws, rules and regulations related to energy policies directly and other policies that might be related to energy expertise, such as climate change and natural resources management
3. How do scientists and engineers balance advocacy with scientific neutrality
4. What are the roles of other stakeholders, like industries and interest groups

Day 4
1. Where does scientific and technological expertise come from
2. What is the role of universities
3. What are threats and opportunities to energy-related educational success at all levels
4. What is STEM promotion policy--is it needed

Day 5
1. Group-based case study exercise on identifying a specific energy related problem and developing and "testing" a set of viable policy options, with associated costs and benefits
2. Final discussion and module takeaways.

Required Textbook: There is no required textbook.

Suggested Reading:
Articles and book chapters will be assigned by the instructor(s) and made available via email or during class.

Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

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. Please pay close attention to guidelines on avoiding plagiarism: http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
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 □ Professional (e.g., DVM, JD, MD, etc.)
2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy, ICPE
4. Catalog course description (not to exceed 50 words): Introduction to energy law and regulation in the United States; focus on the key sources of energy (both nonrenewable and renewable) driving the U.S. economy, and identifies the various challenges facing the industry in their production and distribution; key regulations and laws governing energy production as well as the jurisdictional and regulatory divisions between federal and state governments.

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. This course will be:
a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)
   Executive Master of Science in Energy
b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

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

12. Prefix Course # Title (excluding punctuation)
<table>
<thead>
<tr>
<th>ICPE</th>
<th>609</th>
<th>INTRODUCTION TO U.S. ENERGY LAW</th>
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</table>

Approval recommended by:
Dr. Costas N. Georgiades
Department Head or Program Chair (Type Name & Sign) Date

Chair, Course Review Committee Date

Department Head or Program Chair (Type Name & Sign) Date
Dean of College 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 - 4/14
ICPE-609: Introduction to U.S. Energy Law & Policy

Term: Spring 2016
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructor:
Dr. Gina S. Warren
School of Law
Texas A&M University
1515 Commerce Street
Fort Worth, TX 76102
Tel.: 817-212-3935
Email: gswarren@law.tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course Description:
This 5-day (4.4 hours per day) module provides a basic introduction to energy law and regulation in the United States. It focuses on the key sources of energy (both nonrenewable and renewable) driving the U.S. economy, and identifies the various challenges facing the industry in their production and distribution. It considers the key regulations and laws governing energy production as well as the jurisdictional and regulatory divisions between federal and state governments. The module addresses electricity production, transmission, and regulation and considers the interface of energy production and energy transmission, as well as the various challenges facing the electricity industry. In addition, the module addresses related legal, policy, and societal concerns including environmental, land use, regulatory, and economic issues as they relate to each energy source.

Class Format and Student Participation: Each class will begin with a lecture followed by class discussion and participation in problem solving exercises. You are expected to come to class prepared to engage in a conversation and analysis on each class day. Accordingly, you must read the assigned materials in advance of each class. In addition, based on the readings for each day, you must prepare two questions for each class session that you would like discussed in class that day. Questions must be turned in via email or hardcopy no later than the start of class each day.
<table>
<thead>
<tr>
<th>Day 1</th>
<th>Topics</th>
<th>Readings</th>
</tr>
</thead>
</table>
| **Introduction to Energy Law & Policy** | - Background and history of the origination of energy laws in the US  
- Federal/state regulatory framework |  
- *Nutshell* = pp. 1-52  
- US Energy Information Administration  

**Introduction to US Energy Sources**  
- Background, history, statistics, and energy industry basics  
- Framing the energy issue |  
- US Energy Information Administration  
  - Energy Explained ([http://www.eia.gov/energyexplained/index.cfm](http://www.eia.gov/energyexplained/index.cfm))  
  - What are the major sources and users of energy in the United States? ([http://www.eia.gov/energy_in_brief/article/major_energy_sources_and_users.cfm](http://www.eia.gov/energy_in_brief/article/major_energy_sources_and_users.cfm))  
  - EPA, How does electricity affect the environment? ([http://www.epa.gov/cleanenergy/energy-and-you/affect/index.html](http://www.epa.gov/cleanenergy/energy-and-you/affect/index.html)). Click and thoroughly read the description of the various sources of energy ("Electricity Generation Technologies"), as well as environmental impacts related to each source. |

<table>
<thead>
<tr>
<th>Day 2</th>
<th>Topics</th>
<th>Readings</th>
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</thead>
</table>
| **Nonrenewable Energy — Coal** | - Process of extraction  
- Regulatory structure  
- Industry challenges  
- Environmental concerns |  
- *Nutshell* = pp. 316–358  
  - Case excerpts:  

<table>
<thead>
<tr>
<th>Day 3</th>
<th>Topics</th>
<th>Readings</th>
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<tbody>
<tr>
<td><strong>Nonrenewable Energy — Oil &amp; Gas</strong></td>
<td>- Process of</td>
<td></td>
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- US Energy Information Administration, Oil Explained |
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<tr>
<th>Day 4</th>
<th>Nonrenewable Energy — Nuclear</th>
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<tr>
<td>Extraction</td>
<td>(<a href="http://www.eia.gov/energyexplained/index.cfm?page-oil_use">http://www.eia.gov/energyexplained/index.cfm?page-oil_use</a>)</td>
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<tr>
<td>• Regulatory structure</td>
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<td>• Industry challenges</td>
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<tr>
<td>• Environmental concerns</td>
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<tr>
<td>• Offshore drilling</td>
<td></td>
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<tr>
<td>• Federal lands development</td>
<td></td>
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<tr>
<td>Energy4Me.com, Petroleum — Oil and Natural Gas (<a href="http://www.energy4me.org/energy-facts/endources/petroleum/">http://www.energy4me.org/energy-facts/endources/petroleum/</a>)</td>
<td></td>
</tr>
<tr>
<td>Jad Mouawad and Clifford Kraus, Pollution Fears Creating a Reaction Against Natural Gas Booms Times (<a href="http://www.nytimes.com/2009/12/08/business/energy-environment/08fracking.html">http://www.nytimes.com/2009/12/08/business/energy-environment/08fracking.html</a>)</td>
<td></td>
</tr>
<tr>
<td>US Energy Information Administration, Where Our Natural Gas Comes From (<a href="http://www.eia.doe.gov/energyexplained/index.cfm?page=natural_gas_where">http://www.eia.doe.gov/energyexplained/index.cfm?page=natural_gas_where</a>)</td>
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<tr>
<td>• Case excerpts:</td>
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<tr>
<td>- Secretary of Interior v. California, 464 U.S. 312 (1984)</td>
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<tr>
<td>- BP Exploration &amp; Oil, Inc. v. United States EPA, 66 F.3d 784 (6th Cir. 1995)</td>
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<th>Day 4</th>
<th>Nutshell = pp. 426–474</th>
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<tr>
<td>• Case excerpt:</td>
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<th>Day 5</th>
<th>Introduction to Electricity</th>
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<td>Extraction</td>
<td>(<a href="http://www.eia.gov/energyexplained/index.cfm?page-oil_use">http://www.eia.gov/energyexplained/index.cfm?page-oil_use</a>)</td>
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<tr>
<td>• Understanding electricity</td>
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<tr>
<td>• Production &amp; transmission of electricity</td>
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<tr>
<td>Steven Ferrey, Inverting Choice of Law in the Wired Universe: Thermodynamic, Mass, and Energy (<a href="http://scholarship.law.wmu.edu/cgi/viewcontent.cgi?article=1337&amp;context=wmlr">http://scholarship.law.wmu.edu/cgi/viewcontent.cgi?article=1337&amp;context=wmlr</a>)</td>
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<tr>
<td>William and Mary L. Rev. 1839 at pp. 1909-1922 (2004) (Sections A and B of Chapter VI). Make sure to read the accompanying footnotes, especially in Section A</td>
<td></td>
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<tr>
<td>Edison Electric Institute: “About the Industry” (<a href="http://www.eei.org/whoweare/AboutIndustry/Pages/default.aspx">http://www.eei.org/whoweare/AboutIndustry/Pages/default.aspx</a>, including linked page “History”)</td>
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<tr>
<td>US Energy Information Administration, Most states have Renewable Portfolio Standards (<a href="http://www.eia.gov/todayinenergy/detail.cfm?id=4850#">http://www.eia.gov/todayinenergy/detail.cfm?id=4850#</a>)</td>
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</tbody>
</table>
Electric Power Industry; also, skim through "Key Facts About the Electric Power Industry")

  (http://www.puc.nh.gov/Transmission%20Commission/Transmission%20Infrastructure/Appended)
  (http://www.publicpower.org/files/PDFs/Numelecproviderscust2006.pdf)
- Case law excerpts:

Required Text & Reading Material (see also in the class schedule):
- Articles, excerpts, and websites indicated in the syllabus

Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm two days after the last lecture. One letter grade will be deducted for each day past the deadline.

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. Please pay close attention to guidelines on avoiding plagiarism: http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
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 (e.g., DVM, JD, MD, etc.)

2. Request submitted by (Department or Program Name):
   - Interdisciplinary Curricular Program in Energy, ICPE

3. Course prefix, number and complete title of course:
   - ICPE-610: The Global Energy Future

4. Catalog course description (not to exceed 50 words):
   Global energy outlook, including energy demand, population growth and
   humanitarian issues, environmental and climate concerns, and the energy/water nexus and water scarcity;
   evolution of the global oil and gas industry; controlling nations, laws, and agencies (OPEC, IEA, etc.);
   international and domestic climate change laws and policies; global
   future of climate change adaptation and mitigation.

5. Prerequisite(s):
   - Cross-listed 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. This course will be:
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)
      Executive Master of Science in Energy
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments.
    Attach approval letters.

11. 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).

12. Prefix: ICPE  
    Course #: 610  
    Title (excluding punctuation): THE GLOBAL ENERGY FUTURE

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Approval recommended by:

Dr. Costas N. Georgiades
Department Head or Program Chair (Type Name & Sign) Date 9/22/14

Chair, College Review Committee Date 9/22/14

Department Head or Program Chair (Type Name & Sign) Date 9/22/14

Dean of College Date 10/20/14

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 – 04/14
ICPE-610: The Global Energy Future

Term: Spring 2016
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructors:
Dr. Gabriel Eckstein
School of Law
Texas A&M University
1515 Commerce Street
Fort Worth, TX 76102
Tel.: 817-212-3912
Email: gabrieleckstein@law.tamu.edu
Office hours: by appointment

Dr. Gina S. Warren
School of Law
Texas A&M University
1515 Commerce Street
Fort Worth, TX 76102
Tel.: 817-212-3935
Email: gswarren@law.tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course Description:
This 5-day (4.4 hours per day) module will look at our global energy outlook, including energy demand, population growth and humanitarian issues, environmental and climate concerns, and the energy/water nexus and water scarcity. Worldwide demand for natural resources for fuel, shelter, food, and fiber is growing exponentially. Many forms of energy, especially fossil fuel generation but also renewables like solar and hydropower, require significant amounts of increasingly scarce water resources to develop. Conversely, most water production and purification processes are critically dependent on energy to pump, move, and treat water. This so-called “water-energy nexus” is now essential for countries around the world as they debate and consider how best to grow their economies while sustaining and protecting their natural resources. At the center of much humanitarian and environmental controversy is fossil fuel production and distribution – particularly oil and gas. This module will explore the evolution of the global oil and gas industry, and it will look at the controlling nations, laws, and agencies
(OPEC, IEA, etc.). In addition, this module will also explore international and domestic climate change laws and policies and discuss the global future of climate change adaptation and mitigation. The exploitation of natural resources around the world has resulted in profound, long-term, and destructive impacts on the climate. It has also brought about movements to reduce societal dependence on natural resources as well as identify and introduce alternatives that would lessen and possibly eliminate many of the destructive natural resource-related activities.

**Class Format and Student Participation:** Each class will begin with a lecture followed by class discussion and participation in problem solving exercises. You are expected to come to class prepared to engage in a conversation and analysis on each class day. Accordingly, you must read the assigned materials in advance of each class. In addition, based on the readings for each day, you must prepare two questions for each class session that you would like discussed in class that day. Questions must be turned in via email or hardcopy no later than the start of class each day.

**Class Schedule:**

<table>
<thead>
<tr>
<th>DATE</th>
<th>TOPICS</th>
<th>READINGS</th>
</tr>
</thead>
</table>
| Day 2 | Global Oil & Gas Trade | - Excerpts from Daniel Yergen’s “The Prize” and “The Quest”  
- Polinares, The International Energy Agency (IEA), the Organization of Oil Exporting Countries (OPEC) and the International Energy Forum (IEF): the elusive quest for institutional cooperation in oil and gas international trade (December 2012) [http://www.polinares.eu/docs/d4-1/polinares_wp4_chapter10.pdf](http://www.polinares.eu/docs/d4-1/polinares_wp4_chapter10.pdf) |
### Energy and Human Rights Policies

### US Climate Change Laws & Policies
- Nutshell = pp.
- Excerpts from Climate and Energy Law text
- Case excerpts:

### Our Global Energy Future
- Nutshell = pp. 548–567

### Required Text & Reading Material (see also in the class schedule):
- Articles, excerpts, and websites indicated in the syllabus

### Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See [link](http://student-rules.tamu.edu/rule07).
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

**Grading:** Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final exam 50%.

**Grade scale:** 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

**Take home exam:** due by 4:00pm two days after the last lecture. One letter grade will be deducted for each day past the deadline.

**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. Please pay close attention to guidelines on avoiding plagiarism: http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
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  
   - [X] Graduate  
   - [ ] First Professional (e.g., DPhi, JD, MD, etc.)

2. Request submitted by (Department or Program Name):  
   - Interdisciplinary Curricular Program in Energy, ICPE

3. Course prefix, number and complete title of course:  
   - ICPE-611: Economics of Energy

4. Catalog course description (not to exceed 50 words):  
   - Basics of economics concepts as they relate to energy applications; how the government policies affect the energy economy; present the economics of energy and climate change; introduction to renewable technologies and their impact.

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  
   - [X] No  
   - If yes, from ______ to ______

7. Is this a repeatable course?  
   - [ ] Yes  
   - [X] No  
   - If yes, this course may be taken ______ times.  
   Will this course be repeated within the same semester?  
   - [ ] Yes  
   - [X] No

8. Will this course be submitted to the Core Curriculum Council?  
   - [X] Yes  
   - [ ] No

9. This course will be:  
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)
      - Executive Master of Science in Energy
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments.  
    Attach approval letters.

11. [X] I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-controls/export-control-basics-for-distance-education).

12. Prefix  
    Course #  
    Title (excluding punctuation)

    | ICPE | 611 | ECONOMICS OF ENERGY |
    |------|-----|---------------------|
    | Lect. | 1 | 1 | 5 | 0 | 1 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 5 |
    | Lab | 1 | 5 | 0 | 1 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 5 |
    | SUI | | | | | | | | | | | | |
    | CLP and Fund Code | | | | | | | | | | | | |
    | Admin. Unit | 1 | 5 | - | 1 | 6 | 0 | 0 | 3 | 6 | 3 | 2 |
    | Acad. Year | | | | | | | | | | | | |
    | Title of Course | | | | | | | | | | | | |

   Approval recommended by:  
   - Dr. Costas N. Geophiades  
   - Date: 9/22/14
   - Chair, College Review Committee  
   - Date: 9/22/14
   - Dean of College  
   - Date: 10/20/14

   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 – 04/14
ICPE-611: Economics of Energy

Term: Spring 2016  
Day: MTuWThF  
Time: TBD (4.4hrs/day)  
Location: TBD  
Number of Credits: 1.5Credits

Instructor:
Dr. Bruce A. McCarl  
Department of Agricultural Economics  
Texas A&M University  
College Station, Texas 77843-2124  
Tel.: (979) 845-1706  
Email: mccarl@tamu.edu  
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:  
The course will cover the following topics:

I. Why study economics as an energy topic
   A. Vanishing values of byproducts - the concept of product demand  
   B. Increasing costs of feedstocks - the concept of input supply  
   C. Demand growth and price impacts - the concepts of international trade, market linkages, and income related demand expansions  
   D. Who gains and who loses - the concept of welfare economics  
   E. Damages through pollution and emissions - the concept of externalities  
   F. Treatment of costs and income over time – investment, discounting and present value concepts

II. Basic economic concepts review
   A. Demand and supply  
   B. Market equilibrium in single and multiple markets including transportation concerns  
   C. Determinants of demand and supply – income, prices, compliments, substitutes, factor supply, derived demand, projected supply.  
   D. Welfare economics and cost-benefit analysis  
   E. Net present value, discounting, timing of investments and returns  
   F. The concept of externalities and their correction - taxes, regulations, tradable


permits
G. Economics of byproducts
H. Public and private goods

III. What might cause the way we use energy to change – an economic exploration
A. Depletion and extractable energy
B. Emissions and climate change
C. Pollution and energy
D. Prices and energy substitutes

IV. How can and does government policy influence the energy economy
A. Commodity Subsidies, Taxes and Tariffs
B. Technology subsidies
C. Tax policy
D. Clean air act
E. Electricity markets and regulation
F. EISA and RFS

V. Economics of energy and climate change
A. Energy emission rates
B. Emissions and externalities
C. Development, growth and emissions
D. Momentum, emissions, and the inevitability of climate change
E. Nature and economics of climate change effects
   1. Sea Level Rise
   2. Hotter Temperatures
   3. Altered Precipitation
   4. Extremes
   5. Agricultural Production
   6. Unmanaged Ecosystems
   7. Ocean acidification
F. Climate change and policy decision-making
   1. Adaptation
   2. Mitigation
   3. Trade-offs in investment and conventional funds use
G. Adaptation economics
   1. Private versus public adaptation
   2. Limits to adaptation
   3. Means of adaptation
   4. modeling and analysis
   5. co-benefits
   6. synergies with mitigation
H. Mitigation economics and concepts
1. Lifecycle analysis
2. Marginal abatement curves
3. Passing a price signal - taxes, cap and trade
4. Regulation
5. International comparative advantage
6. Low hanging fruit
7. Asset fixity and rate of adjustment
8. energy substitution
9. nuclear and licensing
10. modeling and analysis
11. co-benefits
12. synergies with adaptation

VI. Alternative forms of energy - renewables and bioenergy

A. why bioenergy
   1. energy security
   2. domestic source
   3. greenhouse gas offsets
   4. payments to agriculture and regions
   5. mandates and GHG desires

B. good and bad experiences
   1. the biodiesel industry a study and excess optimism
      a) input prices
      b) byproduct values
      c) capacity utilization
   2. economics of corn ethanol and agriculture
      a) cost of production
      b) inputs and price escalation
      c) economics of transportation and Texas production
   3. cellulosic ethanol – where are we

C. ethanol, oxygenate and the blend wall
   1. oxygenate requirement
   2. infrastructure compatibility and drop in fuels
      a) cars c10, e15, E 85
      b) pumps and distribution
   3. exports

D. bio electricity

E. difficulties in feedstock supply
1. seasonality
2. perishability
3. storage
4. stochastic yields
5. logistics, hauling area, cost and transport
6. energy concentration
7. land competition and leakage
8. marginal lands and productivity
9. externalities, the dead zone, input use, water quality
10. lack of alternative markets, need for contracting, difficulties with increases in crop yields and processing plant efficiencies
11. opportunity cost of removing crop residues, nutrients, erosion and sequestration

F. Alternative sources of feedstock
1. Urban wastes
2. crop residues
3. marginal lands including their heterogeneity
4. energy crops
5. forests
6. forest byproducts
7. forest logging residue

G. other issues
1. rural development
2. jobs
3. land and water degradation
4. water consumption, availability and localized depletion
5. spatial monopolies
6. perennial versus annual and irreversible land uses
7. RINS
8. uncertainty and mandates
   a) relaxation under drought
   b) industrial uncertainty and relaxation – flex fuel cars and pumps
9. appraising innovation who is a charlatan
10. arguments for subsidization
11. regional comparative advantage
12. effects of agricultural technical change and agricultural prices
13. welfare to producers and consumers
14. liquid versus electricity for transport
15. including ccs

Required Textbook: There is no required textbook.

Suggested Reading: Articles and book chapters will be assigned by the instructors and made available via email or during class.
Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

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 (e.g., DVM, JD, MD, etc.)

2. Request submitted by (Department or Program Name):  
   Interdisciplinary Curricular Program in Energy, ICPE

3. Course prefix, number and complete title of course:  
   ICPE-612: Entrepreneurship in Energy

4. Catalog course description (not to exceed 50 words):  
   Focus on developing an understanding of the techniques and issues for growing emerging organizations in the energy field; participants will be guided through a range of issues faced by a venture team in building and growing a new organization or pursuing innovative projects inside existing organizations.

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  
   Will this course be repeated within the same semester?  
   ☐ Yes  ☐ No  
   If yes, this course may be taken _____ times.

8. Will this course be submitted to the Core Curriculum Council?  
   ☐ No  ☐ Yes

9. This course will be:
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)
      Executive Master of Science in Energy
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments.  
    Attach approval letters.

☐ I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vtr.tamu.edu/resources/export-controlbasics-for-distance-education).

12. Prefix  Course #  Title (excluding punctuation)
    ICPE  612  ENTREPRENEURSHIP IN ENERGY

    Lect.  Lab  SCH  CIP and Fund Code  Admin. Unit  Acad. Year  HCL Code
    1  5  1  5  5  2  0  7  0  1  0  0  1  6

    Approval recommended by:  
    Dr. Costas N. Geogiades  
    Date: 9/22/14

    Department Head or Program Chair (Type Name & Sign)  Date  Chair, College Review Committee
    Date: 9/22/14

    Department Head or Program Chair (Type Name & Sign)  Date  Dean of College
    (if cross-listed course)  
    Date: 10/28/14

    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 – 04/14
ICPE-612: Entrepreneurship in Energy

Term: Spring 2016
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5Credits

Instructor:
Dr. Richard H. Lester
Department of Management
Mays School of Business
Texas A&M University
College Station, TX 77843
Phone: 979-862-7091
Email: rlester@mays.tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
Entrepreneurship in Energy is focused on developing an understanding of the techniques and issues for growing emerging organizations in the energy field. This distinguishes the course from a business planning class in that participants will be guided through a range of issues faced by a venture team in building and growing a new organization or pursuing innovative projects inside existing organizations.

Entrepreneurship is often defined as "the pursuit of opportunity without regard to resources currently controlled." In this course the objective is to develop in you a different way of thinking and behaving that is appropriate for both established and nascent organizations. Many of our illustrations will come from activities and behavior related to new venture creation. However, entrepreneurship is neither for the meek and mild nor those who disdain ambiguity. Normally we view it for those who are self-motivated, willing to take calculated risks and learn from the inevitable failures that will occur along the way. We will also discover there is no certain profile for entrepreneurs; they come in many different sizes and shapes and characteristics. Our focus therefore is to develop in you an entrepreneurial mindset. This you will find is somewhat different from a managerial approach to problem solving.

The intellectual basis for the course is rooted in concepts garnered from the work of Eric Reis and Steve Blank regarding Lean Startup Methodology and the Business Model Canvas by Alexander Osterwalder.

Approach
Several methods of instruction are utilized: lectures, case discussions, workshops, group projects, and guest presentations. The core concepts and discussions are presented in the main sessions, which are led by the instructor. This course incorporates both individual and group efforts.
We accomplish course objectives by:

1. Studying entrepreneurship from application perspectives
2. Assessing the human set of knowledge, skills, talents and strengths for their suitability to influence new venture creation.
3. Learning to identify new opportunities and screen them.
4. Looking at new opportunities from the perspective of their underlying business model.
5. Developing a pre-business plan...what analysis and due-diligence must you do prior to deciding if the opportunity is worth pursuing.

Required Textbook: There is no required textbook.

Suggested Reading:
Articles and book chapters will be assigned by the instructors and made available via email or during class.

Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
- Read all required material.
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Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm two days after the last lecture. One letter grade will be deducted for each day past the deadline.

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<td>How to outshine the competition</td>
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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 (e.g., DVM, JD, MD, etc.)
2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy, ICPE
   ICPE-613: Natural and Shale Gas Monetization: Technologies, Fundamentals, Economics, and Applications
3. Course prefix, number and complete title of course:
4. Catalog course description (not to exceed 50 words): Focuses on the important role played by natural and shale gas in the energy market and the potentials to grow; major monetization processes including production, treatment, processing, and conversion; key economic and technical aspects as they pertain to the processing technologies and the supply chains of natural and shale gas.

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
   Will this course be repeated within the same semester? □ Yes   □ No
   If yes, this course may be taken ________ times.
8. Will this course be submitted to the Core Curriculum Council? □ Yes   □ No
9. This course will be:
   a. required for students enrolled in the following degree programs(s) (e.g., B.A. in history)
   Executive Master of Science in Energy
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

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

12. Prefix  Course #  Title (excluding punctuation)
ICPE  613  NATURAL AND SHALE GAS MONETIZATION

Lect.  Lab  SCH  CIP and Fund Code  Admin. Unit  Academic Year  HCE Code
1   5   1   5  1 4 0 7 0 1 0 0 0 6 1 5 - 1 6 0 0 3 6 3 2

Approval recommended by:

Dr. Costas N. Georgiades
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
Chair, GC & 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 – 04/14
ICPE-613: Natural and Shale Gas Monetization: Technologies, Fundamentals, Economics, and Applications

Term: Spring 2016
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructors:
Dr. Nimir Elbashir
Department of Chemical Engineering
Texas A&M University-Qatar
Doha, Qatar
Tel.: 974-4423-0128
Email: nimir.elbashir@qatar.tamu.edu
Office hours: by appointment

Dr. Mahmoud El-Halwagi
Texas A&M University
Artie McFerrin Department of Chemical Engineering
230 Jack E. Brown Engineering Building
3122 TAMU
College Station, TX 77843-3122
Tel: (979)-845-3484
Email: el-halwagi@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
This module highlights the important role played by natural and shale gas in the energy market and the potentials to grow. The module covers the major monetization processes including production, treatment, processing, and conversion. The key economic and technical aspects are discussed as they pertain to the processing technologies and the supply chains of natural and shale gas. The following topics will be covered:

- Gas production technologies
- Gas treatment technologies
- Monetization, pathways, and process technologies for shale and natural gas (e.g., liquefied natural gas “LNG”, gas-to-liquid “GTL”, gas-based chemical and petrochemical supply chains)
- Reaction and separation systems in gas monetization
- Importance of catalysis in natural gas conversion
- Ultra-clean fuels from natural and shale gas
- Process integration for conserving mass and energy resources in gas processing
- Capital cost estimation for gas-processing facilities
- Operating cost estimation for gas-processing facilities
- Profitability analysis for gas-processing facilities

Required Textbook: There is no required textbook.

Suggested Reading:
Articles and book chapters will be assigned by the instructors and made available via email or during class.

Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
- Read all required material.
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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.

Catalog course description (not to exceed 50 words):
Introduction to the goals and methods of CO2 sequestration in the subsurface and of monitoring its effectiveness; discussion and explanation of current technological challenges and problems in monitoring CO2 in the subsurface and in implementing sequestration for mitigating climate change; addresses how carbon is transferred between atmosphere, hydrosphere, biosphere and geosphere by natural processes; basic geologic processes influencing sequestration programs.

5. Prerequisite(s):

6. Is this a variable credit course? Yes No

7. Is this a repeatable course? Yes No

8. Will this course be submitted to the Core Curriculum Council? Yes No

9. 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)

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

11. I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-control-basics-for-distance-education).

12. Prefix Course # Title (excluding punctuation)

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Approval recommended by:

Dr. Costas N. Geophichis
Department Head or Program Chair (Type Name & Sign) Date 9/25/14

Department Head or Program Chair (Type Name & Sign) Date 9/22/14

Submitted to Coordinating Board by:

Associate Director, Curricular Services Date 10/20/14

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu
Curricular Services – 04/14
ICPE-614: CO2 Sequestration

Term: Spring 2016
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructor:
Dr. Richard Gibson
Department of Geology and Geophysics
Texas A&M University
Room 351, Halbouty
College Station, TX 77843
Tel.: 979-862-8653
Email: Gibson@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
This module will focus on:
• Explaining the goals and methods of CO2 sequestration in the subsurface and of monitoring its effectiveness
• Identifying and explain current technological challenges and problems in monitoring CO2 in the subsurface and in implementing sequestration for mitigating climate change
• Understanding how carbon is transferred between atmosphere, hydrosphere, biosphere and geosphere by natural processes; basic geologic processes influencing sequestration programs

It will cover the following topics:
1. CO2 and climate
1.1. Overview of CO2 in the atmosphere and climate change – recent and in deep time
1.2. Carbon cycle – exchange of carbon between major Earth systems: geosphere, hydrosphere, biosphere and atmosphere; important geologic processes
1.3. Comparison of natural processes and industrial activity on carbon levels
2. Carbon Capture and Sequestration (CCS) as a solution to global climate change
2.1. Definitions and examples of sequestration; mechanisms for storage; capture technologies
2.2. Sequestration sites – geological settings, rock properties, relationship to petroleum exploration activities [potential guest lecturer - geologist]
2.3. Injection of CO2 – physical properties of CO2; flow processes; rock properties controlling flow [potential guest lecturer – petroleum engineer]
2.4. Summary – optimal sequestration sites; global capacity and requirements for mitigating global climate change
3. Technological challenges and problems
3.1. Long term storage goals; leakage potential and effectiveness of capture; consequences of leakage to environment, including groundwater
3.2. Monitoring and verifying CO₂ storage in the subsurface: overview; accuracy requirements
3.3. Seismic monitoring of CO₂ movement and leakage detection; relationship to geology and rock properties; examples of seismic methods
3.4. Alternative geophysical techniques: gravity, electromagnetic, well data
3.5. Geochemical sampling of borehole fluids and direct measurement of leakage
4. Other risks and challenges
4.1. Public perception and cost; alternative energy solutions
5. Summary
5.1. Current state of the art in CO₂ sequestration – major existing projects
5.2. Ongoing research efforts – what questions need to be answered? What is required to make sequestration a major means of CCS? Can sequestration be applied on the scales required for significant impact on climate

**Required Textbook:** There is no required textbook.

**Suggested Reading:** Articles and book chapters will be assigned by the instructor and made available via email or during class.

**Course requirements:**
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07).
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

**Grading:** Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final exam 50%.

**Grade scale:** 90-100 A; 80-89 B; 70-79 C; 60-69 D; <50 F

**Take home exam:** due by 4:00pm two days after the last lecture. One letter grade will be deducted for each day past the deadline.

**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](http://aggiehonor.tamu.edu). Please pay close attention to guidelines on avoiding plagiarism: [http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx](http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx)

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
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 (e.g., DVM, JD, MD, etc.)

2. Request submitted by (Department or Program Name):  Interdisciplinary Curricular Program in Energy, ICPE

3. Course prefix, number and complete title of course:  ICPE-615: Smart Grid Fundamentals

4. Catalog course description (not to exceed 50 words):  Fundamentals of electricity grid development, monitoring, control and protection; renewable generation; microgrids and grid integration; electricity markets; long term planning and associated risk, and grid robustness.

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. This course will be:
   a. required for students enrolled in the following degree programs(s) (e.g., B.A. in history)
   b. elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

10. Executive Master of Science in Energy

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. Approval recommended by:

Dr. Costas N. Georgiades
Department Head or Program Chair (Type Name & Sign)  Date

Department Head or Program Chair (Type Name & Sign)
(If cross-listed course)

Submitted to Coordinating Board by:

Associate Director, Curricular Services

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

Curricular Services – 04/14
ICPE-615: Smart Grid Fundamentals

Term:           Fall 2015
Day:            MTuWThF
Time:           TBD (4.4hrs/day)
Location:       TBD
Number of Credits: 1.5Credits

Instructors:
Dr. Mladen Kezunovic
Department of Electrical Engineering
Texas A&M University
323C WEB
College Station, TX 77843
Tel: 979-845-7509
Email: kezunov@ece.tamu.edu
Office hours: by appointment

Dr. Chanan Singh
Department of Electrical Engineering
Texas A&M University
3011 WEB
College Station, TX 77843
Tel: 979-862-1553
Email: singh@ece.tamu.edu
Office hours: by appointment

Dr. Le Xie
Department of Electrical Engineering
Texas A&M University
301H WEB
College Station, TX 77843
Tel: 979-845-7563
Email: lxie@ece.tamu.edu
Office hours: by appointment

Dr. Robert Balog
Department of Electrical Engineering
Texas A&M University
205D WEB
College Station, TX 77843
Tel: 979-862-4985
Email: rbalog@ece.tamu.edu
Office hours: by appointment
Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
The course will cover the following topics:

1. Electricity grid development (M.K.):
   - History of development of electricity systems
   - Challenges of future grid developments
   - Smart Grid requirements and expected impacts

2. Monitoring, Control and Protection (M.K.)
   - How the electricity grid is controlled today and what are future control concepts
   - The role of Big Data
   - Outage and asset management

3. Renewable generation (R.B., L.X.)
   - Overview of non-thermal generation
   - Understanding energy availability and mitigation of renewable intermittency
   - Opportunities to serve load while alleviating congestion on distribution feeder system

4. Microgrids and grid integration (R.B.)
   - New concepts for “last mile” of distribution at the point-of-use including variable
     voltage, variable frequency (including DC) distribution feeder systems
   - Grid-interactive codes and standards for interconnection and safety
   - Mitigation of variability at PCC for utility, quality of service (QOS) as a system
     design considerations

5. Electricity markets (L.X.)
   - Foundations of Energy Economics
   - Locational Marginal Price and Power Market Operations
   - Challenges and Opportunities in Market Design in Support of Smart Grid

6. Customer participation (L.X.)
   - Background of Demand Response
   - Models and Types of Demand Response
   - Customer Participation in Wholesale and Retail Level

7. Operational and long term planning and associated risk (C.S.)
   - An overview of the operational and long term planning process
   - The conventional and new sources of uncertainty
   - Models for planning and risk management

8. Reliability and grid robustness (C.S.)
   - New sources of potential reliability issues in the smart grid
   - How can the reliability and grid robustness be assured
   - Models and methods for reliability forecasting and assurance
Required Textbook: There is no required textbook.

Suggested Reading:
- Articles and book chapters will be assigned by the instructors and made available via email or during class.

Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07).
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

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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  □ Graduat e  □ First Professional (e.g., DPM, JD, MD, etc.)
2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy, ICPE
3. Course prefix, number and complete title of course: ICPE-616: Multi-functional Materials for Energy Conversion
4. Catalog course description (not to exceed 50 words): Focus on the two most important multi-functional materials (MFM s): piezoelectric materials and shape memory alloys (SMAs); understanding the materials, and how devices are designed using these materials; energy conversion will be studied via: (1) actuators that convert electrical or thermal energy into mechanical work; and (2) energy harvesting, in which mechanical work is converted into electrical energy.

5. Prerequisite(s):  Graduate classification
Cross-listed with:  □ Yes  □ No  If yes, from _______ to _______
Stacked with:  □ Yes  □ No

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. 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)
   Executive Master of Science in Energy

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments.  Attach approval letters.
11. □ 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).

12. Prefix  Course #  Title (excluding punctuation)
   ICPE  616  MULTI-FUNCTIONAL MATERIALS FOR

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Approval recommended by:
Dr. Costas N. Georgilakis  8/23/14
Department Head or Program Chair (Type Name & Sign)  Date
Chair, College Review Committee  9/23/14  Date

Department Head or Program Chair (Type Name & Sign)  Date
Dean of College  10/20/14  Date

Submitted to Coordinating Board by:
Chair, GC or UCC  10/20/14  Date
Effective Date  10/20/14

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 04/14
ICPE-616: Multi-functional Materials for Energy Conversion

Term: Fall 2015
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5Credits

Instructors:
Dr. James G. Boyd
Department of Aerospace Engineering
Texas A&M University
741C HRBB
College Station, TX 77843
Tel.: 979-458-0419
Email: jboyd@tamu.edu
Office hours: by appointment

Dr. Dimitris Lagoudas
Department of Aerospace Engineering
Texas A&M University
109C HRBB
College Station, TX 77843
Tel.: 979-845-1604
Email: d-lagoudas@tamu.edu
Office hours: by appointment

Dr. Raymundo Arroyave
Department of Materials Science and Engineering
Texas A&M University
522 MEOB
College Station, TX 77843
Tel.: 979-845-5416
Email: rarroyave@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
This course module will focus on the two most important multi-functional materials (MFMs): piezoelectric materials and shape memory alloys (SMAs). There are two parts to the course: understanding the materials, and understanding how devices are designed using these materials. Energy conversion will be studies from two aspects: (1) Actuators that convert electrical or
thermal energy into mechanical work; and (2) Energy harvesting, in which mechanical work is converted into electrical energy.

The course meets four hours per day for five consecutive days. We will divide the course into ten 2.2 hour lectures.

**Lecture 1:**
Introduction to MFMs; energy conversion; performance comparison of MFMs using energy density, frequency, efficiency, etc.; current and future industrial applications.

**Lecture 2:**
Materials science of coupled fields, thermodynamic potentials.

**Lecture 3:**
Materials science of coupled fields, thermodynamic potentials.

**Lecture 4:**
Piezoelectrics – electrical aspects: definitions of free charge, bound charge, polarization charge, electric polarization, electric displacement, electric field; 1-D forms of Gauss law and Faraday’s law.

**Lecture 5:**
Piezoelectrics – mechanical aspects: solid mechanics in 1-D: strain-displacement equations; mechanical equilibrium; elasticity.

**Lecture 6:**
Piezoelectrics: combined electrical and mechanical equations.

**Lecture 7:**
Piezoelectrics: device design for piezoelectric stacks and bending bimorphs.

**Lecture 8:**
Shape memory alloys: phase diagrams

**Lecture 9:**
Shape memory alloys: shape memory effect.

**Lecture 10:**
Shape memory alloys: pseudoelasticity

**Required Textbook:** There is no required textbook.

**Suggested Reading:**
Articles and book chapters will be assigned by the instructors and made available via email or during class.

**Course requirements:**
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07).
- Read all required material.
- Participate actively in discussions.
• Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

**Grading:** Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

**Grade scale:** 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

**Take home exam:** due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

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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 (e.g., DVM, JD, MD, etc.)

2. Request submitted by (Department or Program Name):  
   Interdisciplinary Curricular Program in Energy, ICPE

3. Course prefix, number and complete title of course:  
   ICPE-617: Gas Separations for Energy: Fundamentals, Applications and New Directions

4. Catalog course description (not to exceed 50 words):  
   Robust foundation of advanced expertise in gas separation technologies including (i) solid-phase adsorbent technologies, (ii) liquid amine-based adsorption technologies, (iii) polymeric and inorganic membrane technologies, and (iv) emerging reactive separation concepts for process intensification.

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. 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)

10. Executive Master of Science in Energy

11. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

   □ I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-controls/export-control-basics-for-distance-education).

12. | Prefix | Course # | Title (excluding punctuation) |
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</table>

Approval recommended by:  
Dr. Costas N. Georghiades  
Department Head or Program Chair (Type Name & Sign)  
Date  
Chair, College Review Committee  
Date

Department Head or Program Chair (Type Name & Sign)  
Date  
Dean of College  
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 – 04/14
ICPE-617: Gas Separations for Energy: Fundamentals, Applications and New Directions

Term: Fall 2015
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5Credits

Instructor:
Dr. Benjamin A. Wilhite
Texas A&M University
Artie McFerrin Department of Chemical Engineering
226 Jack E. Brown Engineering Building
3122 TAMU
College Station, TX 77843-3122
Tel: (979)-845-0406
Email: benjaminwilhite@mail.che.tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
A central challenge to the existing energy industry (oil & natural gas processing) is the separation and purification of fuel-grade chemicals. For example, the distillation of petroleum into liquid fuels (kerosenes, gasoline, diesels) remains a lynchpin to the refining of raw petroleum. Existing gas separation technologies are primarily employed for oxygen and/or nitrogen enrichment from air, recovery of refinery hydrogen from cracking and reformer units, and carbon dioxide sequestration. The rapidly expanding natural gas and shale gas industry will require significant expansion of gas separation capacity for removing nitrogen, carbon dioxide and water from well-head natural gas. This course will provide a robust foundation of advanced expertise in gas separation technologies including (i) solid-phase adsorbent technologies, (ii) liquid amine-based adsorption technologies, (iii) polymeric and inorganic membrane technologies, and (iv) emerging reactive separation concepts for process intensification.

Course Content: The course will span the following topics to prepare students with both a qualitative understanding of existing and emerging technologies for gas separations and a quantitative understanding of the design and analysis of these technologies:

Section II: Gas-Liquid Separations. Review of existing absorption tower and stripping tower applications and designs. Derivation of design equations and graphical techniques (McCabe-Thiele diagrams) for sizing gas-liquid stripping and absorption/adsorption columns. [5.5 hours]

Section III: Gas-Solid Separations. Review of existing pressure-swing adsorption and desulfurization systems for natural gas processing. Derivation of design equations and graphical techniques for adsorbent evaluation and process scale-up. Discussion of emerging reactive-separation concepts (e.g., sorption-enhanced reforming processes) for advanced natural gas processing. [5.5 hours]

Section IV: Gas Membrane Separations. Review of membrane technology from 1970's to present and present challenges/needs. Discussion of polymeric membranes for light-gas separations and their limitations (e.g., Robeson's upper boundary). Discussion of inorganic membranes based upon carbon molecular sieves, zeolites and metal-organic frameworks. Derivation of design equations for evaluating membrane processes. [5.5 hours]

Required Textbook:
“Transport Processes and Separation Process Principles” by C.J. Geankoplis

Suggested Reading:
Articles, monographs, and book chapters will be assigned by the instructors and made available via email or during class.

Course requirements:
• Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
• Read all required material.
• Participate actively in discussions.
• Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

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Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

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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 (ex., J0M, J0D, M0, etc.)

2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy, ICPE

3. Course prefix, number and complete title of course: ICPE-618: Carbon Capture, Utilization and Storage, CCUS

4. Catalog course description (not to exceed 50 words): Introduction to technologies for carbon capture, modeling and technoeconomic analysis and comparison of different carbon capture technologies, and economics of carbon capture, utilization, and storage statewide and nationwide.

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?  Ð Yes  ☒ No  If yes, from ________ to ________

7. Is this a repeatable course?  Ð Yes  ☒ No  If yes, this course may be taken ________ times.

8. Will this course be repeated within the same semester?  Ð Yes  ☒ No

9. Will this course be submitted to the Core Curriculum Council?  ☒ Yes  □ No

   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)

   Executive Master of Science in Energy

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

11. ☒ I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-controls/export-control-basics-for-distance-education).

12. Prefix  Course #  Title (excluding punctuation)

   ICPE  618  CARBON CAPTURE, UTILIZATION AN

   Lect.  Lab  SCH  CIP and Fund Code  Admin. Unit  Acad. Year  HUC Code
   1  5  1  1  4  0  7  0  1  0  0  0  0  6

   Approval recommended by:

   Dr. Costas N. Georgiades
   Department Head or Program Chair (Type Name & Sign)  9/24/14
   Date

   Chair, College Review Committee
   9/24/14
   Date

   Dean of College
   10/23/14
   Date

   Chair, GC or UCC
   10/23/14
   Date

   Submitted to Coordinating Board by:

   Date

   Effective Date

Questions regarding this form should be directed to Sandra Williams at 845.8201 or sandra.williams@tamu.edu.
Curricular Services – 04/14
ICPE-618: Carbon Capture, Utilization and Storage, (CCUS)

Term: Fall 2015
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5Credits

Instructor:
Dr. Faruque M.M. Hasan
Texas A&M University
Artie McFerrin Department of Chemical Engineering
241 Jack E. Brown Engineering Building
3122 TAMU
College Station, TX 77843-3122
Tel: (979)-862-1449
Email: hasan@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
The course will cover the following topics:

Day 1 (hour 1 – 4): Introduction to Carbon Capture and Storage
1. CO₂ emissions from energy and other sectors, relation with global-warming and climate change
2. Terminologies: power plant, flue gas, stationary source, parasitic loss, energy penalty, CO₂ captured, CO₂ avoided, CO₂ capture, CO₂ sequestration, feed dehydration, compression, purity, recovery, CO₂ injection, CO₂-EOR (enhanced oil recovery)
3. How to address the grand challenge of “energy and the environment”; Description of a general CO₂ capture, utilization and storage (CCUS) framework
4. CCUS potentials; Current CCUS status; Factors affecting the CCUS costs

Day 2 (hour 5 – 9): Technical Review of Carbon Capture Processes
5. Overview of CO₂ capture alternatives: post-combustion, pre-combustion and oxycombustion technologies for CO₂ capture; Absorption, adsorption, membrane, cryogenic, chemical looping, and microbial processes for CO₂ capture; Direct air capture.
6. Absorption-based CO₂ capture: MEA absorption, process configuration, flowsheet optimization, heat integration
7. Adsorption-based CO₂ capture: Pressure swing adsorption, vacuum swing adsorption, cyclic process design, grey-box modeling and optimization for CO₂ capture
8. Membrane-based CO₂ capture: multi-stage and multi-component process configuration, membrane model, analysis of membrane processes

Day 3 (hour 10 – 14): Technology Comparison for Carbon Capture
9. Materials and processes for capture; Introduction to Zeolites, Metal Organic Frameworks (MOFs) for CO₂ capture, Multi-scale framework for adsorbent (zeolite) screening
10. Solvent (amines, ionic liquids) selection for the absorption-based CO₂ capture
11. Membrane selection for the membrane-based CO₂ capture
12. Technology comparison for CO₂ capture: Capture costs of various materials and processes

13. CO₂ transportation, CO₂-based enhanced oil recovery, CO₂ sequestration and geological storage alternatives
14. How to select the most cost-effective materials, processes and networks for CCUS networks: mixed integer programming for CCUS supply chain network optimization
15. Case study 1: State-wide CO₂ management in Texas
16. Case study 2: Nationwide CO₂ management in the U.S.A.

Day 5 (hour 19 – 22): Other issues related to CCUS
17. CCUS implementation: retrofitting power plants, process integration, scale up, safety, uncertainty, storage and monitoring
18. Policy issues: carbon tax, carbon trading, electricity prices and capture costs
19. Alternative approaches to CO₂ utilization from CCUS
20. Future opportunities in CCUS

Required Textbook: There is no required textbook.

Suggested Reading:


**Course requirements:**
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07).
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

**Grading:** Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

**Grade scale:** 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

**Take home exam:** due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

**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](http://disability.tamu.edu).

**Academic Integrity:** For additional information please visit: [http://aggiehonor.tamu.edu](http://aggiehonor.tamu.edu). Please pay close attention to guidelines on avoiding plagiarism: [http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx](http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx)

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
5 Derivation and application of Thermal Stress Approx.
6 Derivation of Shear Center for various cross-sections
7 EXAM #1 (in class)
8 Application of Beams on Elastic Foundations to practical structural problems
9 Continue.....Application of Beam on Elastic Foundation to practical structural problems
10 Application of Plastic Hinges (Plasticity)
11 Continue .....Application of Plastic Hinges (Plasticity)
12 Application of Castigliano’s Theorem
   EXAM #2 (in class)
12 Continue ------ Application of Castigliano's Theorem
Graduate Project #2 (to be determined) i. e. Use of Castigliano’s Theorem to determine the
displacement, stresses and loads in a complex structure. May need to write a brief report.
14 Machine Design Considerations

COURSE LEARNING OUTCOMES: At the end of this course, students should be able to:

1. determine response of structural members undergoing extensional, bending and
twisting deformations
2. understand and calculate the response of materials and structures subject to various loading
   conditions
3. analyze response of structural members (bars, beams, plates) with coupled axial, bending, and
twisting
4. derive the critical buckling (instability) of beams with various end conditions and supports along
   the beam.
5. set-up governing equations for deformation in structures
6. use energy methods to calculate deformations, unknown forces and stresses in multifunctional
   and shaped structures
7. determine the interface forces, stress in members of a complex multi-component structure using
   beams on elastic foundations
8. determine the instability of thin walled structural members due to bending ans compression loads
9. determine the stresses and displacement in composite beams
10. determine the approximate thermal stress and displacement in members subject to thermal
    gradients
11. determine the critical failure load in beams with multiple supports using plastic hinge (plasticity)
12. determine the stress and deflection in curved beams of various cross-sections
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  (e.g., DVM, JD, MD, etc.)
2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy, ICPE
3. Course prefix, number and complete title of course: ICPE-619: Nanomaterials Engineering and Energy Storage
4. Catalog course description (not to exceed 50 words): Nanomaterial synthesis and processing with an emphasis on the creation of materials relevant to energy storage (batteries, capacitors, etc.). Prior knowledge of an undergraduate engineering level of familiarity of chemistry and physics is desirable

5. Prerequisite(s):
Graduate classification; Prior knowledge of an undergraduate engineering level of familiarity of chemistry and physics is desirable.
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. This course will be:
a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)
   Executive Master of Science in Energy
b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)
   [signature]

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments.
   Attach approval letters.

11. □ I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-controls/export-control-basics-for-distance-education).

12. Prefix  Course #  Title (excluding punctuation)
    ICPE  619  NANOMATERIALS ENGINEERING AND

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Approval recommended by:

[Signature]  9/22/14

Department Head or Program Chair (Type Name & Sign)  Date
Chair, College Review Committee  Date

[Signature]  9/22/14

Department Head or Program Chair (Type Name & Sign)  Date
Dean of College  Date

[Signature]  10/20/14

Submitted to Coordinating Board by:

Chair, GC or UCC  Date  Effective Date

[Signature]  Date

Associate Director, Curricular Services  Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 04/14
ICPE-619: Nanomaterials Engineering and Energy Storage

Term: Spring 2016
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructors:
Dr. Jodie Lutkenhaus
Texas A&M University
Artie McFerrin Department of Chemical Engineering
218 Jack E. Brown Engineering Building
3122 TAMU
College Station, TX 77843-3122
Tel: (979)-845-2682
Email: jodie.lutkenhaus@che.tamu.edu
Office hours: by appointment

Dr. Micah Green
Texas A&M University
Artie McFerrin Department of Chemical Engineering
202 Jack E. Brown Engineering Building
3122 TAMU
College Station, TX 77843-3122
Tel: (979)-862-1588
Email: micah.green@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
Nanomaterials offer unique properties for energy storage applications and are poised to enable a new generation of high capacity batteries, high-power supercapacitors, and flexible power sources. Specifically, nanomaterials offer high surface area, catalytic activity, structural reinforcement, and conductivity, depending on the chemistry, structure, and manner in which they are processed. Examples of promising nanomaterials include carbon nanotubes, graphene, porous carbons, hybrid nanocomposites, and electroactive polymers.
This module will cover the broad area of nanomaterial synthesis and processing with an emphasis on the creation of materials relevant to energy storage (batteries, capacitors, etc.). Prior knowledge of an undergraduate engineering level of familiarity of chemistry and physics is desirable.

Course content: This course will introduce students to the basics of nanomaterials in energy storage applications. Initially, students will learn the basics of energy storage applications and operations, followed by an overview of the unique structure, properties, and intermolecular interactions of nanomaterials in electrodes and electrolytes. The course will then cover nanomaterials synthesis (or isolation from bulk materials) and purification techniques; students will learn about the current processing challenges related to the scalable production of nanomaterials and associated quantity-quality tradeoffs. Particular emphasis will be directed toward how synthesis, doping, chemical functionalization, and liquid-phase processing can control the structure and surface chemistry of nanomaterial-based electrodes in batteries and supercapacitors. Students will learn the state-of-the-art techniques for how processing can enable both top-down templating of nanostructured materials as well as bottom-up self-assembly of films and porous structures. The multifunctional nature of these nanostructured materials will also be covered to show how energy storage may be coupled with structural or sensing needs. The final portion of the course will provide an overview of current research directions in regard to meet industrial energy needs in a manner that addresses scalability, environmental, and health concerns; this portion is particularly critical as industrial interest in nanomaterials increases and regulatory agencies form policies for nanomaterial production, handling, and disposal.

Course outcomes: Each student will exit the module with an understanding of nanomaterials chemistry for use in energy storage applications, with an emphasis on the fundamentals of processing-structure-property relations.

Required Textbook: There is no required textbook.

Suggested Reading:
Articles and book chapters will be assigned by the instructors and made available via email or during class.

Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F
Take home exam: due by 4:00 pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

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Academic Integrity: For additional information please visit: http://aggiehonor.tamu.edu. Please pay close attention to guidelines on avoiding plagiarism: http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
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 (e.g., DPM, JD, MD, etc.)

2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy, ICPE

3. Course prefix, number and complete title of course: ICPE-620: Thermoelectric Materials and Devices

4. Catalog course description (not to exceed 50 words): Methods useful for the synthesis of both bulk crystals and nanomaterials (nanoparticles and nanowires); focus on the underlying thermodynamics and kinetic principles involved in the synthesis of these materials; pathways useful for the integration of nanomaterials into functional thermoelectric devices, methods useful for ascertaining the thermoelectric performance of materials and devices.

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. 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)

   Executive Master of Science in Energy

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments.
    Attach approval letters.

11. I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-control/export-control-basics-for-distance-education).

12. Prefix  Course #  Title (excluding punctuation)
    ICPE  620  THERMOELECTRIC MATERIALS AND D

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Approval recommended by:

Dr. Costas N. Georghiou
Department Head or Program Chair (Type Name & Sign)  Date  3/22/14

Chair, College Review Committee  Date  9/22/14

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

Dean of College  Date  10/20/14

Submitted to Coordinating Board by:

Associate Director, Curricular Services  Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu
Curricular Services – 04/14
ICPE-620: Thermoelectric Materials and Devices

Term: Fall 2015
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructor:
Dr. Sreeram Vaddiraju
Texas A&M University
Artie McFerrin Department of Chemical Engineering
237 Jack E. Brown Engineering Building
3122 TAMU
College Station, TX 77843-3122
Tel:(979)-862-1615
Email: sreeram.vaddiraju@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course Description:

- **Fundamental semiconductor physics**: Introduction to metals, semiconductors and insulators, electronic properties of semiconductors
- **Bulk semiconductor crystal synthesis**: Czochralski process and Bridgman process
- **Inorganic nanomaterials synthesis**: quantum dot and inorganic nanoparticle synthesis, inorganic one-dimensional structure synthesis (nanotubes, nanowires, nanobelts, hierarchical branched nanowires, nanowire superlattices) and superlattice thin films
- **Assembly of nanomaterials**: layer-by-layer assembly, assembly using Langmuir-Blodgett films, epitaxy, pelletization and sintering, printing, spin-casting and doctor-blade techniques.
- **Thermoelectric materials synthesis**: Synthesis of bulk crystals and nanostructures of clathrates, silicides, skutterudites, oxides and half-Heusler alloys
- **Fabrication and Testing of Thermoelectrics**: Fabrication of thermoelectrics from bulk semiconductor crystals and nanomaterials, analysis of the performance of thermoelectric materials and devices

**Course Objectives:**

- Upon completion of this class, the students will gain insight into the methods useful for the synthesis of both bulk crystals and nanomaterials (nanoparticles and nanowires), and understand the underlying thermodynamics and kinetic principles involved in the synthesis of
these materials. The students will also learn the pathways useful for the integration of nanomaterials into functional thermoelectric devices. Finally, the students will learn methods useful for ascertaining the thermoelectric performance of materials and devices.

### Tentative Course Schedule:

<table>
<thead>
<tr>
<th>Topics (timeline)</th>
<th>Reading Material</th>
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<tr>
<td>Introduction and fundamentals of semiconductor physics</td>
<td>Instructor notes</td>
</tr>
<tr>
<td>Bulk crystal growth, doping of semiconductors, p-n junctions</td>
<td>Instructor notes</td>
</tr>
<tr>
<td>Nanomaterial (nanoparticle) synthesis, nanowire synthesis using liquid phase techniques, template-based, template-free methods for nanowire synthesis</td>
<td>References 3 and 4</td>
</tr>
<tr>
<td>Nucleation and growth aspects of nanowire synthesis</td>
<td>References 3 and 4</td>
</tr>
<tr>
<td>Assembly of nanowires, epitaxy, self-assembly, assembly using shear forces</td>
<td>Instructor notes</td>
</tr>
<tr>
<td>Seebeck effect, Thermoelectrics, fundamental operating principles and methods for testing thermoelectric performance</td>
<td>References 1 and 2</td>
</tr>
<tr>
<td>Synthesis of bulk crystals and nanostructures of clathrates, silicides, skutterudites, oxides and half-Heusler alloys; and fabrication and testing of thermoelectrics based on these materials</td>
<td>References 1 and 2, instructor notes</td>
</tr>
<tr>
<td>Nanomaterial-based thermoelectrics and their efficiencies</td>
<td>Reference 1</td>
</tr>
</tbody>
</table>

### Suggested Textbooks and Reading:

2. CRC Handbook of Thermoelectrics, Edited by D. M. Rowe, CRC Press 1995 (E-book available through TAMU library)

### Course requirements:

- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07).
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.
Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

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Academic Integrity: For additional information please visit: http://aggiehonor.tamu.edu. Please pay close attention to guidelines on avoiding plagiarism:
http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
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 (e.g., DVM, JD, MD, etc.)

2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy, ICPE

3. Course prefix, number and complete title of course: ICPE-621: THERMOELECTRICS: FUNDAMENTALS OF ELECTRONIC AND THERMAL TRANSPORT

4. Catalog course description (not to exceed 50 words): Fundamentals of electronic and phononic transport phenomena; understanding of thermodynamics and transport properties from a microscopic viewpoint; thermal transport theories for analyzing and designing energy conversion devices, nanomaterials, microelectronics, and nano/micro-electromechanical systems (NEMS/MEMS).

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. This course will be:
   a. required for students enrolled in the following degree program(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)

   Executive Master of Science in Energy

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

11. ☒ I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-control/basics-for-distance-education).

12. Prefix  Course #  Title (excluding punctuation)
    ICPE  621  THERMOELECTRICS: FUNDAMENTALS

    | Lect. | Lab | SCH | CPI and Fund Code | Admin. Unit | Acad. Year | NOTE Code |
    |-------|-----|-----|-------------------|-------------|------------|-----------|
    | 1     | 5   | 1   | 1419010000        | 15 - 16     | 00        | 3632      |

    Approval recommended by:

    Dr. Costas N. Geophiades  9/12/14
    Department Head or Program Chair (Type Name & Sign)  Date

    Chair, College Review Committee  9/23/14
    Date

    Department Head or Program Chair (Type Name & Sign)  9/12/14
    (if cross-listed course)

    Dean of College  10/20/14
    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 – 04/14
ICPE-621: Thermoelectrics: Fundamentals of Electronic and Thermal Transport

Term: Spring 2016
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructor:
Dr. Choongho Yu
Texas A&M University
Department of Mechanical Engineering
312 MEOB
College Station, TX 77843
Tel:(979)-862-1073
Email: chyu@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
This course introduces the fundamentals of electronic and phononic transport phenomena. The main focuses and learning outcomes are:

(i) An understanding of thermodynamics and transport properties from a microscopic viewpoint;
(ii) Thermal transport theories for analyzing and designing energy conversion devices, nanomaterials, microelectronics, and nano/micro-electromechanical systems (NEMS/MEMS).

The course covers the following topics:

- Kinetic theory - Transport properties
- Maxwell Boltzmann equilibrium distribution
- Crystal structure of solids; reciprocal lattice
- Lattice vibrations: acoustic and optical modes
- Phonons: energy quantization, Bose-Einstein statistics
- Phonon specific heat
- Phonon scattering and thermal transport
- Free electron model of metals- Fermi Dirac statistics
- Internal energy; Specific heat and thermal conductivity of electrons
- Electron scattering, Thermal and electrical transport
- Semiconductors
- Band structure of semiconductors
- Carrier densities
- Drude model
- Phonon-electron interactions
- Boltzmann transport theory – Basic/conservation equations

Suggested Textbooks and Reading


Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07).
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

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Take home exam: due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

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Academic Integrity: For additional information please visit: [http://aggiehonor.tamu.edu](http://aggiehonor.tamu.edu). Please pay close attention to guidelines on avoiding plagiarism: [http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx](http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx)

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
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 (ex., DVM, JD, MD, etc.)
2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy, ICPE
3. Course prefix, number and complete title of course: ICPE-622: Energy Efficiency in Buildings
4. Catalog course description (not to exceed 50 words): Introduction to energy efficiency in buildings; understanding the energy use in buildings, the heating and cooling requirements, the role of renewable energy resources, the impact of lighting, the role of optimal control measures in existing and new buildings, the verification of energy savings, and the building energy simulation.

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
   Will this course be repeated within the same semester?  □ Yes  □ No
   If yes, this course may be taken _____ times.

8. Will this course be submitted to the Core Curriculum Council?  □ Yes  □ No

9. 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)

Executive Master of Science in Energy

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

12. Prefix  Course #  Title (excluding punctuation)
    ICPE  622  ENERGY EFFICIENCY IN BUILDINGS

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Approval recommended by:
Dr. Costas N. Georgiades
Department Head or Program Chair (Type Name & Sign) Date 9/22/14
Chair, College Review Committee Date 9/22/14
Department Head or Program Chair (Type Name & Sign) Date 10/20/14
Dean of College Date

Submitted to Coordinating Board by:
Associate Director, Curricular Services

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu.
Curricular Services – 04/14
ICPE-622: Energy Efficiency in Buildings

Term: Spring 2016
Day: MTuWThF
Time: TBD (4.4hrs/day)

Location: TBD
Number of Credits: 1.5 Credits

Instructors:
Dr. David Claridge
Department of Mechanical Engineering
Texas A&M University
327 MEOB
College Station, TX 77843
Tel.: 979-845-1280
Email: dclaridge@tamu.edu
Office hours: by appointment

Dr. Charles Culp
Department of Architecture
Texas A&M University
A17 Langford
College Station, TX 77843
Tel.: 979-458-3600
Email: cculp@tamu.edu
Office hours: by appointment

Course description:
The course covers the following topics:

1. Introduction to Energy Efficiency in Buildings (~ 60 slides, with 2 exercises)
   - Learning: Understand the current and projected impact of energy use and methods that can be used to reduce consumption and maintain comfort.
   - Define the issue and where energy is used
   - Show changes over time
   - Show impact on world
   - What are the limits of energy efficiency?
   - Discuss pollution — causes and cures
   - Introduce global warming (true / false?)
   - Exercise 1. Pose a dire problem and have students work through a solution.
   - Exercise 2. Define sustainability and write a two page summary on impact and solution.

2. Building Energy Use / Building Design (~ 60 slides, with 2 exercises)
   - Learning: Understand pictorially and with rough calculations how/when buildings use the various energy sources. The final exercise will be a spreadsheet calculation which enables students to see the impact of each load.
   - Show residential building energy flows
   - Show commercial building energy flows
Discuss heat flow in walls, windows and roofs and magnitude of impact
Discuss lighting and plug loads and their impact on heating and cooling
Discuss solar gains and impact on heating and cooling
Discuss heat flows to the ground and impact on heating and cooling
Exercise 1. List the energy gains and losses and estimate the relative magnitude on the building in a) a peak summer day, b) a low temperature winter day, and c) an average day in September.
Exercise 2. Create a spreadsheet which calculates hourly energy consumption for a building with large solar heat gain. This will be set up in class and given as homework.

3. Building Heating and Cooling Equipment (~ 60 slides, with 2 exercises)
Learning: Understand pictorially what equipment is used in buildings and the function and impact of each component.
Heating and cooling equipment - chillers, boilers, DHW
Getting heating and cooling to occupants - air handler units, pumps, ducts, piping and efficiency issues
Building controls from thermostats to energy management systems and control (EMCS)
Exercise 1. Start with a building diagram and locate the water and air side equipment. Also include the piping routing and air duct routing. The idea is to have the students understand the tradeoffs that get made.
Exercise 2. Draw an air flow diagram with each of the main components and list their function.

4. Renewable Energy (~ 60 slides, with 2 exercises)
Learning: Understand pictorially renewable energy sources and there technical strengths / weaknesses.
Show windmills with pictures. Start with a US map showing good areas. Cover the types of applications / sizes of windmills, when the high / low output times are, value including costs of installation and operations,
Show photovoltaics. Use pictures, do an exercise on sizing with cost analysis,
Show solar thermal systems (passive and active).
Show co-generation (combined heat-power).
Show ground source heat pumps
Show hydro
Discuss Biomass
Exercise 1. Size a PV system, show the various components and draw a diagram of when the energy is available.
Exercise 2. Design an off-grid house powered by renewable energy so that it always has adequate power to operate appliances, lighting and HVAC equipment.

5. Envelope/Building Lighting Measures (~ 60 slides, with 2 exercises)
Learning: Understand pictorially the building envelope (windows, walls, roofs, floors) and heating and cooling flows. Understand lighting and the impact on energy consumption.
Cover walls, flooring, insulation and the impact on energy use. Include wall construction methods (normal stick built, wood with spray insulation, ICFs, straw bales, sod-walls, stone walls, adobe, green walls (living plant material).
Cover windows. Discuss U-value, SHGC, VT and how advanced technology is changing fenestration. Cover electro-chromatic windows and other advanced coatings that are put on windows. Explain with pictures and minimal calculations.
Cover roofs including cool roofs. See LBL for pictures and material. Discuss green roofs. Cover the main types of lighting technology and discuss the relative light output, energy consumption and uses of each.

Exercise 1. Create an envelope for a home and show where energy reductions could be implemented.
Exercise 2. Create a 5 story office building (20kft² per floor) and show how to make this more energy efficient.

6. Control Measures (~ 60 slides, with 2 exercises)
   Learning: Understand the basic operation of control systems in residential and commercial buildings.
   Cover Energy Efficiency Measures including 1) timed start-stop, 2) optimum start-stop, 3) demand control (including ratchet clauses, time based, and real time pricing), 4) economizer, 5) cold-deck/hot-deck resets, 6) optimized feedback, 7) static pressure reset, 8) PID and advanced loop controls, 9) adaptive controls.
   Exercise 1.
   Exercise 2.

7. Building Energy Standards (~ 60 slides, with 2 exercises)
   Learning: Understand the standards process, the basic set of standards used in the building industry and how codes are created from standards. The key HVAC/R standards are ASHRAE 90.1-20XX (Energy efficiency in commercial buildings), ASHRAE 62.1-20XX (Indoor air standard), ASHRAE 55-20XX (Thermal comfort), and the EPA air quality standards.
   Cover the above standards and show how these have been used to create the Texas State energy codes. Also discuss how the air quality standards have evolved and the interrelationship with energy efficiency standards.
   Exercise 1.
   Exercise 2.

8. Commissioning (New and existing buildings) (~ 60 slides, with 2 exercises)
   Learning: Understand the concepts and practice of new building commissioning and commissioning of existing buildings.
   Cover the growth and changes that commissioning processes have gone through in the past 2 decades and their impact on energy efficiency. Show the processes that are effective and the results that should be obtained.
   Exercise 1.
   Exercise 2.

9. Measurement and verifying (M&V) energy savings (~ 60 slides, with 2 exercises)
   Learning: Understand the practical application of M&V technologies.
   Cover the relevant guidelines including IPVM and ASHRAE Guideline 14-20XX.
   Exercise 1.
   Exercise 2.

10. Building Simulation and energy efficiency (~ 60 slides, with walk through demonstration and 2 exercises)
   Learning: Understand the basic types of building energy simulation.
   Load eQuest and use this simulation software to model a building and determine the energy use of the planned structure and HVAC systems.
   Exercise 1. Create a baseline building and determine the monthly energy use.
Exercise 2. Add energy efficiency measures and determine the yearly savings.

Sections – 2.2 hours each

1. Introduction to Energy Efficiency in Buildings (~ 60 slides, with 2 exercises)
2. Building Energy Use / Building Design (~ 60 slides, with 2 exercises)
3. Building Energy Using Equipment (~ 60 slides, with 2 exercises)
4. Renewable Energy (~ 60 slides, with 2 exercises)
5. Building Envelope/Building Lighting Measures (~ 60 slides, with 2 exercises)
6. Building Control Measures (~ 60 slides, with 2 exercises)
7. Building Energy Standards (~ 60 slides, with 2 exercises)
8. Commissioning New Buildings and Existing Buildings (~ 60 slides, with 2 exercises)
9. Measuring and Verifying Energy Savings (~ 60 slides, with 2 exercises)
10. Simulation and Energy Efficiency in Buildings (~ 60 slides, with walk through demonstration and 2 exercises)

Required Textbook: There is no required textbook.

Suggested Reading:
Articles and book chapters will be assigned by the instructors and made available via email or during class.

Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

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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 (e.g., DVM, JD, MD, etc.)
2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy, ICPE
   ICPE-623: Water-Energy-Food Nexus: Towards Sustainable Resource Allocation
3. Course prefix, number and complete title of course:
4. Catalog course description (not to exceed 50 words): Securing energy, clean water and greening agriculture; principles of the Water-Energy-Food nexus and its application to the corresponding three themes; includes hands on laboratory.

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. This course will be:
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.
11. □ 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).

12. Prefix: ICPE   Course #: 623   Title (excluding punctuation): WATER-ENERGY-FOOD NEXUS: TOWAR

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Approval recommended by:

Dr. Costas N. Georgiadis
Department Head or Program Chair (Type Name & Sign) Date
9/21/14

Chair, College Review Committee Date
9/22/14

Dean of College Date
9/22/14

Chair, GC or DCC Date
9/29/14

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 04/14
ICPE-623: Water-Energy-Food Nexus Towards Sustainable Resource Allocation

Term: Spring 2016
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructor:
Dr. Rabi H. Mohtar
Department of Civil Engineering
Texas A&M University
410B CE/TTI
College Station, TX 77843
Tel.: 979-458-9780
Email: mohtar@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course Description:
The course will cover securing energy, clean water and greening agriculture. It will include lectures and hands on laboratory. The course will be designed that can be intellectually digested by learners or various backgrounds. Lectures will cover principles of the Water - Energy -Food nexus and its application to the corresponding three themes above.

After covering the subject matter fundamentals, students will work on real world projects or case studies relevant to the subject being discussed.

Case Studies
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.

1. Securing clean water: Providing access to safe drinking water, revealing the extent of water use and thereby teaching a new American 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.

Nexus Tool to be used:
The Water-Energy-Food nexus tool developed by Mohtar and Dæ̈ner (2014) will be used in this module. The tool designed off a scenario-based framework that quantifies the interlinkages and tradeoffs between these resources.
Required Textbook: There is no required textbook.

Suggested Reading:
Articles and book chapters will be assigned by the instructors and made available via email or during class.

Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
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- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

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Texas A&M University
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Undergraduate • Graduate • Professional
• Submit original form and attach a course syllabus.

Form Instructions:

1. Course request type:  
   - Undergraduate  
   - Graduate  
   - First Professional (e.g., DVM, JD, MD, etc.)

2. Request submitted by (Department or Program Name):  
   Interdisciplinary Curricular Program in Energy, ICPE

3. Course prefix, number and complete title of course:  
   ICPE-624: Energy-Water Nexus

4. Catalog course description (not to exceed 50 words):  
   Various aspects of energy-water nexus including the fundamentals, technologies, applications, and economics; focus on energy production, conversion and utilization; connection with water production, treatment, delivery and usage.

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. 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)

Executive Master of Science in Energy

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

11. I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-control/export-control-basics-for-distance-education).

12. Prefix  
    Course #  
    Title (excluding punctuation)

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Approval recommended by:

Dr. Costas N. Georghiades  
Department Head or Program Chair (Type Name & Sign)  
Date  
Chair, College Review Committee  
Date  

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

Date

Dean of College

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 – 04/14
ICPE-624: Energy-Water Nexus

Term: Fall 2015
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructor:
Dr. Mahmoud El-Halwagi
Texas A&M University
Artie McFerrin Department of Chemical Engineering
230 Jack E. Brown Engineering Building
3122 TAMU
College Station, TX 77843-3122
Tel: (979)-845-3484
Email: el-halwagi@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
Energy and water are among the most ubiquitously used natural resources in the world. These two vital resources are mutually dependent. Energy production, conversion, and utilization involve water. Likewise, water production, treatment, delivery, and usage involve energy. The course is intended to cover various aspects of energy-water nexus including the fundamentals, technologies, applications, and economics. The following topics will be addressed:

- Forms of energy: sources, domestic and global usage, reserves, and economics
- Forms of water: sources, qualities, usage, and economics
- Water needs for upstream energy production (e.g., oil production, shale-gas production, heavy oil production)
- Water needs for energy conversion (e.g., thermoelectric cooling, hydropower) and downstream processing (e.g., steam in combined heat and power cycles in industrial facilities, water usage in oil refining, energy-water nexus in gas-to-liquid plants)
- Energy needs for water: technologies and basic principles for water extraction, treatment (e.g., thermal desalination, membrane desalination), disposal (e.g., wastewater treatment), and transportation.
- Energy-water nexus for renewable energy sources (e.g., the use of renewable energy for water desalination, the production and usage of water in biofuels plants)
• Water and energy usage and conservation in industrial processes
• Economic aspects of energy-water nexus
• Environmental aspects of energy-water nexus
• Creating, assessing, and selecting sustainable options for energy-water nexus
• An open-ended group project on energy-water nexus (technologies, applications, economics, and regulatory aspects)

Required Textbook: There is no required textbook.

Suggested Reading:
Articles and book chapters will be assigned by the instructors and made available via email or during class.

Course requirements:
• Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
• Read all required material.
• Participate actively in discussions.
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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 (e.g., DVM, JD, MD, etc.)

2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy, ICPE

3. Course prefix, number and complete title of course: ICPE-625: Integrated Risk Management for Exploration and Production Projects

4. Catalog course description (not to exceed 50 words): Structured introduction to project systems and advance analysis of integrated project risks to practicing engineers and decision makers in the energy sector; emphasis on risks in context of a) project phase-gate process, b) systems representation, and c) flow across different functional and design requirements, areas of expertise/specialization, and construction/installation methods.

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. This course will be:

   a. required for students enrolled in the following degree program(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)

   Executive Master of Science in Energy

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11. ✔ I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://vpr.tamu.edu/resources/export-control/export-controls-basics-for-distance-education).

12. Prefix  Course #  Title (excluding punctuation)

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Approval recommended by:

Dr. Costas N. Georghiades

Department Head or Program Chair (Type Name & Sign)

Date

Chair, Coordinating Committee

Date

Department Head or Program Chair (Type Name & Sign)

Date

Dean of College

Date

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Date

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8211 or sandra.williams@tamu.edu.

Curricular Services – 04/14
ICPE-625: Integrated Risk Management for Exploration and Production Projects

Term: Spring 2016
Day: MTuWThF
Time: TBD (4.4hrs/day) Location: TBD
Number of Credits: 1.5 Credits

Instructors:
Dr. Ivan Damnjanovic
Department of Civil Engineering
Texas A&M University
705C CE/TTI
College Station, TX 77843
Tel.: 979-862-6616
Email: idamnjanovic@civil.tamu.edu
Office hours: by appointment

Dr. Zenon Medina-Cetina
Department of Civil Engineering
Texas A&M University
702D CE/TTI
College Station, TX 77843
Tel.: 979-845-6567
Email: zmedina@civil.tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course Description:
The current approaches to planning, delivery, and operations of exploration and production (E&P) projects are highly fragmented. What makes the delivery process highly fragmented are the advances in drilling and installation technologies, better understanding of geophysical characteristics of the site and the corresponding development of unique designs, as well as the general industry trend of mitigating liability/risk and focusing only on core competencies; hence outsourcing the supporting operations and services. Academic and industry reports have noted this trend and have linked it to major project failures and accidents including the Macondo oil spill in the Gulf of Mexico.

The industry leaders are fully aware of this problem and have emphasized the need for the industry to provide education and training on how different elements of project design, delivery, and operations interact. In fact, a number of efforts on this topic are currently underway. For
example, large operators have started implementing in-house training programs and complex knowledge management systems to have their engineers understand the bigger picture of a project and how different project elements are interconnected. However, only larger operators can afford this. Smaller and mid-size operators do not have enough resources to provide training and mainly rely on professional organizations courses. While these courses are very informative on a narrow topic, they fall short in communicating the big picture, filling the gaps in fundamentals of risk assessment and management, and linking everything together in a method that promotes active learning.

The objective of this course is to provide a structured introduction to project systems and advance analysis of integrated project risks to practicing engineers and decision makers in the energy sector. The emphasis will be given to risks in context of a) project phase-gate process, b) systems representation, and c) flow across different functional and design requirements, areas of expertise/specialization, and construction/installation methods. Hence, the course would provide sufficient theoretical introductions in systems modeling, decision analysis, and probability theory to enable students to develop and implement decision-support models, understand and interpret model results, as well as propose original solutions using advanced risk analysis methods for exploration and production projects. The course delivery will be based on a combination of lectures, in-class and group homework assignments, and remote communication to promote active learning. In addition, two case studies would be used to illustrate the new materials — unconventional shale gas project and deep-water offshore project case study.

**Required Textbook:** There is no required textbook.

**Suggested Reading:**
Articles and book chapters will be assigned by the instructors and made available via email or during class.

**Course requirements:**
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07).
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

**Grading:** Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

**Grade scale:** 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

**Take home exam:** due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.
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. Please pay close attention to guidelines on avoiding plagiarism: http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
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 (e.g., DVM, JD, MD, etc.)
2. Request submitted by (Department or Program Name): Interdisciplinary Curricular Program in Energy, ICPE
3. Course prefix, number and complete title of course: ICPE-626: Safety in Energy Systems
4. Catalog course description (not to exceed 50 words): Role of leadership and development of management systems to ensure safety performance in energy systems, a systems approach to safety management for energy systems, lifecycle analysis and the energy supply chain, and applications of engineering principles to process safety and hazards analysis.

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. 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)

   Executive Master of Science in Energy

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

12. Prefix  Course #  Title (excluding punctuation)
      ICPE  626  SAFETY IN ENERGY SYSTEMS

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<th>Lect.</th>
<th>Lab</th>
<th>S/H</th>
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<th>Admin. Unit</th>
<th>Acad. Year</th>
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</tbody>
</table>

Approval recommended by:
Dr. Costas N. Georgiadis  8/14/14
Department Head or Program Chair (Type Name & Sign) Date

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

Mary Carter  9/22/14
Chair, Course Review Committee  Date

James Smith  10/20/14
Dean of College  Date

Submitted to Coordinating Board by:
Associate Director, Curricular Services

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu
Curricular Services – 04/14
ICPE-626: Safety in Energy Systems

Term: Spring 2016
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructor:
Dr. Sam Mannan
Texas A&M University
Artie McFerrin Department of Chemical Engineering
246 Jack E. Brown Engineering Building
3122 TAMU
College Station, TX 77843-3122
Tel: (979) 845-6446
Email: mannan@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
Energy safety and security is of essential importance for society and engineering for sustainable development. Over the whole spectrum of energy systems, which include electricity and fuels generated from a variety of sources such as nuclear, fossil fuels, hydrogen and fuel cell, solar, biomass, wind, ocean and geothermal as well as others, there are various safety aspects to be considered. These safety concerns may be prevalent in one or more stages of the energy supply chain, i.e., production, storage, distribution and application. Life cycle analysis, also known as life cycle assessment, is a technique to assess the safety and environmental aspects and potential impacts of a product, process or service with all the stages of a product, process or service from cradle-to-grave (e.g., from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling).

This course module will consist of 10 2.2 hour segments delivered over a period of 1-1.5 weeks that will focus on developments of strategies and techniques to assess and enhance safety levels in energy systems. Topics covered in this course module are listed below.

- Case studies on financial ramifications of major incidents
- The role of leadership and development of management systems to ensure safety performance in energy systems
- A systems approach to safety management for energy systems
- Lifecycle analysis and the energy supply chain
- Applications of engineering principles to process safety and hazards analysis
- A three-pronged approach: prevention, mitigation, and response
- Use of modeling techniques in incident prediction and risk management
• Use of leading and trailing indicators
• Use of qualitative and quantitative methods in process safety and risk assessment
• Layer of protection and the multiple barriers concept
• Risk identification, assessment and management techniques and applications
• Risk-benefit analyses of safety concepts in energy systems
• Risk-based decision making
• Risk perception and risk acceptance
• Regulatory and permitting activities
• The concept of as low as reasonably practicable
• The relationship of reliability of energy systems and sustainability
• Security of energy systems; a multi-faceted and growing issue
• Managing chronic and acute environmental impacts
• Case studies in safety and security

Required Textbook: There is no required textbook.

Suggested Reading:
Articles and book chapters will be assigned by the instructor and made available via email or during class.

Course requirements:
• Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
• Read all required material.
• Participate actively in discussions.
• Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

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. Please pay close attention to guidelines on avoiding plagiarism: http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
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 (ex., DVM, JD, MD, etc.)
2. Request submitted by (Department or Program Name):  
   Interdisciplinary Curricular Program in Energy, ICPE
3. Course prefix, number and complete title of course:  
   ICPE-627: Interfacial Phenomena of Energy Systems
4. Catalog course description (not to exceed 50 words):  
   Fundamentals of interfacial phenomena, energy related interfacial materials, and 
   interfacial issues of energy systems; specific energy-related applications include oil recovery, lubrication, thermal management, 
   photovoltaics, battery, fuel cells, and supercapacitors.

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. This course will be:  
   a. required for students enrolled in the following degree program(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)

   Executive Master of Science in Energy

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments.  
    Attach approval letters.

11. ☒ I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://ypr.tamu.edu/resources/export- 
    controls/export-controls-basics-for-distance-education).

12. Prefix  
    Course #  
    Title (excluding punctuation)

    ICPE  627  INTERFACTORIAL PHENOMENA OF ENERGY

    Lec.  Late  SCH  CIP and Fund Code  Admin. Unit  Acad. Year  ECE Code
    1  5  1  5  1  4  0  7  0  1  0  0  0  6

    Approval recommended by:  
    Dr. Costas N. Georganides  

    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, GCC/UCO  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 – 04/14
4. Aggregation, Flocculation, and Colloidal Stability (1 × 2hr)

II. Energy Related Interfacial Materials (2 × 2hr)
5. Amphiphiles (0.5 × 2hr)
6. Polymers (0.5 × 2hr)
7. Nanoparticles and Colloids (0.5 × 2hr)
8. Thin Films (0.5 × 2hr)

III. Interfacial Issues of Energy Systems (5 × 2hr)
9. Oil Recovery and Hydraulic Fracturing (1 × 2hr)
10. Energy Efficiency[1][2][3][4][5][6][7][8][9][10][11][12][13]
11. Energy Efficiency[1][2][3][4][5][6][7][8][9][10][11][12][13]
12. Photovoltaics (1.0 × 2hr)
13. Batteries, Fuel Cells, and Supercapacitors (1.0 × 2hr)

Required Textbook:

Suggested Reading:

Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

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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](http://aggiehonor.tamu.edu). Please pay close attention to guidelines on avoiding plagiarism: [http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx](http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx)

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
ICPE-627: Interfacial Phenomena of Energy Systems

Term: Spring 2016
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5Credits

Instructor:
Dr. Mustafa Akbulut
Texas A&M University
Artie McFerrin Department of Chemical Engineering
230 Jack E. Brown Engineering Building
3122 TAMU
College Station, TX 77843-3122
Tel:(979)-847-8766
Email: makbulut@tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
Because materials interact with the outside world through their surfaces, the significance of surface science cannot be overemphasized for scientific and engineering applications, in particular energy systems. For instance, in oil recovery, surface active compounds are typically used to lower the interfacial tension or capillary pressure that impedes oil droplets from moving through a reservoir. Likewise, for heterogeneous catalysis applications, adsorption -which is the accumulation of atoms, ions, molecules, macromolecules, or particles at an interface- is a critical interfacial phenomenon to consider.

This module will be divided in three sections: (i) Fundamentals of Interfacial Phenomena, (ii) Energy Related Interfacial Materials, and (iii) Interfacial Issues of Energy Systems. Specific fundamental topics will include Intermolecular and Surface Forces; Contact Angle, Wetting, and Capillarity; Adsorption, Desorption, and Removal; and Aggregation, Flocculation and Colloidal Stability. Amphiphiles, Polymers, Nanoparticles and Colloids, and Thin films will be the interfacial materials of interest. The specific energy-related applications that will be covered include Oil Recovery; Lubrication; Thermal Management; Photovoltaics; and Battery, Fuel Cells, and Supercapacitors.

Course Content:
I. Fundamentals of Interfacial Phenomena (4 × 2hr)
1. Intermolecular and Surface Forces (1 × 2hr)
2. Contact Angle, Wetting, and Capillarity (1 × 2hr)
3. Adsorption, Desorption, and Removal (1 × 2hr)
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 (e.g., DVM, JD, MD, etc.)

2. Request submitted by (Department or Program Name):
   - Interdisciplinary Curricular Program in Energy, ICPE
   - ICPE-628: Multi-physics Geomechanics for Energy Applications (CO2, fracking, nuclear waste)

3. Course prefix, number and complete title of course:

4. Catalog course description (not to exceed 50 words):
   - Focuses on main physical phenomena and processes that control the behavior of porous media; formulation for non-isothermal multiphase flow and transport problems in deformable porous media; problems of practical interest in the broad field geo-engineering and geo-mechanics.

5. Prerequisite(s):
   - Graduate classification
   - 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.
   - Yes
   - No

8. Will this course be submitted to the Core Curriculum Council?
   - Yes
   - No

9. This course will be:
   - required for students enrolled in the following degree programs(s) (e.g., B.A. in history)
   - an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)
   - Executive Master of Science in Energy

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments.
    Attach approval letters.

11. I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://www.tamu.edu/resources/export-contacts/export-controls-basics-for-distance-education).

12. Prefix   Course #   Title (excluding punctuation)
    ICPE   628   MULTI-PHYSICS GEOMECHANICS FOR

    Lect. Lab  STU LCH and Fund Code Admin. Unit  Acct. Year  HCL Code
    1 5 15 43 90 10 00 6

    Approval recommended by: Level 5
    Dr. Costas N. Georgiades 9/22/14
    Department Head or Program Chair (Type Name & Sign)
    Chair, College Review Committee 9/22/14
    (if cross-listed course)
    Dean of College 10/20/14
    Chair, GCCOS UCC

    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 – 04/14
ICPE-628: Multi-physics Geomechanics for Energy Applications (CO2, fracking, nuclear waste)

Term: Fall 2015
Day: MTuWThF
Time: TBD (4.4hrs/day)
Location: TBD
Number of Credits: 1.5 Credits

Instructor:
Dr. Marcelo Sanchez
Zachry Department of Civil Engineering
Texas A&M University
CE-TTI Building
3136 TAMU
College Station, TX 77843-3136
Tel.: 979 862 6604
Email: msanchez@civil.tamu.edu
Office hours: by appointment

Email will be the primary means of communication for the course. Check your email often and keep your mailbox below quota. Go to elearning.tamu.edu for course materials.

Course prerequisites: Graduate classification.

Total contact hours: 22hrs

Course description:
In the last few years geo-engineering has expanded its domain of intervention, particularly in the field of geo-environmental engineering and geo-technology applied to assist present and future energy challenges (i.e. from energy production, to waste management and carbon sequestration). This has led to study the behavior of soils and rocks under extreme and complex conditions involving simultaneous hydraulic (both: liquid and gas), thermal, mechanical and geochemical actions. This course focuses on the study of the main physical phenomena and processes that control the behavior of porous media. The formulation is presented for the general case of non-isothermal multiphase flow and transport problems in deformable porous media. The course also contemplates a brief introduction to the numerical approximation of the mathematical formulation. Problems of practical interest in the broad field geo-engineering and geo-mechanics are analyzed during the course.

Outline of topics:
1. Introduction and basic concepts
   1.1 Notation. Approximation of the porous medium as a continuum.
   Representative elementary volume. Porosity and effective porosity.
   Particle-size/pore-size distribution. Other statistical descriptions.
   1.2 Properties of the liquid water. Density, compressibility, viscosity and surface tension.
   1.3 Properties of the water vapor and gaseous phase (wet air).
1.4 Influence of temperature, pressure and solutes on water and gas properties. Influence of capillary tension and suction on vapor concentration.

2. Single-phase flow in non deformable porous media
   2.3 Laboratory and in-situ tests.

3. Multiphase flow in non deformable porous media
   3.2 Darcy's law for two-phase media (e.g., water-air, gas-oil) media. Relative permeability. Piezometric level. Flow equations for multiphase porous media. Richards's equation.
   3.4 Short introduction to laboratory and in-situ tests.

4. Mass transport in non deformable porous media
   4.2 Adsorption. Transport of radioactive nuclides (radioactive decay).
   4.3 Solute transport in multiphase flow. Introduction to reactive transport.

5. Energy transport in non deformable porous media
   5.3 Issues related to advective-dispersive terms in transport equations. Characteristic times. Peclet and Rayleigh numbers.
   5.4 Short introduction to laboratory and in-situ testing.

6. Deformable porous media
   6.1 Stresses and strains. Momentum balance equation. Porosity changes.
   6.2 Elastic and Elastoplastic models for soils and rocks.
   6.4 Deformation in unsaturated (multiphase) porous media. Effect of net stresses and capillary pressure on deformation. Behavior of swelling clays and shales. Mechanical behavior of fractures.
   6.5 Short introduction to laboratory and in-situ testing.

7. Applications
   7.1 Applications to 'Enviromental Geomechanics': waste containment system, clay barriers, drainage materials. Multiple barriers concept. underground storage.
   7.1 Applications to 'Energy Geomechanics': borehole stability, CO2 sequestration, hydraulic fracturing, fault reactivation, hydrate bearing sediments, geothermal piles, CAES design.

Suggested Textbooks and Reading:
Handouts and Course Notes.
Journal Papers.

Course requirements:
- Attend all lectures. Absences for previously scheduled activities will only be excused if they are communicated well in advance. If you have not discussed an absence with the instructor ahead of time, it will be considered unexcused unless proper documentation is provided. See http://student-rules.tamu.edu/rule07.
- Read all required material.
- Participate actively in discussions.
- Complete assignment(s) and final take home exam. Late assignments/exam will be downgraded a letter grade for each late day.

Grading: Letter grades will be assigned based on: active participation 25%; homework assignments 25%; final take home exam 50%.

Grade scale: 90-100 A; 80-89 B; 70-79 C; 60-69 D; <60 F

Take home exam: due by 4:00pm the day after the last lecture. One letter grade will be deducted for each day past the deadline.

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Academic Integrity: For additional information please visit: http://aggiehonor.tamu.edu. Please pay close attention to guidelines on avoiding plagiarism: http://aggiehonor.tamu.edu/Descriptions/Plagiarism.aspx

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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.

1. Course request type:  □ Undergraduate  □ Graduate  □ First Professional (DDS, MD, JD, PharmD, DVM)
2. Request submitted by (Department or Program Name): International Affairs
3. Course prefix, number and complete title of course: INTA 636 International Development in Theory and Practice
4. Catalog course description (not to exceed 50 words):
Course reviews various definitions of development and the theories which explain why some countries develop and others do not. Current controversies will be examined about what factors lead to economic growth; what role good governance and democratic institutions play; the cultural values of a society; social services play in government

5. Prerequisite(s): None  n/a
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.

8. Will this course be repeated within the same semester?  □ Yes  □ No

9. Will this course be submitted to the Core Curriculum Council?  □ Yes  □ No

10. How will this course be graded?  □ Grade  □ S/U  □ P/F (CLMD)
This course will be:

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)
INTA  636  Intl Dev Theory & Prac

<table>
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<tr>
<th>Lect.</th>
<th>Lab</th>
<th>Other</th>
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<th>Admin. Unit</th>
<th>Acad. Year</th>
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Approval recommended by:

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

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

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu.
Curricular Services – 07/14
“International Development Theory and Practice”
INTA 636
Andrew Natsios
George H.W. Bush School of Government and Public Service
Texas A and M University

The course will review various definitions of development and the theories which explain why some countries develop and others do not. Current controversies will be examined about what factors lead to economic growth; what role good governance and democratic institutions, the cultural values of a society, and social services play in development. Finally, the course will analyze how the foreign aid programs of donor governments and international institutions affect the development process, the politics of aid programs and the mechanisms for their implementation, and the role of new actors in development such as non-governmental organizations, corporations, and foundations.

Andrew Natsios Contact Information
Office: 1081 Allen Building
Telephone: 979-862-1154
Office Hours: Tuesdays after class
Classroom TBD
Class schedule: Tuesdays

Required Texts


Paul Collier, The Bottom Billion, Oxford University Press, 2007

Douglass North, Weingast, and Wallis, Violence and Social Orders, 2009

James Scott, Seeing Like a State, Yale University Press, 1998
And other readings from development journals and publications

Course Objectives

Students who complete the course successfully will be able to describe:

- The 9 major schools of international development theory, their predictive value, and their strengths and weaknesses.
- The major sectoral disciplines of international development practice
- The history of international development practice through multi-lateral institutions such as the World Bank and the United States government aid agencies
- The options available to policy makers in allocating foreign assistance among countries
- The four major clashes within donor governments among the multi-uses of international development funding and other equities and interests which conflict with long term development
- The evidence of what works, what does not, and why in the use of foreign aid program dollars
- The mechanisms used to spend aid dollars by aid agencies, the characteristics of each of the mechanisms, and the trade-offs between options
- The new, non-traditional partners which are now engaged in doing and funding development programs and the consequences of these changes

Assignments

A 12 page (DOUBLE SPACED) research paper is due on the last day of class.

There will be 4 one page papers SINGLE SPACED.

There will also be an in-class midterm and final exam.

Grading Methodology

Each student’s grade will be made up of the grades of the mid-term (20%), final examination (30%), one paper (20%), 4 one page papers (20%) and class attendance, class presentations, and attendance at Scowcroft class lectures (10%). If you attend a formal lecture of the Scowcroft Institute you will get extra credit if you send me a one paragraph summary of the lecture within 24 hours.

Academic Honesty: The Bush School is committed to the development of principled leaders for public service. The commitment to “principled leadership” is a further elaboration of the Texas A&M student honor code that states: “An Aggie will not lie, cheat, or steal nor tolerate those who do.” Students who engage in plagiarism or other forms of academic dishonesty will be referred to the Aggie Honors Council. These same
penalties apply to submission of the same material for a grade in more than one course.

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. The source of the material does not matter — a book, an article, material off the web, another student's paper — all constitute plagiarism unless the source of the work is fully identified and credited. It is important when using a phrase, a distinct idea, concept, a sentence, or sentences from another source to credit explicitly that source either in the text, a footnote, or endnote. Plagiarism is a violation of academic and personal integrity, and carries extremely serious consequences. Further information can be found at http://www.tamu.edu/aggiehonor/academicconduct.htm. Students in this course must submit the book review and the research paper to Turnitin.com, before a grade will be given. Turnitin.com is an internet-based service which serves as a tool to help detect plagiarism. Turnitin.com reduces plagiarism by comparing course papers to on-line resources. The student will submit the paper simultaneously to Turnitin.com and to the instructor. Information and procedures for access to Turnitin.Com may be found at http://itsinfo.tamu.edu/turnitin/. Select the "student" prompt.

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.

Grading Scale

| 90%-100% | A | Extraordinary, excellent work and mastery of concept |
| 80%-89%  | B | Good work and solid command of concept |
| 70%-79%  | C | Adequate work and sufficient understanding of concept |
| 60%-69%  | D | Poor work, little understanding of concept |
| 0%-59%   | F | Lack of work, no understanding of concept |

Attendance and Make-Up Policy

Class attendance is mandatory. 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 listed below. See Student Rule 7 for details (http://studentrules.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.
   a) 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)
   b) 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:
      (i) Texas A&M University Explanatory Statement for Absence from Class form available at http://attendance.tamu.edu or
      (ii) 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.

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.

On rare occasions, the instructor might have to miss a class due to administrative or academic responsibilities out of town. This will be exceedingly rare, but if it does occur, the instructor reserves the right to reschedule class at a time when the vast majority of students are available for the make-up class and will convey the material to students unable to attend the make-up during office hours.

**Office Hours**

Office Hours will be held the hour following class each week, however you may stop in any afternoon (I will be writing in the morning) after 1 pm. Knock on my door—I keep my door closed so I do not disturb other people near my office—but a closed door does not mean I am away from my office (nor does it mean I am busy). I do not mind you stopping by as long as it is after 1 pm. If you wish to make an appointment for a specific time, do it by email.
Contacting Me

If you have any questions during the semester between classes each week, email them to me on my TAMU/Bush Account and cc my gmail account. anatsios@gmail.com

E-reserves or Blackboard

Some of the readings will be on e-reserves for which the syllabus does not have links, wherever it says on blackboard read that to mean e-reserves. If the syllabus says you must read most or all of the book the law prohibits me from placing the book on e-learning or e-reserves, so you must get the book itself.

CLASSES 1-3: BACKGROUND ON DEVELOPMENT

Lecture 1 - Poverty and Underdevelopment at the beginning of the 21st century

- Define international development, poverty, and underdevelopment
- How do we define progress?
- What countries have made progress, which have not and why?
- Poverty, destitution, disease, hunger, illiteracy, and human rights.
- Inequality and development
- Capability-based development: Amartya Sen

READINGS: (Complete these readings for our first class on January 15)

FOR THE FIRST CLASS A ONE PAGE PAPER (SINGLE SPACE)

Lecture 2 - Schools of Development Theory, Stages of Economic growth, Structuralism, Modernization theory, and Neo-liberalism

- Threat, Crisis, and modernization: Toynbee, Birdsall hypothesis.
- Dependency Theory and neo-Marxism: Wallerstein and Prebisch
- Structuralism and Neo-Structuralism: Prebisch
- Stages of Economic Growth: Walter Rostow
- Neo-liberalism & Washington Consensus: John Williamson

READINGS:

5


- Washington Consensus, structural adjustment, market fundamentalism, and macro-economic reform
- Pro-Poor Growth: inequities in growth
- Trade and Growth → East Asian export-led development
- Geographic determinism: Diamond and Sachs
- Fraying of the neo-liberal consensus: Joseph Stiglitz and Dani Rodrik

**READINGS:**
2. Rodrik, Dani. *One Economics and Many Recipes*, (Chps 1, 3, 5, and 6)

**CLASSES 4 – 9: ISSUES IN DEVELOPMENT**

*Lecture 4: Micro-economics of growth, culture and values and development, geographic determinism, institutions and growth. High Modernism and its Critics.*

- **Micro-economics of growth**: Michael Porter on Competitiveness, *Doing Business Report* of World Bank, Hernando DeSoto, property rights and informal sector
- **Development, institutions, and open access orders**: Douglass North, Frank Fukuyama
- **Culture and Values**: Max Weber and Larry Harrison
- **High Modernism and its critics**: Edmund Burke, Jane Jacobs, and the James Scott critique
READINGS:

Lectures 5 and 6 - Fragile States and State Failure: Institutions and Development

- Define state fragility and failure
- The greatest development challenge of our time
- Relationship between Least Development Countries (LDC) and fragile and failed states
- Complex humanitarian emergencies: economic collapse, civil war and human rights abuses, food insecurity and starvation, disease epidemics, collapse of the authority of the state to govern, and mass population displacement.
- Post-conflict reconstruction
- Role of Military. Security sector reform. DDRR

READINGS: (Complete the Collier reading for February 21 and the second two readings for class on February 28th)
5. Fukuyama, Francis. *State Building*: Chs. 1 & 2

SECOND PAPER DUE TBD.

MID-TERM EXAM – Date to be announced

Lecture 7 - Technology and Development

- The internet and development
- Cell phones: communication, mobile banking, and health data reporting.
- Computers and development
- Point of care diagnostic devices for health

READINGS:
1. Executive Summary of ITU’s annual publication, “Measuring the Information Society” (On Blackboard).

March 16 – Spring Break No Class

Lecture 8 - State Building

- Institutions and development
- Corruption and development
- Democracy and governance strategies and whether they work: current state of research.
- What affect does democracy have on development?

READINGS:

THIRD PAPER DUE – to be determined

Lecture 9 - The Sectors: Agriculture, the Environment, and Health

- The Green Revolution in Asia
- Agriculture and rural employment as a source of growth:
- Food security defined: access, availability, utilization
- Environmental degradation and growth
- Effect of Climate Change on Development
• Education: primary vs. secondary, higher education reform, and structural reforms of education management. Problems of developing world education.

READINGS:
2. International Institute for Environment and Development. The Impact of Climate Change on Least Developed Countries and Small Island Developing States. (On Blackboard)

Lecture 10 - What is foreign aid? What are the Purposes of aid? Has it worked?

• Definitions.
• Multilateral vs. bilateral foreign aid; concessional lending, grant aid.
• National Security and foreign aid during the cold war.
• Short History of Foreign Aid: Marshall Plan, Alliance for Progress, Transitional Assistance after collapse of Soviet Union.
• Foreign Aid and the Bush Administration
• Restructuring of foreign aid and Rice reforms
• Systems for allocating foreign aid: need, performance, risk, interest, and historical inertia

READINGS:
2. Lancaster, Carol, Foreign Aid: Diplomacy, Development, and Domestic Politics (entire book).

Lecture 11 - The Strategic Realignment of International Development: the current debate

• The Millennium Development Goals
• The Monterrey Consensus
• Johannesburg Summit on Sustainable Development
• Poverty Reduction Strategy Plans (PRSP) process of the World Bank
• The UN General Assembly Meeting September 2005 on the MDGs
• Trade and Development: Doha, Cancun, and Hong Kong
• The 2008 recession, western donors economic crisis and the decline of
ODA
- The fraying of the international aid system post-2008.

READINGS:

Lecture 12 - The four clashes in the practice of development using foreign aid funds for diplomatic, counter-bureaucratic, national defense, and political purposes

- Congressional earmarks and directives on US foreign aid spending
- The Local Purchase of food aid controversy in the U.S.
- Non-governmental organizations and faith-based NGOs
- The aid industry and its dependency on donor governments
- Domestic constituencies for foreign aid

READINGS:

Lecture 13 - How efficiently do we spend foreign aid? - The Aid Effectiveness Debate

- Bilateralism vs. multilateralism: World Bank Trust Funds.
- Models of implementation and their programmatic and political implications
- The Paris Declaration 2005: country led development
- Obama Policy: USAID FORWARD
- Untying of donor aid procurement
- The problem of absorptive capacity
• Monitoring and Evaluation of aid programs
• Managing Complexity: donor coordination

READINGS:
1. “The Paris Declaration on Aid Effectiveness” March 2005
2. USAID White paper, (Available Online at:
   Chapters 20-22
4. Moyo, Dambisa Dead Aid: Why aid is not working and how there is a better way for

FOURTH PAPER DUE – date to be announced

Lecture 14 - Institutions that Deliver Aid: New Partners and Actors in Development
• The rise of the non-governmental organizations and for profit
development contractors.
• Private foreign aid defined: the Hudson Institute research
• Public/Private alliances: Global Development Alliance
• Remittances and development
• Corporate, foundations, and faith-based foreign aid
• What we know about development aid and what we do not know

READINGS:
1. Carol Adelman, Index of Global Philanthropy and Remittances, Hudson Institute,
   2012.
2. Edited by Donald F. Terry and Steven R. Wilson, Beyond Small Change: Making
   Migrant Remittances Count, Inter-American Development Bank, 2005. Chapters 1 &
   2 (p. 3-40).
   Innovations Review, Fall 2009
   http://www.ssireview.org/articles/entry/public_private_alliances_transform_aid
4. Roger Ridell, Does Foreign Aid Really Work? NGOs Chapter 16-17.
   Parameters, Fall 2004. (Available on Blackboard and online at
   http://www.carlisle.army.mil/usawc/parameters/Articles/05autumn/natsios.pdf)

CLASS PAPER DUE AT THE BEGINNING OF THE LAST CLASS
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 (DMD, MD, DNP, DVM, DO, DOH)

2. Request submitted by (Department or Program Name):
   Department Of Health & Kinesiology

3. Course prefix, number and complete title of course:
   KINE 631 Specilized Strength & Conditioning Techniques

4. Catalog course description (not to exceed 50 words):
   Research based physiological responses and adaptations associated with power, speed,
   quickness, flexibility and mobility are covered in conjunction with laboratory demonstration/implementation and specific practical experiences
   based on available scientific research. Practical mastery as well as theoretical understanding is required.

5. Prerequisite(s):
   KINE 629 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 program(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 Kinesiology

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)
    KINE  631  SPEC STRENGTH & COND TECH

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Approval recommended by:

Dr. Richard J. Hill
Department Head or Program Chair (Type Name & Sign) Date

Dr. George Cunningham
Chair, College Review Committee Date

Dr. George Cunningham
Dean of College Date

Chair, GC or UCC Date

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services - 07/14
Course Title: KINE 631 – Specialized Strength & Conditioning Techniques
Course Time: Monday & Wednesday 9:00 AM – 10:15 AM
Professor: Dr. Mike Greenwood FNSCA, RS CC *D, CSCS * D, FACSM, FISSN
Phone: 979-862-4667
Office: Blocker 305 D
Office Hours: TBA & By Appointment [Establish Day/Time To Meet Before Or After Class]
E-Mail: mgreenwood@hlnk.tamu.edu
Prerequisite(s): KINE 629 or Approval of Instructor

Required Text:

Also - Select Published Research Manuscripts

Supplemental Textbooks/Materials/Handouts:

Current supplemental readings relevant to the day’s topics will be assigned

Course Description:

Research based physiological responses and adaptations associated with power, speed, agility, quickness and flexibility, mobility are covered in conjunction with laboratory demonstrations/implementation and specific practical experiences based on available scientific research. Practical mastery as well as theoretical understanding is required. Students will demonstrate an understanding of the following “Course Objectives”:

Course Outcomes: At the conclusion of the semester students will:

1. Identify and demonstrate classic and specialized “power” training options to infuse into select periodization schemes.

Power Variations:
- Physiology
- Warm-up progressions
- Drills
- Exercises
- Technique/mechanics development of athlete
- Technique/mechanics analysis and feedback of coach/professional
- Equipment
- Sport specificity & functionality [Rate Of Force Development]

2. **Identify and demonstrate classic and specialized “speed” training options to infuse into select periodization schemes.**

**Speed Variations:**
- Physiology
- Warm-up progressions
- Drills
- Exercises
- Technique/mechanics development of athlete
- Technique/mechanics analysis and feedback of coach/professional
- Equipment
- Sport specificity & functionality - Aerobic/Aerobic

3. **Identify and demonstrate classic and specialized “agility, quickness & mobility” training options to infuse into select periodization schemes.**

**Agility, Quickness & Mobility Variations**
- Physiology
- Warm-up progressions
- Drills
- Exercises
- Technique/mechanics development of athlete
- Technique/mechanics analysis and feedback of coach/professional
- Equipment
- Sport specificity – Directional Movement & Functionality

4. **Identify and demonstrate classic and specialized “plyometric” training options to infuse into select periodization schemes.**

**Plyometric Variations**
- Physiology
- Warm-up progressions
- Drills
- Exercises
- Technique/mechanics development of athlete
- Technique/mechanics analysis and feedback of coach/professional
- Equipment
- Sport specificity

5. **Identify and demonstrate additional specialized training options to infuse into select periodization schemes.**

**Other Valuable Training Considerations**
- Flexibility Options
- Movement Screens
- Core Strength & Stability
- Kettlebell Training – Chains & Bands
- Drills, Exercises, Technique/mechanics development of athlete
- Technique/mechanics analysis and feedback of coach/professional
- Equipment & Assessment & Muscle Specificity & Functionality
- Rate of force development

**Evaluation Procedures**

A. **Course Assignments and Requirements:**
   
   *The student is expected to:*
   
   1.) Attend class - participate in discussions, presentations and practical experiences;
   2.) Abide by reasonable rules of professional conduct;
   3.) Turn in typed quality work on time (NO LATE ASSIGNMENTS ACCEPTED – See University Excused Absence policy for exceptions.);
   4.) Demonstrate effective writing, speaking skills and rational thinking ability.

B. **Evaluation Procedures**

**Final Exam - 40% of Final Grade (400 points)**
This written take home exam will be provided 2 weeks before the end of the semester. This exam will require that the student demonstrates a strong knowledge of all the content areas covered in class. The exam will be essay format with emphasis placed on practical application and available research. The exam is worth 40% of the final grade. **No makeup exams will be given except in the cases of university excused absences.**

**Final Exam due to Dr. Greenwood via e-mail file no later than assigned due date 12-??-15 5PM**

**PowerPoint Presentations - 20% of Final Grade (200 points)**

*E-mailed PowerPoint to Dr. Greenwood at Least 2 Days Before Assigned Presentation Date*

Throughout the course of the semester students will be expected to participate/teach in various strength training and conditioning protocols. Students enrolled in this class will be required to teach/conduct various PowerPoint sessions [2.5 Teaching Experiences]. The following content, in the order provided, is required for the format/structure that must appear in your PowerPoint presentation(s). Do not assume that your presentation content is known to all so please make sure to include specific details regarding all information/content presented – do not take short cuts! Handouts & relevant articles are always welcomed and evaluated accordingly. You will have one hour for the PowerPoint Presentation & one hour for your Laboratory Teaching Experience. Plan
& organization well – it is better to plan with much quality information that is relevant rather than not enough information to meet the requirements of this assignment.
- Title Slide Relevant To Topic Assigned For The Day
- Terms/Definitions Relevant To Topic Assigned For The Day
- Scientific Rationale Behind Topic(s) Assigned For The Day (Accurate Detail Here)
- How Where & When These Relevant Aspects Fit Into One’s Periodization Scheme
- Safety Aspects, Correct Technique & Equipment Regarding The Assigned Topic For The Day
- Other Direct & Indirect Training Techniques Related To The Assigned Topic For The Day
- Specific Anatomical Training Movements & Their Practical Applications
- Future Research Endeavors That Will Expand The Current Body Of Literature

**Laboratory Teaching Experiences** - **20% of Final Grade** (200 points)

**E-mailed Teaching Laboratory & Handouts to Dr. Greenwood at Least 2 Days Before Assigned Due Date**

Throughout the course of the semester the student will be expected to participate in and pass various strength training and conditioning protocols [1.5 Teaching Experiences]. Emerging professional strength and conditioning specialists are expected to participate in and dress appropriately for course practical activities/laboratories. Failing to participate in or dress appropriately for course practical experiences will result in a 10 points reduction in your grade for each offense. It is also critical that your lab teaching experience pay specific detail to your assigned topic. You will have one hour for your Laboratory Teaching Experience after a 5-10 minute dynamic warm-up. At times special guest speakers will assist in this process while students within the class will be required to teach/conduct various lab sessions.

**Research Article Reviews** - **20% of Final Grade** (200 points) [Flexibility – Core S & S – Speed – Power]

Four research article reviews will be required on select assigned topics relevant to strength & conditioning concepts and applications. The students will select articles relevant to designated topics for specific days. The articles will be research oriented and current (2000's to current). Students will follow the abstract template format provided in class in detail in order to ensure quality reviews as well as earn the designated points related to this assignment. In addition to completing the article review form also attach the complete article that you evaluated.

**No Late Assignments Accepted – Exceptions For University Excused Absences**
See Student Rule #7 for more information - [http://students-rule.tamu.edu/rule07](http://students-rule.tamu.edu/rule07)

**Grading Scale:**

- **A** = 90 - 100 (900 - 1000 pts.)
- **B** = 80 - 89 (800 - 899 pts.)
- **C** = 70 - 79 (700 - 799 pts.)
- **D** = 60 - 69 (600 - 699 pts.)
- **F** = Below 60 (below 599 pts.)
### IV. CLASS OUTLINE AND SCHEDULE *

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<tr>
<th>Date</th>
<th>Topic</th>
<th>Book Chapter: More Content</th>
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<tr>
<td>Week 1</td>
<td>Course Introduction – Foundations of PSAQ</td>
<td>Syllabus: Course Handouts, Assignment Schedules, etc.</td>
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<td>Fighting The Good Fight Video</td>
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<td>Week 1</td>
<td>Myofacial Release Techniques</td>
<td>Lecture &amp; Handouts Video Link</td>
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<td>Viable Options?</td>
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<td>Week 2</td>
<td>Flexibility/Warm-Up Presentation &amp; Discussion</td>
<td>1st Research Article Due Flexibility Lab Supplemental Readings SFF - 174-193 - 404-411</td>
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<td>Assigned Student PowerPoint &amp; Practical Lab Demonstration &amp; Participation</td>
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<td>Week 2</td>
<td>Flexibility/Warm-Up Lab</td>
<td>Handouts</td>
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<td>Assigned Student Practical Lab Demonstration &amp; Participation</td>
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<td>Week 3</td>
<td>FMS - Movement Screens Presentations/Discussion</td>
<td>Supplemental Readings SFF - 193-200 &amp; Grey Cook</td>
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<td>Assigned Student PowerPoint</td>
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<td>Week 3</td>
<td>FMS Demonstration &amp; Lab</td>
<td>Motion Screens Lab Supplemental Readings SFF - 193-200 &amp; Grey Cook</td>
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<td>Practical Application Lab Demonstration &amp; Participation</td>
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<td>Student Lab Handouts</td>
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<td>Week 4</td>
<td>Core Strength - Stability Presentations - Discussions</td>
<td>2nd Research Article Due Supplemental Readings SFF - 152-162</td>
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<td>Assigned Student PowerPoint</td>
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<td>Practical Application Lab Demonstration &amp; Participation</td>
<td>Core Lab Supplemental Readings SFF - 151-160</td>
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<td>Supplemental Notes SFF – 65-73 &amp; 144 – 152 &amp; 241 - 247</td>
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<td>3rd Research Article Due Supplemental Notes SFF – 65-72 &amp; 143 – 150 &amp; 240 - 246</td>
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<td>Quickness Presentation - Presentation &amp; Discussion</td>
<td>Supplemental Readings SFF – 125-144</td>
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| Week 10 | Quickness Laboratory & Discussion  
Practical Application Lab Demonstration & Participation  
Student Lab Handouts | Quickness Lab  
Supplemental Readings  
SIF - 125-144 |
|------------------|---------------------------------|
| Week 11 | Plyometric & Med Ball Presentation & Discussion  
Assign Student PowerPoint | 4th Research Article Due  
Supplemental Readings  
SIF - 255-298 - 563-577 |
| Week 11 | Plyometric & Med Ball Laboratory & Discussion  
Practical Application Lab Demonstration & Participation  
Student Lab Handouts | Supplemental Readings  
SIF - 255-298 - 563-577 |
| Week 12 | Olympic Lifts & Kettlebell Presentation  
Assigned Student PowerPoint & Video | Power Training  
Supplemental Readings  
SIF - 255-298 - 563-577 |
| Week 12 | Olympic Lifts & Kettlebell Laboratory & Discussion  
Practical Application Lab Demonstration  
Student Lab Handouts | Power Training  
Supplemental Readings  
SIF - 255-298 - 563-577 |
| Week 13 | Power - Chains - Bands - Sled Presentation  
Assigned Student PowerPoint | Power Training Option  
Supplemental Readings  
SIF - 255-298 - 563-577 |
| Week 13 | Power Laboratory - Chains & Bands - Sled Work  
Practical Application Lab Demonstration & Participation  
Student Lab Handouts | Power Training Laboratory  
Supplemental Readings  
SIF - 255-298 - 563-577 |
| Week 14 | Power Presentations - Tires - Ropes - Sledge Hammers  
Assigned Student PowerPoint | Power Training Laboratory  
Supplemental Readings  
SIF - 255-298 - 563-577 |
| Week 14 | Power Laboratory - Tires - Ropes - Sledge Hammers - TRX  
Practical Application Lab Demonstration & Participation  
Student Lab Handouts | Power Training Laboratory  
Supplemental Readings  
SIF - 255-298 - 563-577 |
| Week 15 | Final Comprehensive Take Home Exam Due  
Sent To Dr. Mike Greenwood Via E-Mail Attachment | Final Exam Due  
By 5 PM Or Before |

This schedule is subject to change upon the instructor’s discretion; student will be notified of such changes in advance.

**COURSE ADMINISTRATIVE STATEMENTS:**

**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, Disability Services in Room B118 of Cain Hall, or call 845-1637. Helpful information is located at [http://disability.tamu.edu](http://disability.tamu.edu).

**Plagiarism Statement:** 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."

**Copyright Statement:** 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.

**Aggie Code of Honor:** “Aggies do not lie, cheat or steal, nor do they 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, integrity, characteristics that Aggies have always exemplified. The Aggie Code of Honor functions as a symbol to all Aggies, promoting the understanding and loyalty to truth and confidence in each other."

All students are expected to abide by the Aggie Honor Code. Students should be aware of all Honor Council Rules and Procedures on the Honor Council website at [http://aggiehonor.tamu.edu](http://aggiehonor.tamu.edu).
Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional
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 Marine Biology

3. Course prefix, number and complete title of course: MARB 635 Marine Invertebrate Zoology

4. Catalog course description (not to exceed 50 words): General biology of marine invertebrate animals; morphology, evolution, and systematics. Laboratory will stress studies of local fauna.

5. Prerequisite(s): Graduate standing

| Cross-listed with: | N/A | Stacked with: | MARB 435 |

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)

   any master’s or doctoral level program

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)

<table>
<thead>
<tr>
<th>Department</th>
<th>Course #</th>
<th>Title (excluding punctuation)</th>
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<tr>
<td>MARB</td>
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<td>INVERTEBRATE ZOOLOGY</td>
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<th>Admin. Unit</th>
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Approval recommended by:

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

Antonietta Ong
Chair, College Review Committee Date

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

Antonietta Ong
Dean of College Date

Chair, GC or UCC Date

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Dates:
- Oct 23, 2014
- Current Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14
15 October 2014

Anja Schulze, Ph.D.
Associate Professor, Marine Biology
Texas A&M University at Galveston
200 Seawolf Parkway
OCSB Bldg 3029, Rm 258
Galveston, TX 77553

Dear Anja,

I am glad to hear that you are expanding your MARB 435 Marine Invertebrate Zoology course to include a graduate section. I know there will be great demand for this there at Galveston. I have talked to Dr. Wicksten about this, and she also thinks it is a great idea. Therefore, I am happy to say that the Department of Biology enthusiastically supports your effort to create a graduate section of your Marine Invertebrate Zoology course.

Sincerely,

Thomas D. McKnight
Professor and Head of Biology
Course Information

Course number and title  MARB 435/635 – Marine Invertebrate Zoology

Term
Spring 20XX
Lecture (OCSB 141): TR 11:00 – 12:15
Lab (CLB 201):
M 1300-1550 (901)
T 1300-1550 (902)
W 1300-1550 (903)
M 1600-1850 (904)

Meeting times and location

Course Description

This course gives an overview of approximately 20 phyla of invertebrate animals with an emphasis on marine representatives. The lectures present an introduction to the diversity, morphology, evolution and ecology of each taxon. The labs focus on local fauna and include several field trips in the Galveston area and an independent study project for students taking the class at the graduate level.

Prerequisites

UG students: BIOL 111 and 112. Junior or senior classification or approval of instructor.
G students: Graduate standing or approval by instructor

Learning Outcomes

- Gain a basic understanding of marine invertebrate diversity, ecology, physiology and evolution
- Research and analyze current literature in invertebrate zoology and synthesize the information
- Collect, analyze and interpret invertebrate-related data and summarize in written reports.

Instructor Information

Name
Anja Schulze, Ph.D.
Telephone number
409-740-4540
Email address
schulzea@tamug.edu
Office hours
T, TR 8:30-10 or by appointment
Office location
OCSB 258

Textbooks and/or Resource Material

2. Marine Invertebrate Zoology, lab manual; available in bookstore (required)

Exams (UG and G students)

The tests, except the lab finals, will mainly cover the material since the last test, but comparative questions referring to previously covered material can be expected.

- 1 -
If you miss a test due to an excused absence you will have the opportunity to take it **within 5 business days** after the original date. If you have an excused absence exceeding five business days, alternative assignments for extra credit can be arranged.

**Independent Project (G students only)**
Each G student will work on an independent research project on a topic related to marine science and throughout the semester. The project will include a field and/or laboratory component and may be related to the student’s graduate work, but it should be concise enough to complete within a semester.

**Presentations**
UG students will give a 10 min group presentation during one of the labs on a choice of topics provided by the TAs.
Each G student will prepare and present one lecture on a topic of their choice, in consultation with the instructor, to the class.

**Written Assignments**
UG students: You are required to submit **one research article critique** (~500 words) and **two field trip reports** (800 words each). Reports are due two weeks after each trip at the beginning of your lab meeting. You will receive written feedback on your first submission and will have the chance to revise it. The penalty for a late assignment is 2 points per day. No late assignments will be accepted after the final deadline in the week of April 21 (beginning of respective lab section). For additional guidance on written assignments, consult with the TAMUG Writing Lab (CLB, writinglab@tamug.edu).

G students: You will submit a written report of your independent study project, structured in the format of a scientific journal article (~10 pages double-spaced, plus references and figures as applicable).

**Grading**

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<th>Lecture</th>
<th>Labs</th>
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<tbody>
<tr>
<td></td>
<td>Points</td>
<td>Percent of final grade</td>
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<tr>
<td>Research article critique</td>
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<td>10%</td>
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<tr>
<td>Test 1</td>
<td>120</td>
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<td>Test 2</td>
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<td>Test 3</td>
<td>120</td>
<td>12%</td>
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<tr>
<td>Final exam</td>
<td>140</td>
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<tr>
<td>Total</td>
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G students
Test 1 (120 points): 12%
Test 2 (120 points): 12%
Test 3 (120 points): 12%
Final (140 points): 14%
Class presentation: 20%
Research project: 30%

All students
A: 90-100%
B: 80-89.9%
C: 70-79.9%
D: 60-69.9%
F: < 60%

Deadlines

UG Students:
Week 3  Zooplankton report
Week 6  Trawling report
Week 8  Oyster reef report
Week 10 Meiofauna report
Week 12 Article critique
Week 13 Habitat recovery report, last deadline to submit all written assignments; no
assignments will be accepted after this date.

G Students
Week 4  One page concept paper for independent study project
Week 12 Rough draft of Project Report
Week 14 Final Project Report

Absences
Information concerning absences is contained in the University Student Rules Section 7. The
University views class attendance is an individual student responsibility. All students are
expected to attend class and to complete all assignments. Please consult the University Student
Rules for reasons for excused absences, detailed procedures and deadlines as well as student
grievance procedures (Part III, Section 45).

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 the Office of Student Counseling, in Seibel Student
Services Center, Suite 104, or call 409-740-4736. For additional information visit
http://www.tamug.edu/counsel/Disabilities.html
Academic Integrity
For additional information please visit: http://www.tamug.edu/catalog/calendar.html

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

Helpful Websites

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<td>Syllabus, Introduction, Zooplankton, Phylogenetics</td>
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<td>Metazoa, Writing lab presentation</td>
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<td>Chapter 12: Classes Bivalvia and Cephalopoda</td>
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<td>Chapter 13: Introduction, Class Polychaeta (including echinoderms and sipunculans)</td>
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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 (DVM, MT, JI, PharmD, DMA)

2. Request submitted by (Department or Program Name): Marine Sciences

3. Course prefix, number and complete title of course: MARS 626 Advanced GIS for Coastal Systems

4. Catalog course description (not to exceed 50 words): Conceptual and technical expansion of GIS and spatial analysis methods. Hands on experience with multidisciplinary data sets relevant to coastal systems; spatial and statistical methods, creation, manipulation, and analysis of various datasets that address the interaction of human and natural systems in coastal habitats.

5. Prerequisite(s): MARS 625, ESSM 351, RENR 405, ESSM 651 or similar course. Graduate status 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 program(s) (e.g., B.A. in history)

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

   c. elective for MARM, MARB-1DP or other Galveston-based graduate students

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)

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Approval recommended by:

Kyeong Park  Kyeong Park  10/4/14
Department Head or Program Chair (Type Name & Sign)  Date

Chair, College Review Committee  Date

Dean of College  Date

Chair, GC & UCO  Date

Submitted to Coordinating Board by:

Associate Director, Curricular Services  Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu.
Curricular Services – 07/14
MARS 626: Advanced Geographic Information Systems for Coastal Systems
Spring 2016

Instructor: Dr. Wesley Highfield
Office: OCSB 364
Office Hours: By appointment/request
e-mail: highfiew@tamug.edu
Phone: (409)740-4726

Teaching Assistant:
TBA
e-mail:

Course Description
This course will challenge students to conceptually and technically expand their knowledge of GIS and spatial analysis methods. Students will gain hands-on experience manipulating and analyzing multidisciplinary data sets relevant to coastal systems. Utilizing spatial and statistical methods, students will create, manipulate, and analyze various datasets that address the interaction of human and natural systems in coastal habitats. It is expected that students in this course will come from a range of backgrounds—the interdisciplinary background of your peers should help promote a wide range of discussions throughout the semester.

Goals
This overall aim of the course is to promote students’ growth of existing spatial analysis skills and introduce more advanced analytical approaches. More specifically, the primary goal of this course is to enhance and expand general GIS skills, spatial analysis, and the application of ArcGIS in an interdisciplinary framework. Students will also be exposed to spatial statistics and the assembly/management of spatially-based data for analysis outside of a GIS framework. Knowledge gained during this course is applicable in both research and professional settings.

Prerequisites
MARS 625, ESSM 351, RENR 405, ESSM 651 or similar course, graduate status or approval of instructor.

Course Structure
This course will have a lecture, computer-based lab, and reading component. Students are expected to attend classes and labs in addition to reading the assigned material.

Required Text
There is no required text. You will need to use the laboratory computers with GIS software. I have also secured a free, one-year license of ArcGIS for each of you enrolled in the class that can be installed on your personal computer (PC only—sorry Mac users). Much of the information needed from a technical perspective can be found on the web and/or through the software’s help menu.
Grading
The weighting of course grades are as follows:
- Weekly Lab Exercises: 30%
- Final Exam: 30%
- Final Project: 30%
- Participation: 10%
I will follow the traditional grading scale of: A=90-100, B=80-89, C=70-79, D=60-69, F=<60

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Re-Introduction to GIS</td>
</tr>
<tr>
<td>Week 2</td>
<td>A review of GIS software, data structures, and data management</td>
</tr>
<tr>
<td>Week 3</td>
<td>Geoprocessing and Model Builder</td>
</tr>
<tr>
<td>Week 4</td>
<td>Vector Data Analysis—Point Pattern Analysis</td>
</tr>
<tr>
<td>Week 5</td>
<td>Vector Data Analysis—Areal Interpolations</td>
</tr>
<tr>
<td>Week 6</td>
<td>Spatial autocorrelation and cluster detection I</td>
</tr>
<tr>
<td>Week 7</td>
<td>Spatial autocorrelation and cluster detection II</td>
</tr>
<tr>
<td>Week 8</td>
<td>Raster Data Analysis—Spatial Interpolations</td>
</tr>
<tr>
<td>Week 9</td>
<td>SPRING BREAK</td>
</tr>
<tr>
<td>Week 10</td>
<td>Raster Data Analysis—Surface Analysis</td>
</tr>
<tr>
<td>Week 11</td>
<td>LiDAR and Point Cloud Data</td>
</tr>
<tr>
<td>Week 12</td>
<td>Basic Image Analysis</td>
</tr>
<tr>
<td>Week 13</td>
<td>Loosely-coupled models: data assembly, analysis and display (cont’d).</td>
</tr>
<tr>
<td>Week 14</td>
<td>Project work; Project Presentations</td>
</tr>
<tr>
<td>Week 15</td>
<td>Final Exam</td>
</tr>
</tbody>
</table>
Make Up Policy for Lab Assignments
Due dates are final. Make-up exams require a university excused absence due to serious illness, a family emergency or extenuating circumstances. 5 points per day will be deducted for late labs.

Plagiarism
Plagiarism consists of passing off as one's own ideas, words, writings, etc., which belong to another. 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". I take academic dishonesty very seriously and if discovered, I WILL pursue it.

Americans with Disabilities Act (ADA) Policy Statement
The Americans with Disabilities Act (ADA) is a federal non-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this law 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 Counseling Office, Seibel Student Center, or call (409)740-4587. For additional information visit http://www.tamug.edu/counsel/services/dssprocedures.htm.

Academic Integrity Statement and Policy
"An Aggie does not lie, cheat, or steal or tolerate those who do."
All syllabi should contain a section that states the above Aggie Honor Code and refers the student to the Honor Council Rules and Procedures on the web: http://www.tamug.edu/HonorSystem.

Statement on Absences
Information concerning absences is contained in the University Student Rules Section 7. The University views class attendance as an individual student responsibility. All students are expected to attend class and to complete all assignments. Please consult the University Student Rules for reasons for excused absences, detailed procedures and deadlines as well as student grievance procedures (Part III, Section 45). Re: excused/unexcused absences & make-up policies will follow Student Rules: http://www.tamug.edu/stulife/Academic%20Rules/Rule%207.pdf.

Statement on the Family Educational Rights and Privacy Act (FERPA)
FERPA is a federal law designed to protect the privacy of educational records by limiting access to these records, to establish the right of students to inspect and review their educational records and to provide guidelines for the correction of inaccurate and misleading data through informal and formal hearings. To obtain a listing of directory information or to place a hold on any or all of this information, please consult the Admissions & Records Office. Items that can never be identified as public information are a student's social security number or institutional identification number, citizenship, gender, grades, GPR or class schedule. All efforts will be made in this class to protect your privacy.
and to ensure confidential treatment of information associated with or generated by your participation in the class.

Statement on Course Evaluations
The PICA (Personalized Instructor/Course Appraisal) is an online course evaluation for Texas A&M. We highly encourage you to complete an evaluation for each course on your schedule. Student input is a critical component used to improve curriculum and teaching. Each faculty member values your input to improve his/her methodology. Your comments can also significantly impact the mix and membership of faculty. The PICA website is available at http://pica.tamu.edu or your howdy portal.
As you may guess, I do not what is required. As I forward this email to Melanie, I hope (and sure) she will let us know what we need to do. Thanks for contacting Katy.

K

Begin forwarded message:

From: Wesley Highfield <highiew@tamug.edu>
Date: October 20, 2014 at 8:25:59 PM CDT
To: Kyeong Park <parkk@tamug.edu>
Subject: FW: Requesting approval new course

Kyeong-

I don't have the course request form, or I would add these course to the prerequisites. Is the email enough to suffice for tomorrow’s meeting? I'm going to optimistically take her response as a conditional “yes”.

If not her response is not enough for GIC, I can modify tonight/tomorrow morning with a copy of the course request form.

wh

**********************************************************************
Wesley E. Highfield, Ph.D.
Assistant Professor
Department of Marine Sciences
Texas A&M University at Galveston
Galveston, TX 77553-6175
Phone: 409-740-4726
**********************************************************************

From: Katy Kavanagh [Katy.Kavanagh@ag.tamu.edu]
Sent: Monday, October 20, 2014 8:05 PM
To: Wesley Highfield
Cc: katyk@tamu.edu; Kyeong Park
Subject: Re: Requesting approval new course

Wesley,
I am sorry that my reply is delayed. I did check with Rusty and Ben and the both agreed there is some overlap:
Rusty said "We should ask them to explicitly list ESSM 351, RENR 405, and ESSM 651 as alternate prerequisites that can be taken in place of MARS 625 - so, MARS 625 OR ESSM...." Ben did not have any major concerns.

I enjoyed my visit to Galveston today!

Katy

Dr. Kathleen Kavanagh  
Professor and Department Head  
Ecosystem Science and Management  
College of Agriculture and Life Sciences  
Texas A&M University  
http://essm.tamu.edu  
979.845.6049

On Oct 20, 2014, at 7:47 PM, "Wesley Highfield" <highfiwel@tamu.edu> wrote:

Dr. Kavanaugh-

Apologies for the multiple e-mails, but would it be possible for you to grant permission and/or support for my new course offering?

The new course, MARS 626 "Advanced GIS for Coastal Systems", is likely to have a small overlap with Srinivasa's ESSM 652 course. However, my course will be oriented toward coastal systems and their data requirements relative to the 652 course. We, the Marine Sciences Department at TAMUG, would like to add this course to the Fall 2015 Catalog. Dr. Searcy in BAEN has already expressed that they have no objections to the course.

I've attached the syllabus for the course; the previous e-mail from our department head, Kyeong Park, has the course request form attached.

Thanks in advance for your consideration and response. And as an alum of the FRSC department (what is now ESSM), I wish you a (belated) welcome.

Thanks again,

Wes Highfield

******************
Wesley E. Highfield, Ph.D.  
Assistant Professor  
Department of Marine Sciences  
Texas A&M University at Galveston  
Galveston, TX 77553-6175
Melanie Lesko

From: Stephen Searcy <s-searcy@tamu.edu>
Sent: Sunday, September 28, 2014 5:13 AM
To: Kyeong Park; 'katyk@tamu.edu'
Cc: Melanie Lesko
Subject: RE: Requesting approvals/support for our new course

BAEN has no objection to the proposed new course, MARS 626.

Stephen W. Searcy, P.E.
Professor and Head
Biological and Agricultural Engineering
Texas A&M University
2117 TAMU
201 Scoates Hall
College Station, TX 77843-2117
Office: 979-845-3940
Mobile: 979-450-3156
Email: s-searcy@tamu.edu

From: Kyeong Park [mailto:parkk@tamu.edu]
Sent: Monday, September 22, 2014 3:24 PM
To: katyk@tamu.edu; Stephen Searcy
Cc: Melanie Lesko
Subject: Requesting approvals/support for our new course

Dear Drs. Kavanaugh and Searcy,

I am new DH of Marine Sciences at TAMUG. I am sending you this email asking for your permission to add a new course, MARS 626 (Advanced GID for Coastal Systems) to our catalog. Attached please find the course request form that includes a syllabus and Dr. Highfield’s CV. While there might be some overlap between this course and ESSM 652 (Advanced Topics in GIS), cross listed with BAEN 652, this course is oriented toward coastal data sets and problems. With your permission, we plan to add this course to the fall 2015 catalog. Please let me know if you have any questions.

I like to thank you in advance for your cooperation. I hope to have a chance to meet you in person in the near future.

Best,

Kyeong Park, Ph.D.
Professor and Head, Dept. of Marine Sciences
Texas A&M University at Galveston
P.O. Box 1675
1801 Texas Clipper Rd, OCSB 280
Galveston, TX 77553
Phone: +1-409-740-4710
Fax: +1-409-740-4429
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, DFM)

2. Request submitted by (Department or Program Name):
   Department of Oceanography

3. Course prefix, number and complete title of course:
   OCNG 603 Communicating Ocean Science

4. Catalog course description (not to exceed 50 words):
   Instruction and practice with presenting scientific information on the ocean to a variety of audiences under different time constraints. Critical components for any presentation; knowing your audience; designing effective visual aids and graphics; leading your audience through complex concepts; and communicating with non-scientists.

5. Prerequisite(s):
   N/A

6. Cross-listed with:
   N/A

7. Is this a variable credit course?
   □ Yes  ✔ No
   If yes, from ________ to ________

8. 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

9. Will this course be submitted to the Core Curriculum Council?
   □ Yes  ✔ No

10. How will this course be graded?
    ✔ Grade  □ S/U  □ P/F (CME)

11. This course will be:
    a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)
       M.S., Ph.D. in Oceanography
    b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

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: OCNG  Course #: 603  Title (excluding punctuation): Communicating Ocean Science

   Lect.  Lab  Other  SCH  CHG & Fund Code  Admin. Unit  Acad. Year  ERI Code
   3.00  0.00  0.00  3.00

   Approval recommended by:
   Department Head or Program Chair (Type Name & Sign)  Date

   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.
Curricular Services – 07/14
Course title and number: OCNG 603: Communicating Ocean Science
Term: Fall 2015
Meeting times and location: W 1:50 to 4:50, O&M 617

Course Description and Prerequisites

This course will provide instruction and practice with presenting scientific information on the ocean to a variety of audiences under different time constraints. Emphasis will be on oral communication, with some written communication. Topics include critical information to be included in any presentation; knowing your audience; designing effective visual aids and graphics; leading your audience through complex concepts; preparing for presentations; and communicating with non-scientists.

Learning Outcomes or Course Objectives

By the end of this course you should be able to:
1. Synthesize and explain complex scientific information.
2. Present clearly to audiences composed of scientists inside your field, scientists outside your field, and non-scientists.
3. Design and present effective oral and poster presentations.
4. Construct clear, easy to follow scientific talks under a variety of times constraints.
5. Speak clearly and confidently in front of small and large audiences.
6. Prepare visual/graphical content that is easy for an audience to see and understand.

Instructor Information

Name
Dr. Kathryn E. F. Shamberger
Telephone # 979-845-5752
Email address katie.shamberger@tamu.edu
Office hours By appointment (I am happy to meet with you if you have any questions.)
Office location Rm 911B, O&M Bldg

Textbook and/or Resource Material

You will be expected to read a number of scientific journal papers in your research area to be presented to the class and in writing. You will choose the papers yourself and approval by the instructor is required before presenting them. Other recommended readings and resources will be posted on eCampus.

Grading Policies

Grading will be based on the following: participation (15%), 10 min talk (10%), 15 min talk (10%), outreach project (5%), 5 min talk and poster presentation (5%), 25 min talk (20%), final poster presentation (20%), paper (15%=5%(paper)+5%(peer review)+5%(revised paper)). The participation part of the grade is based on personal presentation improvement throughout the semester and giving constructive feedback to other students in the class. In order to demonstrate personal presentation improvement, the student must give all required presentations, including the outreach project, and giving constructive feedback to other students in the class requires attending class for other students' presentations. The grading divisions will be: A (90 -100 %), B (80 - 89 %), C (70 - 79 %), D (60 - 69 %) and F (0 – 59%). There will be no extra credit.
Assignments

There will be 6 presentations total throughout the semester: 5, 10, 15, and 25 minute talks and 2 poster presentations, including a final poster presentation. The 10 min talk will be based on a scientific paper from a peer-reviewed journal that the student will choose and have approved by the instructor by Mon, Week 2. Students will be assigned a 10 min talk time for Week 3. The 15 min talk will be a review of the peer-reviewed literature in the student’s chosen field of study and will conclude with open research questions that the student finds compelling. A reference list with at least 10 peer-reviewed journal articles must be submitted to the instructor by Mon, Week 4. Students will be assigned a 15 min talk time for Week 6 or 7. The 5 min talk and first poster are based on the same material as the 15 min talk. All students will give a 5 min talk and present their poster in Week 9. The 25 min talk will follow the format of a proposal which includes a review of pertinent literature, the research question to be addressed, research plan/methods, and how this work would contribute to the field of study. Students will be assigned a 25 min talk time for Week 12, 13 or 14. The final poster presentation will be based on the same material as the 25 min talk. A poster session will be held during the final exam time and students will take turns presenting their posters and viewing other students’ posters. Outside professors and graduate students will also be invited to view and evaluate posters. In addition, there will be an Outreach Activity which students will plan and perform in teams to communicate ocean science to non-scientists.

There will be 3 writing assignments total during the semester and each will be based on a 3-5 page literature review paper covering the same material as the 15 min talk/5 min talk/first poster. The paper is due on Mon, Week 8 (first writing assignment). Each student will be assigned another student’s paper to peer review. Reviews will be double blind and are due by Fri, Week 9 (second writing assignment). Students will then be able to revise their papers based on comments from the instructor and from the peer review. Revised papers are due by Fri, Week 14 (third writing assignment).

Cell Phone/Laptop Policy

Cell Phones: Set to silent during class. Please, no texting during class. If you must take a call, leave the room quietly to do so.

Laptops: I expect your attention during class. Using a laptop to take notes is perfectly acceptable. Please, do not surf, message, or continually check email during class.

Course Topics, Calendar of Activities, Major Assignment Dates

This table shows the class schedule for Communicating Ocean Science. In the event that major changes need to be made to the schedule you will be notified by email and by postings on eCampus ASAP.

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday date</th>
<th>Topics</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>TBD</td>
<td>Critical Components in any Presentation, Preparing for Presentations</td>
<td></td>
</tr>
<tr>
<td>Week 2</td>
<td>TBD</td>
<td>Answering Questions, Being a Good Speaker, and Literature Reviews</td>
<td>Paper approved by Mon</td>
</tr>
<tr>
<td>Week 3</td>
<td>TBD</td>
<td>10 min talks</td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>TBD</td>
<td>Knowing Your Audience: Gearing your Presentation to Different Audiences; Visual Aids and Graphics</td>
<td>References List by Mon</td>
</tr>
<tr>
<td>Week 5</td>
<td>TBD</td>
<td>Leading Your Audience Through Complex Concepts and Paper Reviews</td>
<td></td>
</tr>
<tr>
<td>Week 6</td>
<td>TBD</td>
<td>15 min talks</td>
<td></td>
</tr>
<tr>
<td>Week</td>
<td>TBD</td>
<td>15 min talks</td>
<td>Paper due by Mon</td>
</tr>
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<tr>
<td>Week 8</td>
<td>TBD</td>
<td>Speed Talks; Guide to Good Poster Presentations</td>
<td>Peer Reviews by Fri</td>
</tr>
<tr>
<td>Week 9</td>
<td>TBD</td>
<td>5 min talks and Poster Presentations</td>
<td>Outreach Plan by Fri</td>
</tr>
<tr>
<td>Week 10</td>
<td>TBD</td>
<td>Communicating with Non-Scientists; Outreach Activities</td>
<td>Outreach Plan by Fri</td>
</tr>
<tr>
<td>Week 11</td>
<td>TBD</td>
<td>Outreach Activities</td>
<td>Revised Paper by Fri</td>
</tr>
<tr>
<td>Week 12</td>
<td>TBD</td>
<td>25 min talks</td>
<td></td>
</tr>
<tr>
<td>Week 13</td>
<td>TBD</td>
<td>25 min talks</td>
<td></td>
</tr>
<tr>
<td>Week 14</td>
<td>TBD</td>
<td>25 min talks</td>
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<tr>
<td>5/8, 5/11-13</td>
<td>FINAL EXAM = Poster Session: Date/time TBD</td>
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</tbody>
</table>

Other Pertinent Course Information

The goal of this course is to provide the tools and guidance needed for each student to become the best possible presenter they can be. Students are expected to play an active role in this process, not just in improving their own presentation skills, but also in assisting every student in the class to improve. Everyone in the class will give and receive feedback on each other’s presentations, and openly communicating constructive feedback is encouraged and required. The class is expected to function as a team that supports and encourages every member.

Copyright

All materials generated for this class, which include but are not limited to syllabi, in-class materials, Blackboard materials, and exams, are copyrighted. You do not have the right to redistribute these unless I expressly grant permission. Posted lecture notes can be printed for your sole use and cannot be redistributed.

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](http://disability.tamu.edu)

Academic Integrity

For additional information please visit: [http://www.tamu.edu/aggiehonor](http://www.tamu.edu/aggiehonor)

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
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 [X] Graduate [ ] First Professional (e.g., DVM, JD, MD, etc.)

2. Request submitted by (Department or Program Name): Department of Mechanical Engineering

3. Course prefix, number and complete title of course: MEEN 645 - Engineering Applications of Solid Mechanics

4. Catalog course description (not to exceed 50 words): Mechanical and mathematical basis for modeling response of solid bodies undergoing coupled mechanical and non-mechanical effects, analysis of stress and deformation for structural members subjected to axial, torsional, and bending loads, design of multifunctional systems.

5. Prerequisite(s): CVEN 305, MEEN 368, or equivalent

Stacked with: MEEN 445

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

6. Is this a variable credit course? [ ] Yes [X] No If yes, from _______ to _______

7. Is this a repeatable course? [ ] Yes [X] No If yes, this course may be taken _______ times.

Will this course be repeated within the same semester? [ ] Yes [X] No

8. Will this course be submitted to the Core Curriculum Council? [ ] Yes [X] No

9. This course will be:

a. required for students enrolled in the following degree program(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. or M.Eng. in MEEN

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

[X] I verify that I have reviewed the FAQ for Export Control Basics for Distance Education (http://npr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).

12. Prefix Course # Title (excluding punctuation)

<table>
<thead>
<tr>
<th>MEEN</th>
<th>645</th>
<th>ENG. APP. OF SOLID MECHANICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lect.</td>
<td>Lab</td>
<td>SCH</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

Level 6

Approval recommended by:

Dr. Daniel McAdams

Department Head or Program Chair (Type Name & Sign) Date: 9/12/14

Chair, College Review Committee

Date: 9/12/14

Dr. Alice Johnson

Department Head or Program Chair (Type Name & Sign) Date: 2/22/14

Chair, CC of UCC

Date: 10/20/14

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 – 04/14
SYLLABUS Fall 2014
MEEN 645: Engineering Applications of Solid Mechanics

REQUIRED OR ELECTIVE: Elective course

CATALOG DESCRIPTION: Credit 3. Mechanical and mathematical basis for modeling response of solid bodies undergoing coupled mechanical and non-mechanical effects, analysis of stress and deformation for structural members subjected to axial, torsional, and bending loads, design of multifunctional systems.

PREREQUISITES: Undergraduate Mechanics courses (CVEN 305, MEEN 368, or equivalent)

INSTRUCTOR: Dr. William C. Schneider
Engineering Physics Building (ENPH) Room 305
e-mail: wschneider@tamu.edu

LECTURE: -------------------------------

GRADING: HW & Quiz 10%, EXAM #1 25%, EXAM #2 25%, Final Exam 25%, Graduate projects 15%
A(>=90); B(80-90); C(70-80); D(60-70); F(<60)

There will be two “Graduate Projects” requiring their individual approach to solving a complex problem or deriving a general solution. The project may require approximate mathematical solutions. In some cases there will be no single correct answer. The grades will be based on their logical, but practical, approach to the project.

TEXTBOOK AND OTHER RELEVANT MATERIALS:
No Formal Text  Dr. Schneider Notes


TOPICS COVERED:
# Week

1  Introduction to Course; Beams in general

2  Application and Derivation Instability of Beams, Plates, Thin Section Beams

3  Continue Application and derivation of Instability of Beams, Plates, and Thin Section Beams

Graduate Project # 1 (To be determined) i.e. Derive the buckling instability load for a beam with various elastic end constraints and multiple constraints along the beam. May need to write a brief report.

4  Application and derivation the stress and deflection of Composite Beams
CLASS/LABORATORY SCHEDULE: Two, 75 minute sessions per week, taught in mixed lecture-problem session style. Project and problem-solving materials are assigned.

EXAM #1: -------, class period time (tentative)
EXAM #2: -------, class period time (tentative)
Final Exam: To be determined

RELATIONSHIP OF COURSE TO PROGRAM OUTCOMES:

<table>
<thead>
<tr>
<th>ABET Program Outcome</th>
<th>ABET Program Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>x a. ability to apply knowledge of mathematics, science and engineering</td>
<td>f. understanding of professional and ethical responsibility</td>
</tr>
<tr>
<td>x b. ability to design and construct experiments, as well as to analyze and interpret data</td>
<td>x g. ability to communicate effectively</td>
</tr>
<tr>
<td>x c. ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability</td>
<td>h. broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context</td>
</tr>
<tr>
<td>d. ability to function on multi-disciplinary teams</td>
<td>x i. recognition of the need for, and an ability to engage in life-long learning</td>
</tr>
<tr>
<td>e. ability to identify, formulate and solve engineering problems</td>
<td>j. a knowledge of contemporary issues</td>
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<tr>
<td></td>
<td>x k. ability to use the techniques, skills and modern engineering tools necessary for engineering practice</td>
</tr>
</tbody>
</table>

Prepared by Dr. William C. Schneider Date May 13, 2014

Absences:

Work missed due to absences will only be excused for University-approved activities in accordance with TEXAS A&M UNIVERSITY STUDENT RULES (see http://student-rules.tamu.edu/rule7.htm). 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.).

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 the Disability Services (disability.tamu.edu) in Room B118 of Cain Hall or call 845-1637.

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/
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 (e.g., DVM, JD, MD, etc.)
2. Request submitted by (Department or Program Name): Department of Psychology
3. Course prefix, number and complete title of course: PSYC 605 Memory & Consciousness
4. Catalog course description (not to exceed 50 words):
Research on consciousness and memory; all levels of conscious awareness associated with memory retrieval, from detailed personal experiences of remembering to unaware uses of memory; implicit and explicit memory; automatic and controlled processes; metacognitive explorations of consciousness

5. Prerequisite(s):

<table>
<thead>
<tr>
<th>Cross-listed with</th>
<th>Stacked with</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

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. This course will be:
   a. required for students enrolled in the following degree program(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)

This course will be an elective course for graduate students in Psychology.

10. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

☑ 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).

12. Prefix | Course # | Title (including punctuation)
PSYC | 605 | Memory & Consciousness

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Lab</th>
<th>SCH</th>
<th>CRP and Fund Code</th>
<th>Admin Unit</th>
<th>Acad Year</th>
<th>ECU Code</th>
<th>Approval recommended by</th>
</tr>
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<tr>
<td>0</td>
<td>3</td>
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<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>Douglas Woods</td>
</tr>
</tbody>
</table>

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

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

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 04/14
Human Memory and Consciousness (Psych 605)
Wed 9:00-12:00
Room 422, Psychology Building
Spring 2016

Professor: Lisa Geraci
Office hours: By appointment; Psychology, Room 241
Office phone number: 845-2585
E-mail: Igeraci@alam.edu

Recommended prerequisites: Graduate classification or approval of instructor

Course overview and objectives
This course is designed to provide an in-depth examination of research on consciousness and memory. We will consider levels of consciousness that are associated with memory retrieval, from detailed personal experiences of memory (often called autonoetic consciousness) to fact-like experiences of memory (often called noetic consciousness) to unaware uses of memory (often called anoetic consciousness). Specific topics will include: implicit and explicit memory, automatic and controlled memory, and metacognitive explorations of consciousness. In particular, we will discuss remembering and knowing, reality or source monitoring, and the use of post-memory confidence judgments in assessing levels of awareness associated with explicit memory performance. Lastly, we will examine how consciousness and memory may or may not change across the lifespan.

Learning Outcomes. Successful students of this course will:
- Discuss and analyze current research articles on consciousness and memory
- Describe and compare major theories and findings in the area of memory and consciousness

Required Readings: course readings will be distributed by the instructor and are listed on the course schedule.

Discussion questions for readings (30 points)
For each reading, you will be asked to think of at least 3 thoughtful questions to discuss in class. You will hand in these questions at the end of each class.

Class discussion of assigned reading (15 points)
You will also be asked to lead the discussion of 3 articles in class (worth 5% each). You should prepare some thought-provoking questions that will stimulate class discussion. Use this time to point out any problems you see with the article’s methodology or conclusions. You should assume that everyone has read the article, so you do not need to spend much time going over the details of the article.

Research proposal (40 points)
This paper is designed to give you an opportunity to develop a research proposal on some aspect of memory and consciousness. This should be a proposal for a research project that you might want to conduct. Please follow the format of a typical NIH or NSF grant proposal or a typical APA style paper that you would use for published work. You will receive more detailed instructions for this paper in the following few weeks. The paper should be about 10-15 pages long.

Research proposal presentation (15 points)
During the last two weeks of the semester, you will be asked to present your research proposal idea to the class in a 30 minute presentation, including questions. You should prepare a PowerPoint presentation of your proposed research, including background information, methods, potential results, and discussion of those results.
<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture Topic</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Course Introduction</td>
<td></td>
</tr>
<tr>
<td>Week 2</td>
<td>Remembering and Knowing</td>
<td>Tulving, 1985</td>
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<tr>
<td></td>
<td></td>
<td>Rajaram, 1993</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bodner &amp; Lindsay, 2003</td>
</tr>
<tr>
<td>Week 3</td>
<td>Awareness and memory processes</td>
<td>Dewhurst, Holmes, Brandt, &amp; Dean, 2006</td>
</tr>
<tr>
<td></td>
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<td>Jacoby, Woloshyn, &amp; Kelley, 1989</td>
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<td></td>
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<td>Wheeler &amp; Buckner, 2004</td>
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<td>Week 4</td>
<td>Confidence and awareness</td>
<td>Rajaram, Hamilton, Bolton, 2002</td>
</tr>
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<td></td>
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<td>Conway, Gardiner, Perfect, et al., 1997</td>
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<td>Java, Gregg, &amp; Gardiner, 1997</td>
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<tr>
<td>Week 5</td>
<td>Illusions of consciousness</td>
<td>Lindsay &amp; Kelley, 1996, <em>JML</em></td>
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<td></td>
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<td>Whittlesea &amp; Williams, 1998</td>
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<tr>
<td></td>
<td></td>
<td>Roediger &amp; McDermott, 1995</td>
</tr>
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<td></td>
<td></td>
<td>Geraci &amp; McCabe, 2006</td>
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<tr>
<td>Week 6</td>
<td>Awareness across the lifespan</td>
<td>Bruce, Dolan, Phillips-Grant, 2000</td>
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<tr>
<td></td>
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<td>Perfect &amp; Dasgupta, 1997</td>
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<td></td>
<td>Mantyla, 1993</td>
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<tr>
<td>Week 7</td>
<td>Amnesia and awareness</td>
<td>Warrington &amp; Wieskrantz, 1970</td>
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<td></td>
<td></td>
<td>Schacter, 1983</td>
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<tr>
<td>Week 8</td>
<td>Implicit memory in normals</td>
<td>Roediger, 1990</td>
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<tr>
<td></td>
<td></td>
<td>Blaxton, 1989</td>
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<td></td>
<td></td>
<td>Schnyer, Dobbins, &amp; Schacter, 2007</td>
</tr>
<tr>
<td>Week 9</td>
<td>Awareness in implicit memory</td>
<td>Richardson-Klavehn &amp; Gardiner, 1995</td>
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<tr>
<td></td>
<td></td>
<td>Barnhardt &amp; Geraci, 2007</td>
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<tr>
<td></td>
<td></td>
<td>MacLeod, 2007</td>
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<tr>
<td>Week 10</td>
<td>Implicit memory and aging</td>
<td>Gabrieli, Vaidya, Stone, et al., 1999</td>
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<td></td>
<td></td>
<td>Prull, Dawes, Martin, Rosenberg, &amp; Light, 2006</td>
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<td></td>
<td></td>
<td>Fleischman, Wilson, Gabrieli, et al., 2004</td>
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<tr>
<td>Week 11</td>
<td>Reconsidering implicit memory</td>
<td>Willingham &amp; Preuss, 1995</td>
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<td></td>
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<td>Mitchell, 2006</td>
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<td></td>
<td></td>
<td>Roediger, 2003</td>
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<td>Week 12</td>
<td>Memory awareness and aging</td>
<td>Levy, 1996</td>
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<td></td>
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<td>Hess, Hinson, &amp; Stratham, 2004</td>
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<td>Chasteen, Bhattacharyya, Horhota, et al, 2005</td>
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<td>Hughes, Geraci, &amp; De Forrest, 2013</td>
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<td>Week 13</td>
<td>Class presentations</td>
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<tr>
<td>Week 14</td>
<td>Class presentations</td>
<td>Research proposals due!</td>
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Grades will be assigned according to the following scheme:

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<th>Total semester points</th>
<th>Semester grade</th>
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<tr>
<td>79.50 – 89.49</td>
<td>B</td>
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<tr>
<td>69.50 – 79.49</td>
<td>C</td>
</tr>
<tr>
<td>49.50 – 69.49</td>
<td>D</td>
</tr>
<tr>
<td>00.00 – 49.49</td>
<td>F</td>
</tr>
</tbody>
</table>

Additional issues

Attendance Policy: Consistent with university policy, class attendance is viewed as an individual student responsibility. Students are expected to attend class and to complete all assignments. Students who miss exams, project or homework deadlines for a University approved reason will be given the opportunity to make up the graded work in accordance with University regulations. Further information about university policies may be found at: [http://student-rules.tamu.edu/rule0](http://student-rules.tamu.edu/rule0)

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 Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit [http://disability.tamu.edu](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 Veterinary Integrative Biosciences

3. Course prefix, number and complete title of course:
   VIBS 621 Endocrine Toxicology

4. Catalog course description (not to exceed 50 words):
   Impacts of endocrine toxicity on endocrine system; prevalence, environmental and occupational use and disposal of environmental endocrine disrupting chemicals (EDCs); and structure, toxicokinetics and mechanism of action of EDCs; effects of EDCs on the development and function, disorders, and diseases of the endocrine and reproductive organs.

5. Prerequisite(s):
   Graduate classification; approval of instructor
   Cross-listed with:  
   Stacked with: VIBS 421

   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 program(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)
   VIBS 621  ENDOCRINE TOXICOLOGY

<table>
<thead>
<tr>
<th>Lect.</th>
<th>Lab</th>
<th>Other</th>
<th>SCH</th>
<th>CIP and Fund Code</th>
<th>Admin Unit</th>
<th>Acad. Year</th>
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<td>2609040002</td>
<td>2873</td>
<td>15</td>
<td>-</td>
</tr>
</tbody>
</table>

Approval recommended by:

Evelyn Tiffany-Castiglioni  T-14-14  Department Head or Program Chair (Type Name & Sign) Date

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

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@vtamu.edu
Curricular Services – 07/14
VIBS 421/621: ENDOCRINE TOXICOLOGY

Credit: 3; Spring 2015
Time: 11:10 A.M – 12:25 P.M
Days: Tuesdays and Thursdays
Class room: VMA 329

Director/Instruction:

Sakhila K. Banu, MSc, MPhil, PhD
Assistant Professor
Department of Veterinary Integrative Biosciences
College of Veterinary Medicine &
Biomedical Sciences
Texas A&M University, TAMU 4458
College Station, Texas 77843
Room# 105, VMR building
Phone: 979-458-3613
Fax: 979-847-8981
Email: skbanu@cvm.tamu.edu

Course Description:

VIBS 421 / VIBS 621. Credit 3. Environmental and occupational use of endocrine disrupting chemicals (EDCs); structure, toxicokinetics and mechanism of action of EDCs; effects of EDCs on the development and function, disorders, and diseases (including cancers) of the endocrine and reproductive organs. Detailed study on the endocrine toxicology of PCB, PBB, PAH, DIOXIN and BPA; plasticizers, pesticides, diethylstibestrol, genistein and coumestrol, and heavy metal endocrine disruptors; and vinclozolin and atrazine, persistent organic pollutants (POPs). Clinical perspectives of EDCs, and their effects on estrogen and androgen receptor signaling, ovarian failure, oxidative stress/antioxidants, epigenetics, and an overview of research methodology to study EDCs.

Course learning outcomes:

Upon completion of the course, students will be able to:
1. Describe the most prevalent environmental endocrine disrupting chemicals (EDCs) in the environment; describe properties and the biological processes of EDCs which modulate their toxicokinetics.
2. Understand molecular, cellular and pathophysiological responses of the endocrine organs resulting from exposure to EDCs.
3. Identify underlying mechanisms those contribute to endocrine diseases/disorders and intervention strategies to mitigate/prevent adverse effects of EDCs.
4. Explain research approaches to understand adverse effects of EDCs on endocrine organs.

<table>
<thead>
<tr>
<th>Graduate Students (VIBS 621)</th>
<th>Undergraduate Students (VIBS 421)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-requisite</td>
<td></td>
</tr>
<tr>
<td>Graduate classification and approval of the instructor</td>
<td>Senior classification; Approval of the instructor.</td>
</tr>
</tbody>
</table>

| Evaluation | | |
| Exam-1: Multiple Choice type: | 20% | Exam-1:Multiple Choice type: | 20% |
| Exam-2: Multiple Choice type: | 20% | Exam-2:Multiple Choice type: | 20% |
| Exam-3: Multiple Choice type: | 20% | Exam-3:Multiple Choice type: | 20% |
| Exam-4: Case study report *: | 40% | Exam-4:Descriptive (short essays)*: | 40% |
| Total: | 100% | Total: | 100% |

* Case Study Report: All students will be required to prepare a case study report (maximum total of
10 pages, 2.0 line spaced; 1 inch margins; 12 pt Arial or Times Roman font; 10 references minimum). The case study will require examining a chemical in a specific contaminated site (e.g., chromium in California and New Jersey) or a chemical that affects a more specific target endocrine organ (e.g., organochlorine and thyroid gland or dioxin and endometriosis), or choose one of the "World's worst polluted places", and select one particular EDC and its clinical/endoctrine relevance on the health of the people living in that environment. Alternatively, choose an EDC that is more relevant to occupational exposure etc., (the student can obtain help from the instructor to choose the topic). The case study will examine sources, pathways, transport, levels of contamination in the environment, remediation process (if any), and receptors in the target endocrine organ, and end-point diseases or disorders. The paper should be submitted according to a required format and will reference peer-reviewed work and reviews, website information, reports from USEPA and/or ATSDR, The Blacksmith Institute etc.

Students will be asked essay questions, and should be answered in the given page limit. Exams 1, 2 & 3 are class room exams and exam 4 is a take home assignment.

Case study report not required.

Grading

<table>
<thead>
<tr>
<th>Grade Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>90-100</td>
<td>A</td>
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<tr>
<td>80-89.99</td>
<td>B</td>
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<td>70-79.99</td>
<td>C</td>
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<tr>
<td>60-69.99</td>
<td>D</td>
</tr>
<tr>
<td>Less than 60</td>
<td>F</td>
</tr>
</tbody>
</table>

Study Materials:

Hand out of the lecture will be given (Most of the objective questions will be taken from lectures). Particular book chapters or interested journals could be referred.

Course material will be derived from the following books & reviews.

1. Casarett & Doull's Essentials of Toxicology, by Curtis D. Klaassen and John B. Watkins III.
3. Our Stolen Future by Theo Colborn, Dianne Dumanoski, John Peterson Myers, published by Dutton.

90-100      : A
80-89.99    : B
70-79.99    : C
60-69.99    : D
Less than 60: F

Hand out of the lecture will be given (most of the questions will be taken from lectures). Particular book chapters or interested journals could be referred.

Course material will be derived from the following books & reviews.

1. Casarett & Doull's Essentials of Toxicology, by Curtis D. Klaassen and John B. Watkins III.
3. Our Stolen Future by Theo Colborn, Dianne Dumanoski, John Peterson Myers, published by Dutton.
Review.


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 the Department of Student Life, Services for Students with Disabilities, in Cain Hall or call 845-1637. For additional information visit http://disability.tamu.edu.

Attendance Policies

A university-excused absence is the only excuse acceptable for missing an exam, case studies presentation, homework assignment or a class period (attendance). For information regarding what constitutes an excused absence, please see http://student-rules.tamu.edu/rule07. Late work is unacceptable, unless the student has a university-excused absence. All university-excused absences should be verified through the BIMS office with proper documentation (ex. Doctor’s note etc.). “Rule 7.3: Students may be excused from attending class on the day of a graded activity or when attendance contributes to a student’s grade, for the reasons stated in Section 7.1, or other reason deemed appropriate by the student’s instructor. Except in the case of the observance of a religious holiday, to be excused the student must notify his or her instructor in writing (acknowledged e-mail message is acceptable) prior to the date of absence if such notification is feasible. In cases where advance 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. This notification should include 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”. Instructor’s contact email: skbanu@cvm.tamu.edu; office # 979-458-3613; and mobile: 979-255-3946.

Academic Integrity Statement

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

The student to the Honor Council Rules and Procedures can be found on the web: http://aggiehonor.tamu.edu/

<table>
<thead>
<tr>
<th>Lec#</th>
<th>WEEK</th>
<th>Day &amp; Time</th>
<th>DATE</th>
<th>Title/Topic</th>
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<tbody>
<tr>
<td>2</td>
<td></td>
<td>Thursday 11.10 A.M- 12.25 P.M</td>
<td>1/22/2015</td>
<td>Introduction to Environmental Endocrine Disrupting Chemicals (EDC).</td>
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<tr>
<td>3</td>
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<td>Tuesday 2.20-3.35PM</td>
<td>1/27/2015</td>
<td>Influence of EDCs on Learning and Memory, and Their Effects on Neurocognitive Disorders.</td>
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<td>Week</td>
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<td>Time</td>
<td>Topics</td>
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<tr>
<td>2</td>
<td>1/29/2015</td>
<td>11:10 A.M-12:25 P.M</td>
<td>Structure and Toxicokinetics of Polychlorinated biphenyls (PCBs), Polybrominated Biphenyls (PBBs) &amp; Polycyclic Aromatic Hydrocarbons (PAH); and Their Effects on Hypothalamo-Pituitary-Thyroid (HPT) Axis.</td>
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<tr>
<td>3</td>
<td>2/3/2015</td>
<td>11:10 A.M-12:25 P.M</td>
<td>Effects of PCBs and PBBs on Male and Female Reproductive System.</td>
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<td>4</td>
<td>2/10/2015</td>
<td>11:10 A.M-12:25 P.M</td>
<td>Structure and Toxicokinetics of Dioxins &amp; Bisphenol A (BPA); and Their Effects on Male and Female Reproduction, and Fetal Development.</td>
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<tr>
<td>5</td>
<td>2/17/2015</td>
<td>11:10 A.M-12:25 P.M</td>
<td>REVIEW AND DISCUSSION - 1</td>
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<td>Phase II: Plasticizers, pesticides, diethylstilbestrol, genistein and coumestrol, bioremediation of EDCs, and heavy metal endocrine disruptors.</td>
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<td></td>
<td>3/12/2015</td>
<td>11:10 A.M-12:25 P.M</td>
<td>Heavy Metal Toxicity &amp; Endocrine Disruption.</td>
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<tr>
<td>9</td>
<td>3/16/15 – 3/20/15</td>
<td></td>
<td>SPRING BREAK</td>
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<td></td>
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<td>Phase III: Vinclozolin and atrazine, Persistent Organic Pollutants (POPs), Clinical perspectives, Epigeenetics and ER-signaling and EDCs, ovarian failure, oxidative stress/antioxidants and EDCs; and mechanistic</td>
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<tr>
<td>Week 12</td>
<td>Tuesday 11:10 A.M.-12:25 P.M</td>
<td>4/14/2015</td>
<td>Occupational and Environmental Exposure to EDCs and Reproductive Failure.</td>
<td></td>
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<tr>
<td>Week 13</td>
<td>Tuesday 11:10 A.M.-12:25 P.M</td>
<td>4/21/2015 Last day for Q drop.</td>
<td>(i) In vivo and In vitro Research Approaches to Understand the Basic Mechanisms of Endocrine Disruption.</td>
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<td>(iii) Bioremediation.</td>
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<td>ANNOUNCEMENTS ABOUT CASE STUDY REPORT – ASSIGNMENT QUESTIONS</td>
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<td>REVIEW AND DISCUSSION - 3</td>
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<tr>
<td>Week 15</td>
<td>Tuesday 11:10 A.M.-12:25 P.M</td>
<td>5/5/2015 Exam preparation; no classes</td>
<td></td>
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</tr>
</tbody>
</table>

Return the case study report and assignment to Dr. Banu
Email: skbanu@cvm.tamu.edu
May 2, 2014

Sakhila K. Banu, PhD, Assistant Professor
Department of Veterinary Integrative Biomedical Sciences
College of Veterinary Medicine & Biomedical Sciences
Texas A&M University
College Station, TX 77843-4458

RE: Endocrinology Toxicology Course Offerings – VIBS 421/621

Dr. Banu –

Faculty in the Department of Veterinary Physiology & Pharmacology have reviewed your material for the "Endocrinology Toxicology" - VIBS 421/621 course offerings and find no conflict or overlap with existing courses in our department. We are therefore supportive of your request to make this a permanent course offering.

Let me know if additional information is needed.

John N. Stallone, Interim Head
Department of Veterinary Physiology & Pharmacology
May 01, 2014

Dr. Evelyn Tiffany-Castiglioni
Professor and Head
Department of Veterinary Integrative Biosciences
Associate Dean for Undergraduate Education
College of Veterinary Medicine & Biomedical Sciences
Texas A&M University

Dear Castiglioni:

RE: Support letter for VIBS 421 / VIBS 621: Endocrine Toxicology course.

As Chair of the Interdisciplinary Faculty of Toxicology at Texas A&M University (TAMU), I am writing to strongly confirm my support for Dr. Sakhila Banu's Endocrine Toxicology course. Dr. Banu developed the course Endocrine Toxicology and taught the course for the first time in the spring of 2013. She has successfully taught the course for the past 2 years, and is planning to teach every Spring semester. When she formed her syllabus, she discussed it with me and other colleagues in the College of Veterinary Medicine to avoid possible overlap with other courses at TAMU. In addition, the syllabus was reviewed by the executive committee of the Interdisciplinary Faculty of Toxicology (IFT); and five external reviewers (one international and four national) outside of the Texas A&M University, who are experts in the field of endocrine and/or reproductive toxicology. Their comments about the course indicate that it is well-designed and will be an outstanding contribution to our program.

Endocrine Toxicology has excellent lecture materials, and (again) will not be competing with any course on the campus. Course materials are up-to-date, very thorough, timely, in-depth, solid and very comprehensive. As the reviewers had mentioned, the course covers every essential topic in the endocrine toxicology field. Dr. Banu is an excellent teacher, and she has highly recommended from former students who took the course.

Therefore, I support full course status for Endocrine Toxicology.

Thank you,

Timothy D. Phillips, M.S., Ph.D. ATS, Faculty Fellow
Chair, Interdisciplinary Faculty of Toxicology
Distinguished Professor
Reed Endowed Chair in Toxicology
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 (MD, D.D.S., D.V.M.)
2. Request submitted by (Department or Program Name):  
   Veterinary Pathobiology
3. Course prefix, number and complete title of course:  
   VTMI 602 Animal Models of Obesity
4. Catalog course description (not to exceed 50 words):
   This course is an overview of animal models of obesity. Special emphasis will be on rodent genetically engineered models of obesity related to diabetes mellitus type 2 ("obesity related diabetes") and leptin research to understand metabolism, molecular biology, and origin of lipids as signaling molecules important in obesity.
5. Prerequisite(s):  
   - consent of instructor; minimum 3 credit hours of undergraduate or graduate biochemistry
6. Cross-listed with:  
   - Stacked with:  
   Cross-listed courses require the signature of both department heads.
7. Is this a variable credit course?  
   - Yes  
   - No  
   If yes, from _____ to _____
8. 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
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 program(s) (e.g., B.A. in history)
    PhD in Veterinary Pathobiology, MS in BIMS, MS in Lab Animal Medicine, PhD in BIMS
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://ypr.tamu.edu/resources/export-controls/export-controls-basics-for-distance-education).
13. Prefix  
   - VTMI  
   - 602  
   - Animal Models of Obesity
   Course Title:  
   Lec. Lab Other SCH CIP and Fund Code Admin. Unit Acad. Year UCE Code
   - 4.00  
   - 26.0910.0002  
   - 2907  
   - 0  
   - 0  
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   - 0  
   - 3  
   - 6  
   - 3  
   - 2

Approval recommended by:  
Department Head or Program Chair (Type Name & Sign)  
Date  
Chair, College Review Committee  
Date  
Dean of College  
Date  
Chair, GC or UGC  
Date  
Submit 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
Animal Models of Obesity
VTMI 602
4 credits
Fall 2015
TBA Rm 308 VMR Building

Course Description and Prerequisites

The course is an overview of the role that animal models play in studying obesity. Special emphasis will be placed on rodent and genetically engineered mouse models of obesity related to diabetes mellitus type 2 ("obese diabetes") and mixed diabetic models, particularly genetically engineered, spontaneous, and induced models, to understand intracellular transport, metabolism, molecular biology and origin of lipids as signaling molecules and binding with nuclear receptors important in metabolism, literature evaluation, and communication of rationales to other scientists. Prerequisite: VPAT 601 Comparative Pathology.

Learning Outcomes or Course Objectives

This course is an overview of the role of animal models in obesity, especially in diabetes mellitus. Animal model design advantages and disadvantages encountered by biological scientists in the conduct of their research, in their evaluation of the literature in the field, in their pursuit of grant resources, and design and publication of experiments will be discussed. The course aims to introduce graduate students in pathology, laboratory animal medicine and other life sciences to these issues involving animal models at an early stage in their careers. Students should develop vocabulary and thinking skills that will enhance their ability to make informed judgments on studies of metabolism in vivo, evaluating the appropriate use of such animals by others in the literature and in presentations, and to communicate the rationale for their decisions to other scientists and to the broader public.

Instructor Information

Name Dr. Ann Kier
Telephone number (979) 862-1509
Email address akier@cvm.tamu.edu
Office hours Wed 3:00-5:00
Office location Rm 383 VMR Building

Textbook and/or Resource Material

Christos S. Mantzoros (Ed). Obesity and Diabetes. Humana Press, 1st edition, 2010. In addition, numerous handouts will be provided reviewing select aspects of obesity in animal models.
Attendance Policy

Your presence and participation is expected at all class meetings. The University and College have published guidelines defining excused vs. unexcused absence. 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. 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 listed below. 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.
   a) 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)
   b) 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: (i)Texas A&M University Explanatory Statement for Absence from Class form available at http://attendance.tamu.edu or (ii) 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.
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.

If an examination is missed due to an excused absence, a makeup will be offered. The make-up examination must be completed promptly (within one week of the absence), at a time and place determined by the instructor. Unexcused absence from an examination, or failure to complete a makeup examination, will result in a grade of "zero" (no grading points) for the examination.

Grading Policies

Students will be evaluated on the basis of a midterm presentation and submission of a final term paper focused on a topic covered in the course. Each will count 50% of the final grade. Grading scale: A = 90-100, B = 80-89, C = 70-79, D = 60-69, F = < 60, I = incomplete.
Course Topics, Calendar of Activities, Major Assignment Dates

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Required Reading</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction: epidemiology and pathophysiology</td>
<td>Ch. 1, 2</td>
</tr>
<tr>
<td>2</td>
<td>Genetics of obesity</td>
<td>Ch. 3</td>
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<tr>
<td>3</td>
<td>Signals of energy homeostasis, Leptin receptors</td>
<td>Ch. 4, 5</td>
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<tr>
<td>4</td>
<td>Atherosclerosis and models</td>
<td>Ch. 13, Publications</td>
</tr>
<tr>
<td>5</td>
<td>Metabolic syndrome and models</td>
<td>Ch. 9</td>
</tr>
<tr>
<td>6</td>
<td>Obesity complications and models</td>
<td>Ch. 10, Publications</td>
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<tr>
<td>7</td>
<td>Student midterm presentations</td>
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<tr>
<td>8</td>
<td>Mixed diabetes mellitus and models; Complications of obesity/diabetes and models: accelerated cardiovascular disease</td>
<td>Publications</td>
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<tr>
<td>9</td>
<td>Complications of obesity/diabetes and models: hypertension</td>
<td>Ch. 17, Publications</td>
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<tr>
<td>10</td>
<td>Statins and other pharmaceutical interactions and models</td>
<td>Publications</td>
</tr>
<tr>
<td>11</td>
<td>Diet and lifestyle factors; surgical treatments</td>
<td>Ch. 24, 28, Publications</td>
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<tr>
<td>12</td>
<td>Paired feeding nutritional experiments-animal model design</td>
<td>Publications</td>
</tr>
<tr>
<td>13</td>
<td>High fat/high cholesterol nutrition experiments-animal model design</td>
<td>Publications</td>
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<tr>
<td>14</td>
<td>Presentations and final term paper due</td>
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Other Pertinent Course Information

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."

It is further recommended that instructors print the following on assignments and examinations: “On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work.”

[Signature of Student]