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] [X Graduate] [□ First Professional (DDS, MD, JD, PharmD, DVMD)]

2. Request submitted by (Department or Program Name):
   Agricultural Economics

3. Course prefix, number and complete title of course:
   AGEC 608 - Economics of Foreign Intervention, Conflict, and Development

4. Catalog course description (not to exceed 50 words):
   Expose students to economic models of conflict and development, socio-political models of conflict, conflict and vulnerable groups; advanced quantitative tools and methods in conflict and development research; interaction between poverty, natural resources and conflict in developing countries; role of multilateral, bilateral, and strategic stakeholders in conflict resolution and economic development.

5. Prerequisite(s):
   Cross-listed with: [ ]

   Stacked with: AGEC 408

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]

   How will this course be graded? [X 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)

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-controls-basics-for-distance-education).

12. Chair, College Review Committee
   Date: 1/21/15

13. Dean of College
   Date: 2/14/15

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
AGEC 608
Economics of Foreign Intervention, Conflict and Development
Spring 2015

Instructor: Edwin C. Price, H.G. Buffett Foundation Chair on Conflict and Development
Office: 362 Agriculture and Life Sciences Building (AGLS) (map)
Phone: 979-450-0751
Skype: ConDevCenter
E-mail: ec-price@tamu.edu

Assistant: Melanie Balinas, Program Coordinator, Center on Conflict & Development
Office: 411 Agriculture and Life Sciences Building (AGLS) (map)
Phone: 979-458-9399
E-mail: mbalinas@gmail.com

Teaching Assistant: Jaehyun Ahn
Email: jaehyunahn.tamu@gmail.com

Office Hours: Tuesdays 1:00pm-3:00pm and by appointment
Class Location: AGLS 109
Tuesday/Thursday 9:35-10:50am

Learning Objective
This course is intended to expose students to the economic models of conflict and development; dynamic socio-political models of conflict; conflict and vulnerable groups; quantitative techniques and methods in conflict and development research; interaction between poverty, natural resources and conflict in developing countries; role of multilateral, bilateral, and strategic stakeholders in conflict resolution and promotion of economic development. Classroom sessions will include an introduction to the topic for each classroom session, followed by student and lecturer discussions. There will be occasional guest lectures.

Each student in the class seeks to achieve the following objectives:

1. Gain an understanding of the socio-economics of countries in conflict regions around the world focusing particularly on the interaction of human and institutional capital, natural resources, and science and technology with conflict.

2. Develop and understanding of the factors associated with conflict including food insecurity, competition for natural resources, youth lacking opportunity, communities without voices in their national political economy.
3 Learn the tools of economic analysis needed to understand the underlying causes of conflict and the impact of conflict on the economic development of the country.

4 Expose students to the quantitative methods used to develop and test theories of conflict and development, to assess pre-conditions of conflict, to measure the cost of conflict on society, and to assess the impacts of alternative policy outcomes on conflict and conflict resolution.

5 Provide students with tools applicable in assessing programs to minimize conflicts and promote development, impacts on vulnerable groups, especially women and children, and the contribution of multilateral, bilateral, civic and private strategic stakeholders in conflict prevention and promotion of economic development.

**Americans with Disabilities Act 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. Texas A&M University has a strong institutional commitment to the principle of diversity in all areas. In that spirit, admission to Texas A&M University and any of its sponsored programs is open to all qualified individuals without regard to subgroup, class or stereotype.”

“Disability Services offers accommodations counseling, evaluation referral, disability-related information, adaptive technology services, sign language interpreting and transcription services for academically related purposes. Although Disability Services does not offer disability evaluation and/or testing, tutoring, personal expenses, attendants or scholarships, Disability Services will provide resources and referral information.”

If you believe you have a disability requiring accommodation, please contact Department of Disability Services in Room B118 of the Cain Hall Building. The phone number is 845-1673 and the email is disability@tamu.edu --ADA accommodations will be made in accordance with the law.

**The Aggie Honor Code**

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

**Grading and Course Expectations**

The course is offered online comprising 7, 2-week blocks of learning activity. Learning activity includes five parts: (1) 2-5 readings per two-week block; (2) At least one 15-minute lectures per block, (3) One discussion relevant to the readings and lectures each block, (4) a minimum 3-page write-up every two-weeks on a choice of topics based on reading, lectures, or special assignments or events, (5) mid term exam, (5) Final exam. See note below regarding additional expectations of graduate students.
Additional Graduate Student Requirements

Graduate students will be assigned additional readings in each of the seven blocks in the curriculum. Graduate students will also have two additional questions on the mid-term and final exams. Graduate students will have the option to write a research paper in place of the final exam, and that decision by the student should be made and discussed with the instructor by February 20.

Final grades will be based on:

<table>
<thead>
<tr>
<th>Activities</th>
<th>Percentages</th>
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<tbody>
<tr>
<td>Write Ups on readings and lectures</td>
<td>30%</td>
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<tr>
<td>Mid-term Exam</td>
<td>25%</td>
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<tr>
<td>Final exam</td>
<td>30%</td>
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<tr>
<td>Class Discussion</td>
<td>15%</td>
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</tbody>
</table>

One or two lectures and one or two of the readings in each block will focus on analytical tools and models related to the topic. In the Block 7, analytical methods and findings will be reviewed.

Students will be invited for face-to-face discussions and special events on a non-credit basis. Office hours are available via Skype and face-to-face discussions.

This is a new area of study and substantial thought and innovative contribution will be expected from all students.

Block 1 Write-up and Discussion Handouts January 20
Block 1 Write-up and Discussion Participation Due: Jan. 29 @ 5:00pm

Block 2: Geography of Poverty, Conflict and Foreign Assistance (Jan. 27- Feb. 6)
Block 2 Write-up and Discussion Handouts February 1
Block 2 Write-up and Discussion Participation Due: Feb. 6 @ 5:00pm

Block 3: Foreign Assistance and Conflict. (Feb. 9- Feb. 20)
Block 3 Write-up and Discussion Handouts February 15
Block 3 Write-up and Discussion Participation Due: Feb. 20 @ 5:00pm
Block 4: Natural Resources and Conflict (Feb. 23- Mar. 6)
Block 4 Write-up Discussion Handouts March 1
Block 4 Write-up and Discussion Participation Due Mar. 6 @ 5:00pm
Mid-term Exam Blocks 1-4 (Posted Mar. 8 -- DUE Mar. 20 at 5:00pm)
Block 5: Science, Technology and Food Security and Conflict (Mar. 23 – Apr. 3)
Block 5 Write-up and Discussion Handouts March 29
Block 5 Write-up and Discussion Participation Due Apr. 3 @ 5:00pm
Block 6: Human Capital, Institutions and Policy and Conflict (Apr. 6- Apr. 17)
Block 6 Write-up and Discussion Handouts April 12
Block 6 Write-up and Discussion Participation Due Apr. 17 @ 5:00pm
Block 7: Empirical Methods and Findings on Conflict and Development (Apr. 20- May 1)
Block 7 Write-up and Discussion Handouts April 26
Block 7 Write-up and Discussion Participation Due May 1 @ 5:00pm
Final Exams Posted: May 1
Final Exams Due for Graduating Students: May 6 @ 5:00pm
Final Exams Due for Non-Graduating Students: May 7 @ 5:00pm

Readings will be assigned mainly from the list below, but will be specified by block rather than by week. **The list below is subject to revision.** Readings will be assigned at least one-week before the beginning of each block.

### READING LIST (Tentative)

<table>
<thead>
<tr>
<th>Block</th>
<th>Topic</th>
<th>Lectures and Readings</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Lecture Notes, Materials and Slides</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Powerpoint, &quot;Concept of Conflict&quot;</td>
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<tr>
<td></td>
<td></td>
<td>All Students read</td>
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<tr>
<td></td>
<td></td>
<td>“Economics of Development and the Development of Economics”, Pranab</td>
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<tr>
<td>2</td>
<td><strong>Geography of Poverty, Conflict and Foreign Assistance</strong></td>
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</tbody>
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Lecture Notes, Materials and Slides

Word Document, “Lecture Note Block 2.docx”

Word Document, “Geography of Conflict.docx”

All Students Read


Grad Students ONLY


Additional Readings


| 3 | Foreign Assistance and Conflict | Word Document, “Foreign Aid and Conflict.docx”

**All Students Read**

PDF, “Do Foreign Aid Shocks Cause Violent Conflict?”


“Civil War”, Paul Collier and Anke Hoeffler, Department of Economics, University of Oxford, 2006

**Additional Readings**

“Unintended Consequences: Does Aid Promote Arms Races?”

“Post-Conflict Economic Recovery”, Collier, P. Department of Economics, Oxford University, 2006


| 4 | Natural Resources and Conflict | Lecture Notes, Materials and Slides

PDF, “Water and Violent Conflict”


**All Students Read**


<table>
<thead>
<tr>
<th>5</th>
<th>Science, Technology and Food Security and Conflict</th>
<th>Lecture Notes, Materials and Slides</th>
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<tr>
<td></td>
<td>Proxies for Poverty.</td>
<td>Proxies for Poverty.</td>
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<td></td>
<td>All Students Read</td>
<td>All Students Read</td>
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</table>

<table>
<thead>
<tr>
<th>6</th>
<th>Human Capital, Institutions and Policy and Conflict</th>
<th>Lecture Notes, Materials and Slides</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Students Read</td>
<td>All Students Read</td>
</tr>
<tr>
<td>7</td>
<td>Empirical Methods and Findings on Conflict and Development</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------------------</td>
<td></td>
</tr>
</tbody>
</table>

Lecture Notes, Materials and Slides

"Causality, Philosophical Discussions and Notions"

"Conflict, Aid and Poverty: Cause, Effect and Prediction"

All Students Read


**Class Sessions:** Class session will focus on the topics for each of the seven blocks of the course as identified in the reading list chart above. Discussions will cover current events involving conflict, topics suggested by students, readings and questions posed by the teacher. Students are responsible for keeping up with the readings on their own. **It is very important that students check their email for weekly lectures, assignments, and announcements.** Students are welcome to email the instructor with any questions with the subject line “AGEC489/689:” and can attend office hours or special appointments.

**Assignments:** The students are expected to read all the articles and course materials before each lecture session. A two/three page write up of the designated topic will be due at the beginning of each two-block. The write up should consist of a summary of the reading materials on that topic as well proposed extensions and critiques of current approaches.

**Grade:** Course grade will be determined by class participation, assignments, final exam and final article/paper.

Letter grades will be assigned using the following scale:
90 percent or above A  
80 percent to 89.9 percent B  
70 percent to 79.9 percent C  
50 percent to 69.9 percent D  
Below 50 percent F  

Note: The instructor may scale down the grading, according to the relative performances of the class.  
The final exam will be take-home and will consist of two portions. The first portion will be compulsory for all students. The second portion will have two sets of different questions directed towards undergraduate and graduate students. Graduate students will be required to answer technically rigorous problems with a strong emphasis on quantitative theory and research methodology. The undergraduate students will be required to solve problems focused on policy issues.  

NOTE: This syllabus is subject to changes throughout the Spring 2015 semester. Please check your email for updates.
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):
   Agricultural Economics

3. Course prefix, number and complete title of course:
   AGEC 642 Dynamic Optimization in Agricultural and Applied Economics

4. Catalog course description (not to exceed 50 words):
   Economics of problems of dynamic optimization, focusing on numerical and analytical methods; applications in a wide range of issues related to agricultural and applied economic are considered.

5. Prerequisite(s):
   ECON 607 and ECMT 660 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?  ☑ No
   If yes, from _____ to ______

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

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

8. Will this course be submitted to the Core Curriculum Council?  ☑ 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)

   AGEC, ABME, ECON

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)
    AGEC      642  Dyn Optim in Ag & Appl Econ

    | Lect. | Lab | Other | SCH | CIP and Fund Code | Admin. Unit | Acad. Year | FICE Code |
    |-------|-----|-------|-----|------------------|-------------|------------|-----------|
    | 3.00  | 0.00| 0.00  | 3.00| 0101030005       | 0140        | 15         | 00 0 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

    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
Agricultural Economics 642
Dynamic Optimization in Agricultural and Applied Economics
3 Credits
Fall 2014

Instructor
Richard Woodward
210M AGLS Building
Office: 979-845-5864
Home: 979-703-6470
r-woodward@tamu.edu
Skype: Richard_T_Woodward

Office Hours and communication
• Open door policy
• e-mail messages usually receive
  prompt response.
• If necessary, you may call me at home,
  but please not after 9:00.

I. Course Description
Economics of problems of dynamic optimization, focusing on numerical and analytical methods; applications in a wide range of issues related to agricultural and applied economics are considered.

II. Learning Outcomes
• Develop an intuitive understanding of dynamic economic problems including (discrete and continuous, deterministic and stochastic).
• Compare and contrast applications of dynamic economic analysis in the areas of agricultural and natural resource economics.
• Analyze papers in which dynamic optimization plays a central role.
• Setting up and Solving dynamic optimization problems, both analytically and numerically, and to understand the strengths and weaknesses of alternative methods.
• Apply the skills of dynamic optimization to problems in Agricultural and Resource Economics.

III. Textbook and resource material
There is no required textbook; see the section on texts below. Most class material will be distributed via the class homepage is located at http://agecon2.tamu.edu/people/faculty/woodward-richard/. Notes, problem sets and other information relevant to the course will be available there. I will provide notes for each lecture on the web site at least 48 hours prior to each class. If notes are not posted by this time, contact me because it is likely that there has been a computer glitch. If for some reason I fail to post the notes at that time, I will supply printed copies in class.

IV. Prerequisites
It will be assumed that you have a very strong understanding of calculus (constrained optimization and integration), linear algebra and fundamental principles of probability and statistics. You must also be comfortable with the basic microeconomic results of consumer and producer theory. Previous exposure to differential equations would be helpful, but is not assumed. These prerequisites are satisfied by ECON 607 and ECMT 660 or approval of instructor.

V. Attendance
Attendance is expected at every class. Students who are not able to attend a class, should consult with the professor to ensure that they obtain all the material covered during class. See Student Rule 7 for more information on attendance and excused absences. http://student-rules.tamu.edu/rule07 Policies for making up graded work are explained in the grading section.
VI. Computer programming

The use of computers is central to much of applied economic analysis and will play a major role in this course. The only way to learn a foreign language is by practicing. The same rule holds for programming languages. I believe that you should look at each course you take as an opportunity to learn a new language. The more languages you "speak," the more flexibility that you have as you try to solve a problem. On the other hand, learning a language can be time consuming and get in the way of learning the economic concepts that are the focus of the course. So you must balance the associated benefits and costs based on your own interests, time constraints and talents.

We will have computer labs during which students I will be available to assist in the use of programming languages that will be used to complete the homework assignments.

VII. Homework Assignments

There will be three homework assignments that are intended to give you an opportunity to practice your skills, but these will not be graded. A student may request the answer key at any time. A mastery evaluation on a topic cannot be requested until the corresponding homework problems have been completed.

All of the computer homework assignments can, at least in theory, be completed using any one of a number of programs including GAMS, Fortran, Gauss, Matlab, or Visual Basic. Some of the problems could even be solved in Excel or other spreadsheets. You may use almost any program language to complete the assignments for this course. However, the default language for the dynamic programming part of this course will be Visual Basic. VB is used because it is readily accessible (if you have Excel, you have VB), its syntax is quite easy to learn, it integrates easily with the graphing and analytical capabilities of Excel, and it provides a nice stepping stone to other languages. We will have several sessions in which we spend some time working in the computer lab. There are a number of books that will help you learn to program, including the book by Albright noted below.

I encourage you to use languages other than VB, but if you want to do so, please discuss it with me to make sure that it will work.
VIII. Grading

The grading system to be used in this course is different from most courses that you have ever taken. Your grade will depend on the extent to which you demonstrate mastery of a range of skills and concepts.

These skills and concepts fall into three levels: B = Basic; I = Intermediate; and A = Advanced.

Group I General Issues in Dynamic Optimization:

B = Mastery of basic concepts will be demonstrated by correctly answers 100% of a set of multiple choice questions on that topic. After one attempt, a student may be retested on that concept after a delay of at least 3 days. Retakes may be administered through an oral or short answer questions at the discretion of the instructor.

I = Mastery of intermediate concepts will be demonstrated by correctly answering short answer questions. A student may be retested on an intermediate concept, but at intervals of at least one week. Exceptions may be made to this at the end of the semester. Students will be allowed only one attempt to demonstrate mastery on an intermediate concept after the last day of class.

A = Mastery of advanced concepts will be demonstrated by solving problems or through a discussion with the instructor. Students will be allowed only one attempt to demonstrate mastery on an advanced concept after the last day of class.

Group II Optimal Control

B = Mastery of basic concepts will be demonstrated by correctly answers 100% of a set of multiple choice questions on that topic. After one attempt, a student may be retested on that concept after a delay of at least 3 days. Retakes may be administered through an oral or short answer questions at the discretion of the instructor.

I = Mastery of intermediate concepts will be demonstrated by correctly answering short answer questions. A student may be retested on an intermediate concept, but at intervals of at least one week. Exceptions may be made to this at the end of the semester. Students will be allowed only one attempt to demonstrate mastery on an intermediate concept after the last day of class.

A = Mastery of advanced concepts will be demonstrated by solving problems or through a discussion with the instructor. Students will be allowed only one attempt to demonstrate mastery on an advanced concept after the last day of class.

Group III Numerical Dynamic Programming

B = Mastery of basic concepts will be demonstrated by correctly answers 100% of a set of multiple choice questions on that topic. After one attempt, a student may be retested on that concept after a delay of at least 3 days. Retakes may be administered through an oral or short answer questions at the discretion of the instructor.

I = Mastery of intermediate concepts will be demonstrated by correctly answering short answer questions. A student may be retested on an intermediate concept, but at intervals of at least one week. Exceptions may be made to this at the end of the semester. Students will be allowed only one attempt to demonstrate mastery on an intermediate concept after the last day of class.

A = Mastery of advanced concepts will be demonstrated by solving problems or through a discussion with the instructor. Students will be allowed only one attempt to demonstrate mastery on an advanced concept after the last day of class.

Mastery Tests (MTs) are self-scheduled and must be scheduled at least 24 hours in advance and, in most cases, no more than 4 MTs may be taken per day. MTs will be graded within 2 weekdays. A student who fails an MT must wait at least 2 weekdays before retaking the MT after it has been graded. Holiday periods and weekends do not count.
For a D: A student must attend at least 50% of the classes.

For a C: A student must demonstrate mastery of all basic concepts in all categories.

For a B: A student must demonstrate mastery all intermediate topics in Group I (general issues in dynamic optimization) plus at least 75% of the intermediate concepts in the other categories.

For an A: A student must demonstrate mastery of at least 90% all intermediate concepts and mastery of at least 75% of the advanced topics in either OC or NDP and all advanced topics in Group I.

Students who demonstrate mastery of at least 75% of the advanced topics in both Groups II and II (optimal control and numerical dynamic programming) will also receive a letter indicating their exceptional accomplishment, which will be included in the student’s permanent file.

The following is a list of the basic, intermediate and advanced skills indicates that you should learn during AGEC 642 and will determine your grade as indicated on the syllabus.

* In general, intermediate skills in a category can be evaluated only after all the corresponding basic skills in that category have been mastered and similarly for advanced and intermediate skills. For example, you may be tested on I.B.1 only after you have demonstrated mastery of I.A.1, I.A.2 and I.A.3. Exceptions to this rule will be granted if the student is able to argue that the more advanced material can be understood without some of the lower level skills.

* The notes in the parentheses refer to problem sets or lectures in which the skill is specifically covered; e.g., PS1.1 refers to problem set #1, question 1.

I. General issues in dynamic optimization
   
   A. Basic skills
   1. Identify the key variables and functions in a problem: state, control & intermediate in a general problem statement. (PS1.1)
   2. Define the key functions: Benefit function, state equation, objective function, and salvage value in a general problem statement. (PS1.2)
   3. Be able to write a computer program that would carry out the tasks indicated on the Quiz included in the VB tutorial. (VB Tutorial)

   B. Intermediate skills
   1. Explain the commonalities and differences between optimal control and dynamic programming. (Lecture 1)

   C. Advanced skills
   1. Independently develop a well-defined dynamic optimization problem with reasonable sets of key variables and functions.
   2. Clearly convert a problem from a DP to OC specification and vice versa and explain the commonalities and differences.

II. Optimal control (continuous time & analytical solutions)
   
   A. Basic skills
   1. Solve a very simple (constant or single variable) first-order differential equation. (PS1.3)
   2. Explain in words what a differential equation means (of any order). (PS1)
   3. Solve differential equations using a symbolic algebra program. (PS1.3)
   4. Take a clearly defined dyn. opt. problem and write down the Hamiltonian and FOCs. (PS2)
   5. Derive the transversality condition for a vertical end-point problem. (PS2)
6. Reformulate a present-value OC problem to a current-value specification and vice versa. (PS2.4)

B. Intermediate skills
1. Solve a linear first-order differential equation. (PS1.3)
2. Correctly develop a phase diagram given the appropriate differential equations, including identifying the equilibrium. (PS1.4)
3. Describe a phase diagram or set of differential equations in terms of stability and trajectories. (PS2)
4. Take a general problem and write down the Hamiltonian and FOCs. (PS2)
5. Given a general problem statement, identify the type of end-point problem that it is and correctly state the transversality condition. (PS2)
6. Provide economic interpretation of the FOC w.r.t. the control variable (present & current value). (PS2)
7. Set up a constrained dyn. optimization problem and derive the FOCs. (Lecture 14)

C. Advanced skills
1. Correctly solve a system of equations to reach a set of differential equations, present them in a graph, and interpret the graph. (Lecture 2)
2. Solve a relatively simple constrained optimal control problem. (Lecture 14)
3. Evaluate analytically and/or numerically the stability of a system of nonlinear differential equations. (PS1.4)
4. Given a general problem statement, provide the correct formal statement of the problem, solve the problem (to the extent that a solution is possible), and use appropriate mathematical and graphical skills to describe the solution to the problem. (PS2)
5. Provide strong economic intuition for optimal trajectories using the FOCs. (PS2)
6. Derive the correct transversality condition for any general problem using both a present and current-value specification, including problems with salvage value and infinite horizon problems. (PS2)
7. Provide economic interpretation of the FOC w.r.t. the state variable for both present & current value specifications. (PS2)
8. Provide intuitive economic interpretation of a Hamiltonian. (PS2)
9. Solve a constrained dynamic optimization problem including MRAP and bang-bang type problems. (Lecture 14)
10. Set up and solve a relatively simple stochastic control problem. (Lecture 14)

III. Numerical dynamic programming (discrete time & numerical solutions)
A. Basic skills
1. Set up and solve a well-defined deterministic DD-DP problem using a circle-and-arrow approach. (PS3.2)
2. Write down the Bellman’s equation for a well-specified dynamic optimization problem. (PS3.2)
3. Write down pseudo code that would be used to solve a finite-horizon one-dimensional DD-DP problem. (PS3.2)
4. Write a computer program to numerically solve a deterministic finite-horizon one dimensional DD-DP problem. (PS3.3)
5. Write computer code that generates the optimal path that follows from the solution to a deterministic finite-horizon one-dimensional DD-DP problem and explain the path. (PS3.3) (III.A. 4 and III.A. 5 will be evaluated together)
6. Set up a Markov transition matrix, and find the transition probabilities over \( n \) periods and as \( n \to \infty \). (Lecture 9)

**B. Intermediate skills**

1. Set up and solve a well-defined stochastic DD-DP problem using a circle-and-arrow approach. (Lecture 7)
2. Write down the Bellman’s equation for a general problem statement for a DD problem. (PS3)
3. Present graphically and economically interpret the policy function and value function that results from any DP problem. (PS3)
5. Write a computer program that solves a deterministic infinite horizon DD-DP. (PS3.4)
6. Write computer code that generates the optimal path that follows from the solution to a deterministic infinite-horizon DD-DP problem and explain the path. (PS3.3) (III.B.5 and III.B.6 will be evaluated together)
7. Write a computer program that solves a deterministic CD-DP problems using rounding or linear interpolation. (PS3.4)
8. Write a computer program that solves a stochastic DD-DP problems (PS3.5)
9. Calculate and economically interpret the probabilistic outcomes of a stochastic DP problem (PS3.5)
10. Write computer code that generates the optimal paths that follows from the solution to a stochastic DD-DP problem and explain and analyze the paths and the solution to the problem. (PS3.5) (III.B.8, III.B.9 and III.B.10 will be evaluated together)
11. Solve analytically a simple DP problem with a continuous choice variable. (PS3.1)

**C. Advanced skills**

1. Write a computer program that solves a stochastic infinite horizon DD-DP. (PS3.5)
2. Write a computer program that solves a deterministic CC-DP problems using hill climbing algorithms. (Lecture 11)
3. Write a computer program that solves a problems with multiple state variables.
4. Demonstrate the ability to use policy iteration and another acceleration technique for the solution of \( \infty \)-horizon problems. (PS3.5)
5. Demonstrate the ability to use nonlinear interpolation and spline methods for problems with continuous state variables. (Lecture 11)
6. Describe in general terms how Rust’s nested fixed point algorithm would be used to estimate the parameters of a dynamic decision problem. (Lecture 13)

<table>
<thead>
<tr>
<th>Number of Mastery Exams</th>
<th>Dynamic optimization</th>
<th>Optimal control</th>
<th>Numerical dynamic programming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>3</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Intermediate</td>
<td>1</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Advanced</td>
<td>2</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Totals</td>
<td>6</td>
<td>26</td>
<td>23</td>
</tr>
</tbody>
</table>
Grading Scale:

Legend:

Levels: B = Basic; I = Intermediate; A = Advanced

Groups: I = General Issues in Dynamic Optimization; II = Optimal Control; III = Numerical Dynamic Programming

<table>
<thead>
<tr>
<th></th>
<th>Group I</th>
<th></th>
<th>Group 2 &amp; 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>I</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>A</td>
<td>100% of all</td>
<td>At least</td>
<td>100% of all</td>
<td>At least</td>
</tr>
<tr>
<td></td>
<td>Basic exams</td>
<td>90%</td>
<td>advance exams</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mastery of all exams</td>
<td></td>
<td>mastery of all exams</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intermediate exams</td>
<td></td>
<td>Intermediate exams</td>
</tr>
<tr>
<td>B</td>
<td>100% of all</td>
<td>At least</td>
<td>100% Mastery of all exams</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basic exams</td>
<td>90%</td>
<td>exams</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>mastery of all exams</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intermediate exams</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>100% of all</td>
<td></td>
<td>100% Mastery of all exams</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basic exams</td>
<td></td>
<td>exams</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>No 100% Mastery in Basic exams but attend 50% of class periods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Below all mastery and attendance levels.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It is a violation of the honor code to reveal the specific contents of any of the tests that are used to demonstrate mastery.
IX. **Outline of the course** (This outline is substantive, not sequential)

A. Nature of Dynamics wk. 1

B. Optimal control theory wk. 2
1. Derivation of optimal control necessary conditions, Hamiltonians wk. 3
2. Finite horizon problems wk. 4
3. Infinite horizon problems wk. 5
4. Economic Interpretation wk. 6
5. Bang-bang and most-rapid-approach-path solutions to optimal control wk. 7
6. Stochastic optimal control (Ito calculus) (we usually don’t get to this) wk. 8

C. Dynamic Programming
1. Deterministic DP wk. 9
2. Stochastic DP wk. 10
3. Infinite horizon problem and convergence wk. 11

D. Applications of dynamic optimization
1. Dynamic optimization in pricing of futures and options. wk. 12
2. Using DP in econometric analysis wk. 13
3. Integrating DP with large simulation models wk. 14
4. Final Testing wk. 15

X. **Texts**

The following are optional texts and should be available at the book store. I would not recommend buying all of these books as the cost would be excessive and there is some repetition. You are welcome to look at my copies of these books before making a decision and copies of some books are available for loan. For the nuts and bolts of numerical dynamic programming, excellent available references are the chapter by Rust (Handbook of Computational Economics), the text by Miranda and Fackler, and a few chapters of the book by Judd. If you have not done a lot of programming, then the Albright or Miranda and Fackler texts might be helpful, depending on whether you intend to do the programming assignments in VB or Matlab.

**Optimal Control**


**Dynamic Programming & Numerical Methods**


VB Programming

**XI. Acknowledgments**

In developing the material for this course I draw on numerous sources, and I want to give the authors credit. As a general disclaimer, I claim the discovery of none of the material covered in the course. If you are unsure of the source for the material that I am presenting, simply ask and I will normally gladly provide the necessary citation, at least after the problem set has been handed in. Unpublished sources that I will draw on include:

Karp, Larry. Lecture notes on Methods of Dynamic Analysis and Control. University of California, Berkeley


**XII. Academic Integrity Statement and Policy**

"An Aggie does not lie, cheat or steal, or tolerate those who do." For clarification on what this means in practice, see http://aggiehonor.tamu.edu

**XIII. 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 Disability Services in Room B118 of the Cain Hall Building or call 845-1637. For additional information, visit http://disability.tamu.edu
1. Course request type:  
   - [ ] Undergraduate  
   - [x] Graduate  
   - [ ] First Professional (D.D.S., M.D., Ph.D., D.V.M.)

2. Request submitted by (Department or Program Name):  
   Department of Biochemistry and Biophysics

3. Course prefix, number and complete title of course:  
   BICH 678, Metal Ions

4. Catalog course description (not to exceed 50 words):  
   Understanding the roles of metals in biological systems and the methods used in  
   biochemical and cell biological processes; reading primary research literature critically, critiquing research designs in terms of innovation,  
   significance and logic, and uncovering both strengths and weaknesses of the discussed articles.

5. Prerequisite(s):  
   CHEM 628 or approval of instructor

6. Is this a variable credit course?  
   [ ] Yes  
   [x] No  
   If yes, from _______ to _______

7. Is this a repeatable course?  
   [x] Yes  
   [ ] No  
   If yes, this course may be taken _______ times.

8. Will this course be repeated within the same semester?  
   [x] Yes  
   [ ] No

9. Will this course be submitted to the Core Curriculum Council?  
   [x] Yes  
   [ ] No

10. How will this course be graded?  
    - [x] Grade  
    - [ ] S/U  
    - [x] P/F (CLMD)

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

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

13. Prefix | Course # | Title (excluding punctuation)
   --- | --- | ---
   BICH | 678 | METAL IONS

<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>
<th>FTE Code</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1.00</td>
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<td>0420</td>
<td>15</td>
<td>16</td>
<td>0 0 3 6 3 2</td>
</tr>
</tbody>
</table>

Approval recommended by:  

Department Head or Program Chair (Type Name & Sign)  

Date

Chair, College Review Committee  

Date

Dean of College  

Date

Chair, EC or UGC  

Date

Questions regarding this form should be directed to Sandra Williams at 855-8201 or sandra-williams@tamu.edu

Curricular Services - 07/14

Associate Director, Curricular Services

Date

Effective Date
Course title and number: BICH 678: Metal Ions

Term: Spring 2015
Meeting times and location: Wednesdays 11:30 am -12:30 pm. Place: Room 2121 of Chemistry.

Course Description and Prerequisites

Metal ions play major roles in biochemical and cell biological processes. In this course, we will read and discuss the primary research literature dealing with the roles of iron, copper, zinc, manganese, cobalt, molybdenum, vanadium and tungsten in biological systems. We will study metal ion trafficking and regulation in cells, metalloenzymology, and related spectroscopic investigations. The objective of this course is to understand the roles of metals in biological systems and the methods used in these endeavors. Another objective will be to learn how to read the primary research literature critically, critiquing research designs in terms of innovation, significance and logic, as well as uncovering both strengths and weaknesses of the discussed articles. Prerequisites: Students should have strong backgrounds in chemistry, biochemistry and biophysics. Ideally they would also have strong backgrounds in bioinorganic chemistry (e.g. have taken CHEM 628) and transition metal chemistry, but this is not assumed or required.

Learning Outcomes

Upon completion of this course, students will acquire the ability to critically read and understand the primary research literature focused on metals in biological systems.

Instructor Information

Name: Dr. Paul A. Lindahl
Telephone number: (979) 845 0956
Email address: Lindahl@chem.tamu.edu
Office hours: By appointment
Office location: 1129, Chemistry

Textbook and/or Resource Material

There is no text for the class. Each week, one participant will submit 3 papers (electronic pdf version) to me as candidate papers to discuss. I will select one of these papers and distribute it electronically to the class. The participant who submitted the article will introduce it to the class. I will assign individual students to discuss particular figures/experiments in the paper. Another student will summarize the importance of the paper at the end.

Papers should have the following characteristics:
- involve transition metals
- involve biochemistry and/or biophysics
- be recently published (2013 or 2014)
- in high-profile, high impact journals like Nature, Science, PNAS, ACS journals
- be primary research articles, not reviews

Philosophical orientation of the class
- We will have discussions, not polished presentations; no single person is responsible for presenting an entire article.
• All students are expected to read the paper and contribute to the discussion
• Discussions will be friendly and helpful for students who are not experts in the methods and/or area to which they have been assigned.
• I will moderate the discussion and keep us on track and balanced in terms of participation.

Grading Policies

There will be no exams. Grades will be determined based on the number of classes attended on the level of participation in those classes that are attended. Participation includes reading the article, presenting the assigned section of the paper to the class, and participating in the class discussion. Attendance and participation are each weighted equally (50% each). Each of the three elements of participation will be weighted equally. Thus for each class, the score given will be calculated by the formula

\[
Score = \frac{1}{2}A + \frac{1}{6}R + \frac{1}{6}P + \frac{1}{6}D
\]

\[A, R, D = 0 \text{ or } 1\]

Thus, percentages of points for attending, reading, presenting and participating will be as follows:
- Attendance: 50.00%
- Reading: 16.66%
- Presenting: 16.66%
- Discussions: 16.66%

If a student attends the class, A = 1 (otherwise 0). If a student has read the article (self-reported), R = 1 (otherwise 0). If a student presents their assigned section, P = 1 (otherwise 0). If a student participates in discussion, D = 1 (otherwise 0). Thus, scores range from 0 to 1 per class. Since there are 15 classes in the semester, total scores for the semester range from 0 to 15. Letter grades will be determined from the following schedule:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total score of 11 - 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Total score of 8 - 10</td>
</tr>
<tr>
<td>B</td>
<td>Total score of 5 - 7</td>
</tr>
<tr>
<td>C</td>
<td>Total score of 3 - 4</td>
</tr>
<tr>
<td>D</td>
<td>Total score of 0 - 2</td>
</tr>
</tbody>
</table>

Attendance and Make-up Policies

Students must attend at least 11 out of 15 classes for full credit. Additional unexcused absences will result in a lower grade. See student rule 7 [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07) for the definition of an excused absence.

Tentative schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 21</td>
<td>Organizational meeting (and presentation)</td>
</tr>
<tr>
<td>Jan 28</td>
<td>Discussion of literature</td>
</tr>
<tr>
<td>Feb 4</td>
<td>Discussion of literature</td>
</tr>
<tr>
<td>Feb 11</td>
<td>Discussion of literature</td>
</tr>
<tr>
<td>Feb 18</td>
<td>Discussion of literature</td>
</tr>
<tr>
<td>Feb 25</td>
<td>Discussion of literature</td>
</tr>
<tr>
<td>Mar 4</td>
<td>Discussion of literature</td>
</tr>
<tr>
<td>Mar 11</td>
<td>Discussion of literature</td>
</tr>
<tr>
<td>Mar 25</td>
<td>Discussion of literature</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

Academic Integrity

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
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 (DDS, MD, J.D, PharmD, DVM)

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

3. Course prefix, number and complete title of course: EPSY 633: Qualitative Research Design and Data Collection

4. Catalog course description (not to exceed 50 words):
Introduction to qualitative designs used to answer educational, psychological, or social research questions; historical foundations, epistemologies, and essential elements of prevalent qualitative research designs; methods of collecting qualitative data including interviews, naturalistic observation, participant-observation, and stimulated recall procedures.

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)

       PHD students in the EPSY major in the Learning Sciences program.

    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 in the EPSY department as relevant; course needs and research design needs.

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 633 Qual Res Design & Data Coll

    | Lect. | Lab | Other | SCH | CIP and Fund Code | Admin. Unit | Acad. Year | ELC Code |
    |-------|-----|-------|-----|------------------|-------------|------------|---------|
    | 3.00  | 0.00| 0.00  | 3.00| 1306040004       | 0920        | 16         | 17      |

Approval recommended by:

Victor Wilson, Ph.D.  George Cunningham, Ph.D.
Department Head or Program Chair (Type Name & Sign) Chair, College Review Committee
Date 01/05/15

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

George Cunningham, Ph.D.
Dean of College
Date 01/05/14

Mark Zoran, Ph.D.  Date 2/24/15
Chair, GC or UCC

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
Please see below email of support from Dr. Nafuko.

Yea!

Laura

Laura M. Stough, Ph.D
Learning Sciences Program Coordinator
Department of Educational Psychology
Center on Disability and Development
Texas A&M University
Mail Stop 4225
College Station, TX 77843

From: Fred Nafukho
Sent: Monday, December 01, 2014 5:13 PM
To: Laura Stough
Subject: RE: Proposed qualitative course in Department of EPSY

Dear Dr. Stough,
As a follow up to my last communication with you regarding EPSY 689 Course, I would like to inform you that I have consulted with faculty in the department who are experts in qualitative research methods. The Executive Committee comprised of Program Leaders in the Department met on November 26, 2014 and discussed the syllabus that you shared with me. I am pleased to inform you that the faculty who reviewed your course syllabus and the EC members were very impressed with your course syllabus and requested me to inform you that you should go ahead and submit EPSY 689 as a new course. Faculty who reviewed your course appreciated the fact that while we offer qualitative methods courses in the department, your course is taught from psychological perspective which they found very important.
Based on the feedback provided by qualitative research experts in the Department, I would like to confirm my support for you to submit EPSY 689 as a new course. I also confirm that this course does not in any way duplicate course offering in the Department.

Thank you for your patience and please let me if you have any questions.

Best regards,
Fred

From: Laura Stough
Sent: Wednesday, October 15, 2014 4:01 PM
To: Fred Nafukho
Subject: Proposed qualitative course in Department of EPSY

Dear Dr. Nafukho:

Several years ago, I became concerned about the level of training that the doctoral students in Educational Psychology were receiving in the area of qualitative research. In discussions with a number of your faculty (including Drs. Clark, Gonzalez y Gonzalez, Lincoln, MacKenzie, and Skrla) I developed a qualitative course entitled “Qualitative Research Design and Data Collection.” This course was developed to be non-competitive with other existing qualitative courses in the College and to build on the considerable instructional existing strengths within our College in the areas of epistemology, qualitative theory, and narrative inquiry.

To date, I have taught this graduate course under the EPSY 689 prefix. Our Learning Sciences Program (which includes the Research, Measurement, and Statistics faculty; the Creativity, Cognition, Instruction, and Development faculty, and the Educational Technology faculty) has recently decided to make this course a requirement of all our doctoral students. I would like to, therefore, submit this course as a new course to begin Spring 2015.

Attached you will find a proposed syllabus for the course. Would you write a Letter of Support of assurance that this course does not duplicate an offering within your department?

Thank you for your consideration of this request,

Regards,
Laura

Laura M. Stough, Ph.D
Learning Sciences Program Coordinator
Department of Educational Psychology
Center on Disability and Development
Texas A&M University
Mail Stop 4225
College Station, TX 77843
lstough@tamu.edu
79-843-8237
redd.tamu.edu
EPSY 633: Qualitative Research Design and Data Collection
Spring 2015

Professor: Laura M. Stough, Ph.D.
lstough@tamu.edu
Department of Educational Psychology
709 Harrington
(979) 845-8257

Office Hours: Immediately following class or by appointment

Course Description:
The design of qualitative studies to answer educational, psychological, or social research questions; historical foundations, epistemologies, and essential elements of prevalent qualitative research designs. Methods of collecting qualitative data including interviews, naturalistic observation, participant-observation, focus groups, and stimulated recall procedures.

Prerequisites:
Graduate classification; approval of department head.

Course Objectives:
At the end of this course, students who have successfully completed the requirements will be able to:

- Identify research questions that can be appropriately addressed using qualitative research.
- Understand the difference amongst paradigms used in current qualitative research.
- Describe the history and epistemological origins of different qualitative methods.
- Appropriately design qualitative studies for educational, social, or psychological research.
- Use several methods to collect qualitative data.
- Evaluate the strengths and weaknesses of qualitative research designs and methods used in current academic articles.

Required Texts:
3. Selected articles also will be assigned.

Attendance:
Attendance is essential as 50% of your grade in this class will be based on discussions and presentations that you do in class. In addition, much of what you will learn about qualitative design will be through in-class simulations and activities. If you know you will be missing a class, please call me or leave a message on my voice mail. For a list of university excusable absences please see: http://student-rules.tamu.edu/rule07
Class Participation:
We will be actively designing qualitative studies and practicing qualitative data collection, therefore your participation is essential to mastering the objectives for this course. Each week we will discuss at least one article that focuses on qualitative methods. I expect you to read the article before class and that you are prepared to contribute frequently and knowledgeably to these discussions. In addition, we will have class lectures delivered by researchers currently engaging in qualitative research and I encourage you to engage these researchers with your questions.

Course Expectations:
Your grade will be based on a 100-point scale. For each assignment or exam, you will receive the amount of points described below. At the end of the semester I will assign a grade as follows:

<table>
<thead>
<tr>
<th>Points Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-100 pts.</td>
<td>A</td>
</tr>
<tr>
<td>80-89</td>
<td>B</td>
</tr>
<tr>
<td>70-79</td>
<td>C</td>
</tr>
<tr>
<td>60-69</td>
<td>D</td>
</tr>
<tr>
<td>59 and below</td>
<td>F</td>
</tr>
</tbody>
</table>

While my expectations are high regarding written work and your participation during class, I am quite willing to answer any and all questions you might have about an assignment and to work with you in developing your assignments. Do not hesitate to email me if you have questions.

Assignments:
Assignments should be handed in at the beginning of class to us on the day that they are due. They should be typed, completed to APA standards, and should follow the format described for that assignment. Late assignments (those handed in within one week of the due date) will receive half credit. After one week, late assignments are not accepted, except in cases of university excused absences.

Points given for each assignment for the course follows:
1. Class participation  10 points
2. Written analysis of qualitative article  10 points
3. Data collection exercise #1  10 points
4. Data collection exercise #2  10 points
5. Data collection exercise #3  10 points
6. Qualitative concept presentation  20 points
7. Qualitative design paper  30 points

TOTAL  100 points

The assignments above focus on a collection of skills that all graduate students going on to research careers should master. These skills include reading research, analyzing research, presenting research concepts, collecting data, and designing research.
Analysis of Qualitative Article:
You will select, read, and write an analytical summary of an article that uses qualitative methods from your field of discipline. The focus of your analytical summary should primarily be on the design and the data collection procedures used in the article. You should include your evaluation of the appropriateness of the methodology chosen for the research questions identified by the author. Your analysis should be no longer than two single-spaced pages. Do not summarize the article nor provide the abstract. Print out and attach your selected article to your analytical summary to turn in on the day assigned.

Qualitative Concept Presentation:
Each of you will select a topic that corresponds to the class schedule. Your topic should focus on one specific concept that is introduced in one of our two texts. Expand on that concept by seeking out additional resources on the topic. Plan a presentation that lasts no more than 15 minutes. You may use PowerPoint, Prezi, visuals, posters, an activity, handouts- whatever will be helpful in communicating your topic to the class. In addition to any handouts you distribute, please give me a list of the additional references that you used in designing your presentation.

Data Collection Exercises:
During the semester you will collect data using three different methods. Some of these experiences will take place during class, some outside of class. For each of these exercises, you will write up the results of the exercise in a 3-4 page paper that will be due one week after it is assigned.

Qualitative Design Paper:
The qualitative design paper will be completed at home on your own and will be cumulative. The paper will contain from one to three questions that will require you to integrate concepts presented in your readings and from the lectures. The qualitative paper will be due one week after the final class meeting and may be submitted either via email to me by 5 pm.
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

College of Education and Human Development on Tolerance:
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. In the spirit of shared responsibility, each University unit, student organization, and community member is encouraged to help make our campus, and this class, a welcoming place for all. Should you have any concerns related to respect for diversity or feel that you (or any others) are being discriminated against, please contact your departmental Ombudsperson, or the Department Head or the College Ombudsperson.

Students with Special Needs:
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.

Plagiarism Statement:
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, 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 I expressly grant permission. As commonly defined, plagiarism consists of passing off as one's own the ideas, works, 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 issues of the Texas A&M University Student Rules, under the section "Scholastic Dishonesty."

Academic Integrity Statement and Policy:
Texas A&M has the following Honor Code: "An Aggie does not lie, cheat, or steal or tolerate those who do." Please become familiar with the Honor Council Rules and Procedures on the web at http://www.tamu.edu/aggiehonor.
<table>
<thead>
<tr>
<th>Date</th>
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<td>1</td>
<td>Qualitative approaches to research questions and design</td>
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<td>January 27</td>
<td>2</td>
<td>Major methodological approaches to qualitative design</td>
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<td>February 3</td>
<td>3</td>
<td>Design principles Approaches to data collection</td>
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<td>February 17</td>
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<td>Oral history data collection Narrative designs</td>
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<td>Collecting data through focus groups</td>
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<td>Forrester: 10</td>
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<td>Forrester: 9</td>
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<td>Ethnography as design and data collection</td>
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<td>March 17</td>
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<td>SPRING BREAK</td>
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<td>Case study designs and data collection</td>
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<td>Research ethics Debates in qualitative research</td>
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<td>Forrester: 6</td>
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<td>April 21</td>
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<td>Mixed Methods Analysis and interpretation</td>
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<td>April 28</td>
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<td>Writing up your research Debates in qualitative research</td>
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<td>Design Paper Due 5 pm via email</td>
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Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional

Form Instructions

1. Course request type:
   - Undergraduate  
   - Graduate  
   - First Professional (LLE, LDL, J.D., Pharm.D., DVM)  

2. Request submitted by (Department or Program Name):
   Department of Geography
   GEOG 634 Hydrology and Environment

3. Course prefix, number and complete title of course:

4. Catalog course description (not to exceed 50 words):
   Examination of hydrologic processes affecting surface and groundwater resources; impact of climate, soils, vegetation, land-use practices, and human effects on hydrologic processes; natural-scientific perspectives emphasized.

5. Prerequisite(s):

   Cross-listed with: WMRS 601
   Stacked with: GEOG 434

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

9. How will this course be graded?  
   - Grade  
   - S/U  
   - P/P (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 geography

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

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

13. 

   GEOG 634 Hydrology and Environment

   Approval recommended by:
   David Carman
   Department Head or Program Chair (Type Name & Sign)
   Date 10/31/14

   Ronald Kaiser
   Department Head or Program Chair (Type Name & Sign)
   Date 10/31/14

   Dean of College
   Chair, Undergraduate Curriculum Committee
   Date 11/5/2014

   Submitted to Coordinating Board by:
   Associate Director, Curricular Services
   Date 11/5/2014

Questions regarding this form should be directed to Sandra Williams at 845-3201 or sandra-williams@tamu.edu.
Curricular Services • 07/14
Hydrology and Environment (GEOG 634)

Fall 2015

Instructor: Dr. Steven M. Quiring
Office: O&M 814A
Office Hours: M 11:00 – noon, W 10:30 – 11:30 a.m. and by appointment
Phone: 458-1712
Email: squiring@tamu.edu

Class Meeting Time and Place: MWF 9:10 –10:00 a.m., 303 CSA

Online Course Information: http://ecampus.tamu.edu/

Prerequisite: Graduate classification

Course Objective:
To provide you with an understanding of all components of the hydrologic cycle and how these components vary spatially and temporally due to the influence of human activities and the environment.

Course Description:
Water is fundamental for life on earth. This course will focus on water in the atmosphere, water on the earth’s surface and water in the root zone of the soil. We will investigate all of the hydrologic processes affecting surface and groundwater resources, including precipitation, evapotranspiration, infiltration & storage, and runoff. This includes investigation of the impact of climate, soils, vegetation, land-use practices and human activities on hydrologic processes. Specifically we will investigate the:

1) processes controlling each component of the hydrologic cycle
2) spatial and temporal distribution of each component of the hydrologic cycle in the atmosphere and over the earth’s surface (i.e., how and why it varies)
3) measurement and modeling of each component of the hydrologic cycle (i.e., how is it measured, how accurate are the measurements and models, what are the known biases in measuring and modeling this component)
4) issues related to how humans manage each component and how it is influenced by human activities.

The readings and lectures will cover the fundamental principles that are necessary for understanding hydroclimatolgy. The term paper will require you to quantitatively analyze real-world hydrologic problems and it will help you develop research skills (data analysis, problem solving, etc.).
Learning Objectives:
As a result of taking this course you should know certain things (knowledge objectives) and be able to do certain things (skill objectives).

Knowledge objectives (Things you should know by the end of the course):

- Describe the processes that are responsible for each component of the hydrologic cycle.
- Describe the spatial distribution of each of the components and why they are distributed in this manner (i.e., how and why). You should also be able to describe the temporal trends in each component (e.g., Is the world getting wetter or drier?).
- Describe how each component of the hydrologic cycle is measured and modeled and the biases (errors) in each of the measuring and modeling techniques.
- Discuss the major water resource issues and critique the proposed solutions to these issues.
- Critique published research on hydrology and hydroclimatology and be able to describe the strengths and weaknesses of the data and methodology utilized by the authors.

Skill objectives (Things you should be able to do by the end of the course):

- Interpolate precipitation data.
- Analyze trends in precipitation data.
- Calculate the recurrence interval for precipitation events of a given magnitude.
- Model evapotranspiration.
- Calculate infiltration and runoff.
- Estimate peak discharge.
- Model the climatic water balance.
- Perform library research.
- Write a literature review (synthesis of the literature).
- Evaluate the published research and the research of your peers.
- Write a scientific research paper that conforms to the accepted standard for publication in a peer-reviewed journal.
- Deliver a clear and concise oral presentation on the research that you completed during the semester.

Required Textbook:


Weekly readings will be assigned throughout the semester and will be made available through ecampus.tamu.edu. The textbook will cover the basic material for each unit and
the other assigned readings (which will be drawn from the scientific literature) will provide more depth on certain topics.

Course Outline:
We will begin by examining the fundamentals and importance of hydrology. We will then examine each component of the hydrological cycle in detail. Finally, we will examine some contemporary issues in hydrology.

1) Introduction to Hydrology (Week 1)
   - The Hydrosphere
   - Why is water important?
   - Functions and properties of water
   - Basic concepts in hydrology:
     - Hydrological cycle
     - Watershed

2) Precipitation (Week 2, 3 and 4)
   - Mechanisms
     - What cause precipitation to occur?
     - Types (convective, frontal, cyclonic, orographic)
   - Spatial and Temporal Variability
   - Measurement
     - In situ (gage measurement and biases)
     - Remote sensing (weather radar and satellite)
   - Modeling and Interpolation
     - Areal averaging
     - Interpolation
   - Issues
     - Cloud seeding
     - Climate change

3) Evapotranspiration (ET) (Week 5 and 6)
   - Processes
     - What is evaporation (E)?
     - What is transpiration (T)?
     - What controls the rate of E&T?
     - What is Potential ET? What is Actual ET?
   - Spatial and Temporal Variability
   - Measuring ET
   - Modeling ET
   - Issues
     - Controlling ET

4) Infiltration and Storage (soil moisture & ground water) (Week 7, 8 and 9)
   - Processes
     - What controls infiltration and storage?
- Impact of soil characteristics
- Soil water movement
- Soil water loss
- Ground water recharge and flow
- Ground water-surface water relations

- Spatial and Temporal Variability
- Measuring and Modeling Infiltration and Storage
- Issues
  - Impervious surfaces
  - Irrigation
  - Moisture recycling
  - Effects of ground water extraction
  - Aquifer storage and recovery

5) Runoff and Streamflow (Week 10, 11 and 12)
- Processes
  - Overland runoff
  - Base flow and event flow
  - Streamflow dynamics and networks
  - Hydrographs
- Spatial and Temporal Variability
- Measuring and Modeling Streamflow
  - Stream gages (discharge, stage)
  - Flow routing
  - Hydrologic modeling
- Issues
  - Flood control structures
  - Irrigation
  - Land use/land cover change
  - Water quality
  - Climate change

7) Graduate Research Presentations (December 1, 3 & 5)

8) Last Class & Review for Final Exam (Monday, December 8)

FIRST EXAM (Monday, October 13)
RESEARCH PAPER (Wednesday, November 26)
FINAL EXAM (Monday, December 15, 8-10 am)

Grading:
First Exam (Oct. 13) 25%
Research Paper (Nov. 26) 35%
Research Presentation (Dec. 1, 3 or 5) 10%
Final Exam (Dec. 15) 30%
*No late papers or exercises will be accepted. Students who do not hand in an assignment by the due date will receive a grade of zero.

The grading system follows the Texas A&M University grading system:
A = Excellent
B = Good
C = Satisfactory
D = Passing
F = Failing
Grades will be assigned based on the following cutoffs: A = > 90%, B = 80-89%, C = 70-79%, D = 60-69%, F = <60%.

Exams (first exam = 25%; final exam = 30%):
The two exams will be based on the material covered in the lectures and the readings and in-class exercises. The final exam will be cumulative. They will involve short answer, application and problem solving (based on the exercises), and paragraph/essay questions. Students seeking an excused absence on a test day must notify the professor or the Department of Geography by the end of the next working day following the absence, as described in Texas A&M University Student Rules. For an absence considered excused by the university (see Student Rules), the student will be required to make-up the missed exam. At the instructor's discretion, the make-up exam might be in a different format (e.g., essay) than the original exam. Please see the instructor in advance if you know you will not be able to take a test on the scheduled date.

Research Paper (35%):
The research paper will provide you with an opportunity to do an in-depth study on a hydrological topic that interests you. I am expecting you to review the relevant literature and analyze data. The paper should be approximately 20 pages and should follow the style of Water Resources Research. You will be required to write a research paper and deliver a presentation to the class. This assignment will be discussed in more detail in class. You are welcome to select any topic that relates to the hydrological cycle (e.g., precipitation, evapotranspiration, soil moisture, runoff or streamflow). I have listed examples of a number of topics that would be appropriate:

- How accurately is precipitation measured by... satellites, radar, gages?
- How will (how is) climate change affecting hydroclimatolgy:
  - Is precipitation increasing or decreasing (are floods or droughts becoming more frequent)? Will there be more extreme events? What will happen to evaporation?
  - Describe one of the following hydrological applications: flood forecasting, reservoir management, flashing flooding risk, hydrological modeling
- What impact is land use/land cover change having on hydrology?
- What causes drought to occur?

Project Presentation (10%):
All students will be required to present their research in class Dec. 1, Dec. 3 or Dec. 5. You will be given 15 minutes to present your research and there will be a few minutes for questions following your presentation. Time limits will be strictly enforced (just as they
would be if you were presenting at a national meeting). I will go over the grading rubric in class. You are encouraged to use powerpoint or other visual media to enhance your presentation.

Cellular Telephones
As a courtesy to the instructor and other students please turn off all cellular telephones and two-way pagers before the class begins. I find it extremely impolite to be interrupted by a cellular telephone when I am lecturing.

Email
All Texas A&M students should use their neo email accounts when emailing the instructor and teaching assistants. I may also send out class announcements via the neo email system as well. It is your responsibility to check your neo email account regularly.

Scholastic Dishonesty
It is my hope that academic dishonesty will not be a problem in this class. Texas A&M does, however, have a Scholastic Dishonesty policy to which both students and faculty must comply. If you have any questions about the University’s Scholastic Dishonesty policy please review the Student Rules or see me. The Aggie Honor program is the new program that will handle all cases of academic dishonesty. The Aggie Honor program website is located at http://aggiehonor.tamu.edu/

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http://aggiehonor.tamu.edu/

Student Support
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For more information please contact:
Services for Students with Disabilities
Room B118 of Cain Hall, 845-1637, http://disability.tamu.edu/

There are numerous other student support organizations on campus including:
Student Counseling Service
Cain Hall, 845-4427, http://scs.tamu.edu/
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): ISEN
3. Course prefix, number and complete title of course: ISEN 665 Management of Engineering Systems
4. Catalog course description (not to exceed 50 words): Theory and practice of leadership and management in engineering organizations; focus on both "hard" skills (systems engineering process, project management, planning, forecasting, financial analysis) and "soft" skills (leadership styles, motivation, teamwork, managing creative people, navigating informal networks); science and technology policy, economic implications of engineering and technology.

GRADUATE STUDIES

5. Prerequisite(s):
Graduate classification
Cross-listed with: SYEN 645
Stacked with:
Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? □ Yes □ No If yes, from _____ to _____
7. Is this a repeatable course? □ Yes □ No If yes, this course may be taken _____ times.
Will this course be repeated within the same semester? □ Yes □ No
8. Will this course be submitted to the Core Curriculum Council? □ Yes □ No
9. How will this course be graded? □ Grade □ S/U □ P/F (CLMD)
10. This course will be:
    a. required for students enrolled in the following degree programs(s) (e.g., B.A. in history)
    b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)
M.S., M.Eng., D.Eng., or Ph.D. in any College of Engineering Department; any other graduate student with instructor approval (main focus: Ph.D., M.S., and M.Eng. in Industrial Engineering; M.S. in Engineering Systems Management; Ph.D. in Interdisciplinary 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) 
ISEN 665 MGMT OF ENGR SYSTEMS

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Approval recommended by:

Cesar O. Malave
Department Head or Program Chair (Type Name & Sign) Date: 12/23/2014

John Criscione
Chair, College Review Committee Date: 1/15/15

John Criscione
Dean of College Date: 1/15/15

Mark Zoran
Chair, GC or UCC Date: 2/24/15

Submitted to Coordinating Board by:

Associate Director, Curricular Services Date: 

Effective Date: 07/14

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu.
Curricular Services – 07/14
Department of Industrial and Systems Engineering
ISEN 665: Management of Engineering Systems

This course is intended to teach engineers about the role of people and organizations in the design and development of complex engineered systems and to provide them with the skills needed to effectively manage large-scale system development programs.

COURSE INFORMATION
ISEN 665: Management of Engineering Systems
Spring 2015, Section 600 (Section 700 for Distance Education), M/W 12:40 - 1:55 pm
Class Location: Emerging Technologies Building (ETB) Room 1006

COURSE DESCRIPTION
This course is designed to teach students about the importance of people and organizations in systems engineering and to provide them with the management skills needed to be effective in their careers.

TEXTBOOKS
There is no textbook that covers the full scope of topics presented in this course. Instead, readings will be selected from the extensive literature on each of the topics covered.

TEACHING STAFF
Dr. Mark S. Avnet – Instructor
Office: ETB 4075 Office Hours: M 2-4 pm or by appointment
E-mail: avnet@tamu.edu (Please include "ISEN 665" and your section in the subject line)

PREREQUISITES

- Graduate Classification
- Demonstrated interest in social and organizational aspects of engineering. Relevant professional experience helpful but not required.
- Active eCampus account

Students must abide by the policies and regulations of the Department of Industrial and Systems Engineering and Computer and Information Services of Texas A&M University.

COURSE OBJECTIVES
The student will learn the key principles of leading and managing in systems engineering organizations. The course will provide both the theoretical underpinnings and the practical tools needed to effectively lead and manage technical people engaged in complex engineering efforts. The content will focus on both the “hard” skills (systems engineering life cycle, strategic planning, project selection, organizational structure, decision-making, network scheduling techniques, and financial analysis) and the “soft” skills (effective leadership styles, motivation and psychological type, managing creative people, negotiation, and navigating informal networks). The goal of the
course is to equip students with the broad range of knowledge and skills relevant to leading and managing in the complex organizations of the 21st century.

COURSE SCHEDULE
The course is divided into four distinct but interrelated modules: (1) Leading Technical People and Organizations, (2) Managing Engineering Projects, (3) System Development and Life Cycle Management, and (4) Engineering Systems in Business and Society.

TOPICS TO BE COVERED

- Week 1 . . . . Introduction to Management and Leadership in Engineering Systems
- Week 2 . . . . Formal Organization and Informal Networks
- Week 3 . . . . Organizational Culture, Motivation, and Psychological Type
- Week 4 . . . . Managing Engineering Teams, Negotiation, and Conflict Resolution
- Week 5 . . . . Strategic Planning and Technological Forecasting
- Week 6 . . . . Project Selection (RFIs, Contracts, Decision-Making, Real Options)
- Week 7 . . . . Project Organization, Planning, and Control
- Week 8 . . . . Cost and Schedule Evaluation
- Week 9 . . . . Technology Policy and History of Large-Scale System Development
- Week 10 . . . Stakeholder Analysis and System Requirements
- Week 11 . . . . Systems Engineering Life Cycle and Life Cycle Properties
- Week 12 . . . Tools/Approaches, Configuration Management, System-of-Systems
- Week 14 . . . Student Presentations and the Future of Engineering Systems
- Week 15 . . . Finals

EXAMINATIONS
The two exams will cover both the assigned readings and the material presented in class. The exams will consist primarily of problems on specific topics and short essay questions focused on synthesizing concepts covered throughout the semester. The final exam must be taken by all students at the date and time specified by the University. According to the final exam schedule, it will be held on TBD in the regular classroom.

If an examination is missed, you must have a written authorized excuse. If possible, notify the instructor in advance of the evaluation. Otherwise, do so within 2 days of your return to campus. Makeup evaluations will be administered in accordance with University Rules (Rule 7 at http://student-rules.tamu.edu/rule07).

PROJECT
Each student will submit and present a report relating the concepts from the course to his/her own current or intended career. The emphasis of the project will be on applying engineering management principles to actual situations that you are likely to encounter in the real world.
CASE STUDIES
Several individual and team-based case studies will be assigned on a sporadic basis either as homework or as in-class exercises. These case studies are intended to assist you in applying the principles and ideas learned in the course.

GRADING
Exams: 60% of grade
Project: 20% of grade
Case Studies: 20% of grade

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

The above scale represents the minimum range necessary to achieve each grade, but the actual grades will likely be based on a curve determined by class average and standard deviation.

Important Note on Attendance: Although attendance will not be formally included as part of your final grade, the exams will include certain topics covered only in class. In addition, some team casework will be completed during class time and will be included as part of the grade. As with a job in industry, you will be responsible for all work and all topics discussed regardless of your attendance. If you foresee an unavoidable absence, you are strongly encouraged to discuss it with the instructor in advance. [http://student-rules.tamu.edu/rule07](http://student-rules.tamu.edu/rule07).

TEAMS
This course will involve working in teams, primarily on the assigned case studies. The teams will be formed during the first class day of the second week or after the roster is stable (no more add/drops). Teams will be formed by the instructor such that individuals may be working in concert with students that they do not know or do not know well. This policy is intended to prepare you for a basic reality of industry – that you will regularly work in teams not of your choosing. In general, the teams will consist of 4 to 6 individuals.

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

If a student has the need for the special services provided by the University, please discuss this privately with the professor the first week of the course.
ACADEMIC INTEGRITY
The Aggie Honor Code states that "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/ and http://student-rules.tamu.edu/aggiecode.

STUDENT RULES
The following web site contains specific information pertaining to student conduct and other important issues: http://student-rules.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 (DDS, MD, JD, PharmD, DVM)
2. Request submitted by (Department or Program Name): ISEN
3. Course prefix, number and complete title of course: ISEN 670 Theory of Socio-Technical Systems
4. Catalog course description (not to exceed 50 words): Philosophy, origins, theory, principles, and methodologies of complex socio-technical systems; emphasis on holistic thinking for systems engineering; systems approach; cybernetics; complexity science; physical and biological systems; social, economic, and political systems; network representations of systems; real-world decision-making; system dynamics; emergent behavior; systems architecture; engineered systems today and in the future.

5. Prerequisite(s): Graduate classification
   Cross-listed with: SYEN 643
   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:
   - 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)
     M.S., M.Eng., D.Eng., or Ph.D. in any College of Engineering Department; any other graduate student with instructor approval (main focus: Ph.D., M.S., and M.Eng. in Industrial Engineering; M.S. in Engineering Systems Management; Ph.D. in Interdisciplinary 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)
   | ISEN | 670 | THRY SOCIO TECH SYSTEMS
   | Lect. | Lab | Other | SCH | CIP and Fund Code | Admin. Unit | Acad. Year | ERE Code
   | 3.00 | 0.00 | 0.00 | 3.00 | 1427010006 | 1622 | 15 | - | 16 | 0 | 0 | 3 | 6 | 3 | 2 |
   <br>Approval recommended by:
   <br>Cesar O. Malone 12/3/14
   <br>Department Head or Program Chair (Type Name & Sign) Date
   <br>John Criscione 1/15/15
   <br>Chair, College Review Committee
   <br>Date
   <br>John Criscione 1/15/15
   <br>Dean of College
   <br>Date
   <br>Mark Zoran 2-24-15
   <br>Chair, GC or IUC
   <br>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
ISEN 670 Theory of Socio-Technical Systems

COURSE INFORMATION
ISEN 670 Theory of Socio-Technical Systems
Fall 2015
Section 600, Wednesdays 4:10 - 7:00 pm
Class Location: Emerging Technologies Building (ETB) Room 3027

COURSE DESCRIPTION
This course introduces the student to the philosophy, origins, theory, principles, and methodologies of complex socio-technical systems. The purpose of the course is to develop and foster the type of holistic thinking needed to be an effective systems engineer.

TEXTBOOKS
This course is built on weekly assigned readings, but there is no single required textbook. For each week, a few articles and/or book excerpts are designated as assigned reading. Each week’s assigned readings have been chosen based on three criteria: (1) their relevance to the week’s theme, (2) their importance to the development of the field of socio-technical systems, and (3) their combination of intellectual depth and accessibility to readers from a variety of backgrounds. Many of the optional readings (when listed) also follow these criteria, but some provide more depth and rigor on certain concepts discussed in class. Students are encouraged to explore these additional readings according to their own schedules and interest.

TEACHING STAFF
Dr. Mark S. Avnet – Course Organizer and Primary Instructor
Office: ETB 4075 Office Hours: Th 1:00 - 3:00 pm or by appointment
E-mail: avnet@tamu.edu (Please include “ISEN 670” in the subject line)

PREREQUISITES
• Graduate Classification
• Demonstrated interest in complex socio-technical systems and permission of instructor.
• Relevant professional and/or research experience helpful but not required.
Students must abide by the policies and regulations of the Dwight Look College of Engineering and Computer and Information Services of Texas A&M University.

SYSTEMS ENGINEERING SEMINAR SERIES
This course will be run concurrently with a Systems Engineering Seminar Series sponsored by the Department of Industrial and Systems Engineering and the Dwight Look College of Engineering. The seminar will take place on Wednesdays, 1:50-2:40 pm in ETB 4002. During most weeks, one of the guest speakers in the course will deliver the seminar for that week. Students are strongly encouraged (but not required) to attend the seminar each week.
COURSE OBJECTIVES
The primary objective of this course is to introduce students to the key principles behind the theory of complex socio-technical systems. To achieve this objective, it is essential that students learn about the foundations of complex systems from an interdisciplinary perspective. As such, the course draws on literature from a wide array of fields, including engineering, physics, biology, complexity science, economics, sociology, psychology, political science, and management. Course topics range from the general and abstract to the applied and immediately relevant. Topics covered include foundations of the “systems approach,” human/machine interaction, complexity science, emergence and hierarchy, dynamics and control, human decision-making, uncertainty, and system architecture. The course also includes discussions of several particular types of systems, including space systems, healthcare systems, energy systems, and manufacturing systems. During the semester, the student will develop a holistic view of systems (broadly defined) and an appreciation for the inherent complexity of the modern world.

COURSE SCHEDULE
This course will survey the diverse set of topics related to the general theory of complex socio-technical systems. In the first unit (Weeks 1-4), the theoretical basis and origins of the study of complex systems and the “systems approach” are introduced, and methods for defining and modeling systems problems are discussed. The second unit (Weeks 5-8) focuses on uncertainty and the design and development of complex engineered systems from a full life cycle perspective that incorporates social, economic, and political factors. In the third and final unit (Weeks 9-14), the discussion will turn to case studies of particular classes of socio-technical systems, and students will focus on team project preparation. The course will involve extensive reading covering both depth and breadth. The instruction will be highly participative and discussion-oriented with lecture being limited to brief introductions to unfamiliar topics. Guest speakers will be involved in each class session to provide an array of perspectives on course topics and to engage students in thoughtful discussion about course material.

The weekly topics to be covered during the course are:
• Week 1: Structure and Dynamics of Socio-Technical Systems
• Week 2: Human/Machine Interaction in Complex Engineered Systems
• Week 3: Understanding and Formulating Systems Problems
• Week 4: Bottom-Up Systems Modeling: Agents, Emergence, and Networks
• Week 5: Uncertainty, Risk, and Safety in Socio-Technical Systems
• Week 6: Dealing with Uncertainty: Flexibility and Real Options
• Week 7: System Architecture and Modularity in Engineering Design
• Week 8: Complexity and Human Decision Making
• Week 9: Lean Engineering
• Week 10: Healthcare Systems
• Week 11: Final Team Project Meetings with Instructor (No Class Session)
• Week 12: Energy Systems
• Week 13: Final Report Preparation (No Class – Thanksgiving Holiday)
• Week 14: Social and Organizational Systems
REFLECTION PAPERS
Students will be asked to submit a one- to two-page reflection paper about the assigned reading for each week by noon on the day of the corresponding class session. The format for the paper is open-ended, but it should focus on insights and key learnings from a synthesis of all of the week’s readings taken together. Students might find it helpful to draw on prior research and work experience, other courses taken, and readings from earlier in the semester in developing their reflections. These papers will form the basis for discussion at the beginning of each class session. Every week, a different student will be asked to initiate discussion by presenting a brief summary of his/her reflection paper to the class.

PROJECT
Early in the semester, students will form teams of 3-4 based on common interests, research areas, and/or career fields. Each team will formulate a problem that applies the principles of complexity and socio-technical systems to a particular area of interest. The project should focus on some aspect of analyzing, modeling, and/or designing complex socio-technical systems. Each team will submit a paper of approximately 25 pages. Although there will not be a formal in-class presentation for the final project, students will be encouraged to draw on their project topics during in-class discussions throughout the semester.

GRADING
Weekly One-Page Reflection Papers and In-Class Discussion: 60%
Final Team Project on Analyzing/Modeling a Complex Socio-Technical System: 40%

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

Important Note on Attendance: In a course of this nature, class attendance, participation, and the timely completion of assignments is critical. Specifically, class attendance is an individual student responsibility. Absences that permit making up a major examination or the timely fulfillment of a written assignment will be authorized by the instructor. The exception is University Calendar excused absences or sickness supported by a letter from an authorized physician. For more information on University Excused Absences, attendance, and make up opportunities, please see University Student Rule 7: http://student-rules.tamu.edu/rule07.

STUDENTS WITH DISABILITIES
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services (visit http://disability.tamu.edu, call 845-1637, or go to Cain Hall Room B118).
If a student has the need for the special services provided by the University, please discuss this privately with the professor the first week of the course.

ACADEMIC INTEGRITY
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STUDENT RULES
The following web site contains specific information pertaining to student conduct and other important issues: http://student-rules.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 (DDS, MD, JD, PharmD, DVM)
2. Request submitted by (Department or Program Name):
   Department of Nuclear Engineering
3. Course prefix, number and complete title of course:
   NUEN 657 Emergency Response Dose Assessment
4. Catalog course description (not to exceed 50 words):
   The US Nuclear Emergency Response program; assessment of radiation doses to the public and emergency responders following an event; Topics include U.S. response teams, radiocology, U.S. guidelines, dose assessment techniques and useful software packages; capstone exercise simulating a radiological release.

5. Prerequisite(s):
   NUEN 309 or equivalent, and Graduate classification

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 (CLMP)

11. This course will be:
    a. required for students enrolled in the following degree programs(s) (e.g., B.A. in history)
       None
    b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)
       Undergraduate general academics

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

13. Prefix  | Course # | Title (excluding punctuation) |
          |          | EM Response Dose Assmrt       |
          | NUEN 657 |                                   |

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<th>Lect.</th>
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<th>CIP &amp; Fund Code</th>
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Approval recommended by:

[Signatures and dates]

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra-williams@tamu.edu
Curricular Services – 07/14
NUEN 657: Nuclear Emergency Response Topic and Dose Assessment  
Spring 2015  
TR 11:10 – 12:00

COURSE DESCRIPTION
This course will provide students information on the United States Nuclear Emergency response program. The overall objective of this class is to provide the students the knowledge on how to asses radiation dose to the public and emergency responders following an event. Topics will include US response teams, the National Response Framework, US guidelines, radioecology, dose assessment techniques and useful software packages. The course will culminate with a Capstone exercise simulating a radiological release with the class being graded on how well they can evaluate doses and how they would advise decision makers.

COURSE LEARNING OUTCOMES
The primary goal of this course is to educate the student and increase their understanding how the United States government will respond to disaster that includes a radioactive release. Students will also be able to:
1. understand and evaluate radioactive release, deposition and airborne data to provide radiation dose estimates for the public and first responders.
2. understand how these values relate to current US guidelines.
3. use a variety of software packages used by the US emergency response teams.

PREREQUISITES
NUEN 309 or equivalent or Graduate classification

INSTRUCTOR
Professor: Craig Marianno, Ph.D.  
Title: Visiting Assistant Professor  
Office: 335M Zachry  
Phone: (979) 845-6093  
Email: marianno@tamu.edu  
Office Hours: Tuesdays 9 – 11 (Open door)
GRADING POLICIES
Students will be graded on participation, homework, a mid-term exam, and a final. Homework will be assigned throughout the semester.

The student’s grade will be based on the following criteria:

10% - Participation
40% - Homework
20% - Midterm
30% - Final

The grades will be determined on the following scale:
A - 90.00-100.00
B - 80.00-89.99
C - 70.00-79.99
D - 60.00-69.99
F - 0.00-59.99

All homework assignments are due at the start of class. Late homework will be deducted 10% per day after the due date, unless it is due to a university excused absence. In all such cases, a student will be expected to submit a “Texas A&M University Explanatory Statement for Absence from Class” form available at http://attendance.tamu.edu.

ATTENDANCE POLICY
The university views class attendance as an individual student responsibility. Students are expected to attend class and to complete all assignments. In all such cases for University Excused absences, a student will be expected to submit a “Texas A&M University Explanatory Statement for Absence from Class” form available at http://student-rules.tamu.edu/rule07.

TEXTBOOK
There is 1 required text for the course:

The instructor’s notes will be the principle source of information for the course. These notes will be supplied to the students in MS PowerPoint format.
## COURSE TOPICS

**NUEN 689 Class Schedule Spring 2015**

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<thead>
<tr>
<th>Date</th>
<th>Lecture</th>
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<tbody>
<tr>
<td>20-Jan</td>
<td>Class Introduction</td>
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<tr>
<td>22-Jan</td>
<td>Intro to the NRF</td>
</tr>
<tr>
<td>27-Jan</td>
<td>NRF cont’d</td>
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<tr>
<td>29-Jan</td>
<td>RER Assets 1</td>
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<tr>
<td>3-Feb</td>
<td>RER Assets 2</td>
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<td>5-Feb</td>
<td>FRMAC</td>
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<td>10-Feb</td>
<td>Dose</td>
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<tr>
<td>12-Feb</td>
<td>Terrestrial Transport</td>
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<tr>
<td>17-Feb</td>
<td>Terrestrial Transport cont’d/Atmospheric</td>
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<tr>
<td>19-Feb</td>
<td>HOTSPOT</td>
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<td>24-Feb</td>
<td>HOTSPOT</td>
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<tr>
<td>26-Feb</td>
<td>Intro to NARAC</td>
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<td>3-Mar</td>
<td>RASCAL</td>
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<td>5-Mar</td>
<td>RASCAL</td>
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<td>10-Mar</td>
<td>Intro to ResRad</td>
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<td><strong>12-Mar</strong></td>
<td>Midterm</td>
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<td>17-Mar</td>
<td>Spring Break</td>
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<tr>
<td>19-Mar</td>
<td>Spring Break</td>
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<tr>
<td>24-Mar</td>
<td>Monitoring and Sampling</td>
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<td>26-Mar</td>
<td>RadResponder</td>
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<tr>
<td>31-Mar</td>
<td>Field Exercise</td>
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<td>2-Apr</td>
<td>Field Exercise</td>
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<tr>
<td>7-Apr</td>
<td>Dose Assessment Manual</td>
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<td>9-Apr</td>
<td>Dose Assessment Manual Techniques</td>
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<td>14-Apr</td>
<td>DAM Tech Cont’d</td>
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<td>16-Apr</td>
<td>TURBO FRMAC</td>
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<td>21-Apr</td>
<td>TURBO FRMAC</td>
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<td>23-Apr</td>
<td>TURBO FRMAC Class Exercise</td>
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<td>28-Apr</td>
<td>International Emergency Response</td>
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<tr>
<td>5-May</td>
<td>Reading Day</td>
</tr>
<tr>
<td>7-May</td>
<td>Capstone Final</td>
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ONLINE COURSE MATERIAL
All of the material for this course will be maintained on Texas A&M University’s WebCT Vista system. This includes an electronic copy of this syllabus, the course schedule, all lecture notes, laboratory procedures, lab worksheets, supplemental readings, and assignments. The instructor will use the WebCT Vista email system and discussion board to communicate important messages to the students. Students should check their email often to keep updated on current messages. Also, the student’s grades will be posted on the WebCT Vista system, and the students can use this system to check their grades at any time. The WebCT system can be accessed through elearning.tamu.edu. If you are unfamiliar with this system, instruction will be provided.

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

COPYRIGHTS
The handouts used in this course are copyrighted. By "handouts" we mean all materials generated for this class, which include but are not limited to syllabi, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless the author expressly grants permission.

ACADEMIC INTEGRITY
All students at Texas A&M University are bound by the Aggie Honor Code:

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

For more information, the student is referred to the Honor Council Rules and Procedures on the web at http://aggiehonor.tamu.edu.

As commonly defined, plagiarism consists of passing off as one’s own the ideas, work, writings, etc., that belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules [http://student-rules.tamu.edu/], under the section “Scholastic Dishonesty.”
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): Oceanography
3. Course prefix, number and complete title of course: OCNG 655 Experimental Design and Analysis in Oceanography
4. Catalog course description (not to exceed 50 words): Elements of experimental design in oceanography; logistics of data collection, critical evaluation of field sampling strategies and formulating field studies suitable for hypothesis-based inquiries using the standard linear regression model, the analysis of variance, and principal component analysis

5. Prerequisite(s): Permission of instructor.

Cross-listed with: Stacked with: GEOS 470

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. Oceanography

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

13. Prefix  Course #  Title (excluding punctuation)
    OCNG  655  EXP DESIGN AND ANALYSIS OCNG

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Approval recommended by:
Debbie Thomas  Department Head or Program Chair (Type Name & Sign)  Date

Approved by:
Eric Rigg  Chair, College of Ocean Science  Date
Kate Miller  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 – 07/14
COURSE SYLLABUS

OCNG 655: EXPERIMENTAL DESIGN AND ANALYSIS IN OCEANOGRAPHY

Term: Fall 2015 Semester
Meeting Days: Tuesday and Thursday
Meeting Room: O&M Building Room 617
Time: 2:20-3:35 PM
Three credit hours

Instructor:
Dr. Steven F. DiMarco, Professor and Ocean Observing Team Lead
Department of Oceanography
3146 TAMU
Office: 702D Eller O&M Building
OCNG Phone: 979-862-4168 or GERG Phone: 979-458-9323
Email: sdimarco@tamu.edu
Office Hours: TR 1:20-2:20 PM or by appt., 702D
Admin. Assistant: Ms. Laura Caldwell, 979-845-1231 lcaldwell@geos.tamu.edu

Objective:
To provide the basic tools and techniques to collect, process, analyze, and visualize data sets commonly found in the geosciences.

Catalog description: Elements of experimental design in oceanography; logistics of data collection, critical evaluation of field sampling strategies and formulating field studies suitable for hypothesis-based inquiries using the standard linear regression model, the analysis of variance, and principal component analysis

Prerequisite: Graduate status. Permission of instructor.

Grading Policy:
50% homework problem sets (5), 30% Data Analysis Project and 20% final exam.

Grades will be based on the following grading system: 90-100%=A, 80-89%=B, 70-79%=C, 60-69%=D, <60=F.

Learning Outcomes:
By taking this course, the student, upon completion, will be able to:
1. Perform basic and advanced statistical analysis (linear regression, ANOVA, spectra, multi-variable) of data sets commonly found in the geosciences,
2. Write medium-length (100-150 lines) computer programs in the MATLAB programming language to statistically analyze geosciences data,
3. Produce graphical representations of geosciences data,
4. Interpret graphical and tabular representations of geosciences data,
5. Quantify basic statistical metrics of geosciences data,
6. Apply the scientific method to formulate testable hypotheses,
7. Design experiments to test hypotheses, and
8. Assess error and statistical uncertainty and significance of statistical outcomes calculated from observational data.
10. Prepare a technical report summarizing processing and analysis techniques and scientific interpretations of analyzed datasets of the DAP.

Attendance Policy:
Please refer to http://student-rules.tamu.edu. Please see Part 1: Academic Rules, #7 Attendance. If you would like a copy of the rule it will be provided to you.

Course Topics/Listing:

Weeks 1-2.
    Introduction to Environmental/Geosciences data
    Probability and statistics in the geosciences
    Case Studies: El Nino – Southern Oscillation, Hurricane Andrew

Weeks 3-4
    Parametric and nonparametric statistics
    Distributions and expectation
    Central Limit Theorem
    Case studies: climatology and drought

Week 5
    Summary statistics
    Confidence intervals
    National Data Centers: National Climate Data Distribution Center and National Ocean Data Center

Week 6
    The scientific method
    Framing and Testing Hypotheses
    Parametric analysis
    Graphical visualization of scientific data
    Representations: Eulerian versus Lagrangian data, scatterplots, histograms, vector distributions
    Case studies: coastal water quality, Texas Deadzone

Week 7
    Linear regression
    Error estimation and confidence intervals
    Temporal and spatial scale estimation
    Case Studies: Deep ocean, Bioturbation of marine sediment
Weeks 8
- Sampling methods and measurement theory basics.
- Experimental design
- Degrees of freedom and sample independence
- Outliers and data quality
- Case Studies: winds and currents of the Texas coast

Week 9-11
- Basic quantitative metrics of data analysis
- Analysis of variance
- Case Studies: Texas Drought, North Atlantic Oscillation

Weeks 12
- Time series methods of geosciences data
- Tidal/harmonic analysis
- Fourier expansion and spectra
- Data reduction, filtering, and smoothing of geosciences data
- Case Studies: Sea level height, river discharge


Final Exam (written).

Students are encouraged to bring and use their own data sets for class projects.

Data Analysis Project (DAP) milestones:
- Topic Selection: 1 page, describing topic and introduction of problem and major issues
  9 September 2015
- Draft Analysis Plan: 2-3 pages, description of data and methodologies to be employed
  9 October 2015
- Preliminary Results: 2-4 pages of preliminary graphs and draft interpretation of results
  10 November 2015
- Extended Report Outline: 5 pages showing main, subtopics and key points for DAP
  1 December 2015
- Report Deadline: 15 pages
  16 December 2015

List of assignments and exams:
- Weekly reading assignments. (Biweekly quizzes on readings)
- Homework 0. Problem set due (approximately) 3 September.
- Homework 1. Problem set due (approximately) 17 September.
- Homework 2. Problem set due (approximately) 8 October
- Homework 3. Problem set due (approximately) 27 October
- Homework 4. Problem set due (approximately) 12 November
**Course Calendar:**

**1 September**
Course Introduction. Summary of course objectives and goals, policies, resources and textbook.
Reading Assignment: Chapter 1, pages 3-10

**3 September**
Reading Assignment: Chapter 1, pages 11-15.
**Homework 0 due.**

**8 September**
Reading Assignment: Chapter 1, pages 15-24. Handout on scientific programming.

**10 September**

**15 September**
Reading Assignment: Chapter 2, pages 31-39.

**17 September**
**Homework 1 due.**
Reading Assignment: Chapter 2, pages 41-46

**22 September**
Reading Assignment: Chapter 2, pages 46-56.

**24 September**
Reading Assignment: Chapter 3, pages 57-78.

**29 September**
Reading Assignment: Chapter 4, pages 79-89.

**1 October**
OCNG 655 Experimental Design and Analysis in Oceanography

Dr. Steven F. DiMarco

Course Syllabus

Topic: Framing Hypotheses and the Scientific Method.

6 October
Reading Assignments: Chapter 9, pages 239-250.

8 October
**Homework 2 due.**
Topic: Data Analysis. Regression and the Linear Model
Reading Assignment: Chapter 9, pages 250-258.

13 October
Reading Assignment: Chapter 9, pages 250-281.

15 October
**Midterm** (written). In class. Chapters 1-4, 9 (Regression)
Reading Assignment: Chapter 6, pages 137-155.

20 October
Topic: Designing successful field studies.
Reading Assignment: Chapter 6, pages 156-162.

23 October
Topic: Replications, independence and randomization.
Reading Assignment: Chapter 7, 163-204

27 October
**Homework 3 due.**
Topic: Categorical and continuous variables. Sampling Designs and the Road to ANOVA
Reading Assignment: Chapter 10, pages 289-299.

29 October
Topic: ANOVA Design and assumptions. Hypothesis testing with ANOVA. Partitioning the sum of squares.
Reading Assignment: Chapter 10, pages 300-324.

3 November
Topic: Constructing ANOVA tables
Reading Assignment: Chapter 10 pages 315-335.

5 November
Topic: Random and Fixed Factors. Plotting and understanding ANOVA interaction terms.
Reading Assignment: Chapter 10, pages 335-348.
10 November
Topic: Plotting and Comparing Means. ANOVA Wrap-up
Reading Assignment: Handout on Time-series Analysis.

12 November
**Homework 4 due.**
Reading Assignment: Chapter 12, pages 383-387, Appendix 523-534.

17 November
Topic: Multivariate data and Matrix Algebra.
Reading Assignment: Chapter 12, pages 387-405.

19 November
Topic: Multivariate data. Principal Component Analysis: concepts
Reading Assignment: Chapter 12, pages 406-427.

24 November
Topic: Ordination: PCA and Factor analysis: theory
Reading Assignment: review notes.

26 November No class.

1 December
Topic: Examples of PCA In Geosciences
Reading: Chapter 12 pp 429-437.

3 December
Topic: Classification and Cluster Analysis
Reading: Review notes.

8 December
Topic: Wrap up Multivariate Analysis and review
**Homework 5 due.**

16 December, 01:00 PM
Final Exam. Chapters 7, 9, 10, 12. Appendix.

**Textbook:**
**Required**

**Recommended**
*Geostatistics Explained: An Introductory Guide for Earth Scientists*. S. McKillup and M. D.


Resources:
Access to University computing resources, e.g. Virtual Desktop. MATLAB access through University site license.

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

Copyright and Plagiarism Policy

All materials generated for 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 with research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Students Rules, student-rules.tamu.edu, under the section “Scholastic Dishonesty.”

For more information regarding plagiarism in GEOS 470, please see the instructor or the handout “Assignment Guidelines”.

Know the Code.
Aggie Code of Honor: “An Aggie does not lie, cheat, or steal, or tolerate those who do.”
http://aggiehonor.tamu.edu
COURSE SYLLABUS

GEOS 470-500: DATA ANALYSIS METHODS IN GEOSCIENCES

Fall 2014 Semester
Meeting Days: Tuesday and Thursday
Meeting Room: TM
Time: 4:00-5:15 PM
Three credit hours: 400-level course

Instructor:
Dr. Steven F. DiMarco, Professor and Ocean Observing Team Lead
Department of Oceanography
3146 TAMU
Office: 702D Eller O&M Building
OCNG Phone: 979-862-4168 or GERG Phone: 979-458-9323
Email: sdimarco@tamu.edu
Office Hours: TR 1:30-2:30 PM or by appt., 702D
Admin. Assistant: Ms. Laura Caldwell, 979-845-1231 lcaldwell@geos.tamu.edu

Objective:
To provide the basic tools and techniques to collect, process, analyze, and visualize data sets commonly found in the geosciences.

Course description:
The course is logically divided into segments that parallel the stages a student is likely to encounter while performing research in the geosciences. The student will be taken from conceptualization of a scientific problem, data collection and processing, to appropriate analysis techniques, and finally to data archiving and management. The approach is multi-disciplinary with emphasis on real-world applications from environmental, atmospheric, and oceanographic sciences. There will be basic instructions in the use of the MATLAB scientific programming language to solve problems.

Grading Policy:
Undergraduate students: 50% homework problem sets (5), 10% Quizzes (Biweekly), 20% midterm exam, and 20% final exam.

Graduate students are exempt from taking the midterm and from quizzes but are required to complete a Data Analysis Project constituting 30% of the grade. 50% homework problem sets (5), 30% Data Analysis Project, and 20% final exam.

Grades for both undergraduate and graduate students will be based on the following grading system: 90-100%=A, 80-89%=B, 70-79%=C, 60-69%=D, <60=F.
Learning Outcomes:
By taking this course, the student, upon completion, will be able to:
1. Perform basic statistical analysis (linear regression, ANOVA, spectra, multi-variable) of
data sets commonly found in the geosciences,
2. Write short computer programs in the MATLAB programming language to statistically
analyze geosciences data,
3. Produce graphical representations of geosciences data,
4. Interpret graphical and tabular representations of geosciences data,
5. Quantify basic statistical metrics of geosciences data,
6. Apply the scientific method to formulate testable hypotheses,
7. Design experiments to test hypotheses, and
8. Assess error and statistical uncertainty and significance of statistical outcomes calculated
from observational data.

Prerequisites:
Advanced Undergraduate: U3 or U4. Engineering Math I. (or concurrently). Graduate
students: require instructor approval.

Attendance Policy:
Attendance. If you would like a copy of the rule it will be provided to you.

Course Topics/Listing: (with approximate schedule)

Weeks 1-2.
Introduction to Environmental/Geosciences data
Probability and statistics in the geosciences
Case Studies: El Nino – Southern Oscillation, Hurricane Andrew

Weeks 3-4
Parametric and nonparametric statistics
Distributions and expectation
Central Limit Theorem
Case studies: climatology and drought

Week 5
Summary statistics
Confidence intervals
National Data Centers: National Climate Data Distribution Center and National
Ocean Data Center

Week 6
The scientific method
Framing and Testing Hypotheses
Parametric analysis
Graphical visualization of scientific data
GEOS 470: Data Methods in Geosciences

Dr. Steven DiMarco

Course Syllabus

Representations: Eulerian versus Lagrangian data, scatterplots, histograms, vector distributions
Case studies: coastal water quality, Texas Deadzone

Week 7
Linear regression
Error estimation and confidence intervals
Temporal and spatial scale estimation
Case Studies: Deep ocean, Bioturbation of marine sediment

Midterm

Weeks 8
Sampling methods and measurement theory basics.
Experimental design
Degrees of freedom and sample independence
Outliers and data quality
Case Studies: winds and currents of the Texas coast

Week 9-11
Basic quantitative metrics of data analysis
Analysis of variance
Case Studies: Texas Drought, North Atlantic Oscillation

Weeks 11-12
Time series methods of geosciences data
Tidal/harmonic analysis
Fourier expansion and spectra
Data reduction, filtering, and smoothing of geosciences data
Case Studies: Sea level height, river discharge


Finals Week: Final Exam (written). In class.

Students are encouraged to bring and use their own data sets for class projects.

List of assignments and exams:
Weekly reading assignments. (Biweekly quizzes on readings)
Homework Problems 0. Problem set due (approximately) 4 September.
Homework Problems 1. Problem set due (approximately) 18 September.
Homework Problems 2. Problem set due (approximately) 9 October
Homework Problems 3. Problem set due (approximately) 28 October
Homework Problems 4. Problem set due (approximately) 13 November
Homework Problems 5. Problem set due (approximately) 9 December
Course Calendar:

2 September
Course Introduction. Summary of course objectives and goals, policies, resources and textbook.
Reading Assignment: Chapter 1, pages 3-10

4 September
Reading Assignment: Chapter 1, pages 11-15.

9 September
Reading Assignment: Chapter 1, pages 15-24. Handout on scientific programming.

11 September

16 September
Reading Assignment: Chapter 2, pages 31-39.

18 September
Homework 1 due.
Reading Assignment: Chapter 2, pages 41-46

23 September
Reading Assignment: Chapter 2, pages 46-56.

25 September
Reading Assignment: Chapter 3, pages 57-78.

30 September
Reading Assignment: Chapter 4, pages 79-89.

2 October
Topic: Framing Hypotheses and the Scientific Method.

7 October
Reading Assignments: Chapter 9, pages 239-250.

9 October
Homework 2 due.
Topic: Data Analysis. Regression and the Linear Model
Reading Assignment: Chapter 9, pages 250-258.

14 October
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Midterm (written). In class. Chapters 1-4, 9 (Regression)
Reading Assignment: Chapter 6, pages 137-155.

21 October
Topic: Designing successful field studies.
Reading Assignment: Chapter 6, pages 156-162.

23 October
Topic: Replications, independence and randomization.
Reading Assignment: Chapter 7, 163-204

28 October
Homework 3 due.
Topic: Categorical and continuous variables. Sampling Designs and the Road to ANOVA
Reading Assignment: Chapter 10, pages 289-299.

30 October
Topic: ANOVA Design and assumptions. Hypothesis testing with ANOVA. Partitioning the sum of squares.
Reading Assignment: Chapter 10, pages 300-324.

4 November
Topic: Constructing ANOVA tables
Reading Assignment: Chapter 10 pages 315-335.

6 November
Topic: Random and Fixed Factors. Plotting and understanding ANOVA interaction terms.
Reading Assignment: Chapter 10, pages 335-348.
11 November
Topic: Plotting and Comparing Means. ANOVA Wrap-up
Reading Assignment: Handout on Time-series Analysis.

13 November
Homework 4 due.
Reading Assignment: Handout on Time-series Analysis.

18 November
Reading Assignment: Handout on Harmonic Analysis.

20 November
Topic: Harmonic Analysis.
Reading Assignment: Chapter 12, pages 383-387, Appendix 523-534.

25 November
Topic: Multivariate data and Matrix Algebra.
Reading Assignment: Chapter 12, pages 387-405.

27 November
Thanksgiving Holiday. No class.

2 December
Topic: Multivariate data. Principal Component Analysis.
Reading Assignment: Chapter 12, pages 406-427.

4 December
Topic: Ordination: PCA and Factor analysis.
Reading Assignment: review notes.

9 December
Homework 5 due.
Topic: Wrap up Multivariate Analysis and review

17 December 1-3 PM
Final Exam. Chapters 5, 6, 7, 10, Appendix. Time-series notes.

Textbook:
Required

Recommended
Geostatistics Explained: An Introductory Guide for Earth Scientists. S. McKillup and M. D.


**Resources:**
Access to University computing resources, e.g. Virtual Desktop. MATLAB access through University site license.

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

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http://www.tamu.edu/aggiehonor/
December 1, 2014

MEMORANDUM

TO: Office of the Registrar

THROUGH: Dr. Chris Houser
AOC Dean, College of Geosciences

THROUGH: Dr. Eric Riggs
Assistant Dean, Graduate Affairs and Diversity, College of Geosciences

FROM: Dr. Debbie Thomas
Department Head
Department of Oceanography

SUBJECT: New Course OCNG 655 to be stacked with GEOS 470

OCNG 655 is the first in our data analysis course sequence. Until now, the graduate students needing this course were offered a 685 with this instructor where they would attend the GEOS 470 classes and do the extra work for graduate. We are formalizing this by creating OCNG 655 and stacking it with GEOS 470. The OCNG 655 syllabus shows the graduate work in italics throughout. If you have any questions please contact our Academic Advisor Missy Matthews by email at missy@tamu.edu, or by phone at 979-845-7688.
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 (DOS, MD, JD, PharmD, DVM)

2. Request submitted by (Department or Program Name):
   - Department of Veterinary Small Animal Clinical Sciences
   - VSCS 697 Teaching Anatomy Lab

3. Course prefix, number and complete title of course:

4. Catalog course description (not to exceed 50 words):
   - Theory and practical aspects of teaching anatomy lab, with emphasis on content, instructional methods and practical aspects of anatomy lab. May be repeated for credit. Prerequisite: Graduate classification in VIBS/VSCS; appointment as a TA for VIBS anatomy lab.

5. Prerequisite(s):
   - Appointment as a TA for VIBS
   - Stacked with:
   - Cross-listed courses require the signature of both department heads.

6. Is this a variable credit course? ☑ No
   - If yes, from _______ to _______

7. Is this a repeatable course? ☑ Yes
   - 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? ☑ S/U
    - ☑ P/F (CLMD)

11. 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)
   - MS in Biomedical Science

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

13. Prefix: VSCS
    - Course #: 697
    - Title: Teaching Anatomy Lab

<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>
<th>HCE Code</th>
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<td>0 0 3 6 3 2</td>
</tr>
</tbody>
</table>

Approval recommended by:
Sharon Kerwin
Department Head or Program Chair
Date: 1 Nov 2013

Chair, College Review Committee
Date: 11-21-14

Dean of College
Date: 2-31-15

Associate Director, Curriculum Services
Date: 6-4-14

Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-2111 or sandra.williams@tamu.edu.

Curricular Services • 07/14
Course title and number: VSCS 697 Teaching Anatomy Lab
Term: Fall 2015
Meeting times and location:
- Lecture M/W 9-9:50 (room 201)
- Lab M/W/Th 1-2:50 and 3-4:50 (anatomy lab)

Course Description and Prerequisites

Theory and practical aspects of teaching anatomy lab, with emphasis on content, instructional methods and practical aspects of anatomy lab. May be repeated for credit. Prerequisites: Graduate classification in VIBS/VSCS; appointment as a TA for VIBS anatomy lab.

Course Learning Outcomes

By the end of this class, students will be able to:
- Prepare anatomy laboratories for veterinary students
- Show veterinary students important anatomic structures
- Apply classroom management strategies in the facilitation of a course within your discipline
- Develop a reflective and purposeful approach to teaching
- Apply anatomic knowledge to surgical scenarios

Instructor Information

Co-Instructors

Name: Kelley Thieman Mankin
Telephone number: 979-845-2351
Email address: kthieman@cvm.tamu.edu
Office hours: By appointment
Office location: VSCS 2001

Name: Anton Hoffman
Telephone number: 979-845-5948
Email address: AHoffman@cvm.tamu.edu
Office hours: By appointment
Office location: VMS 156 (adjacent to anatomy lab)

Grading Policies

This course will be graded. Student grades will be determined by development of a teaching portfolio and participation. Participation grades will be determined based on laboratory attendance, and interaction with the veterinary students, specifically the ability to assist and explain anatomy to the veterinary students. Knowledge of the anatomy of the dog and cat based on prosection and assistance during laboratory will also be used to determine the final grade. The teaching portfolio will consist of the TA's reflective teaching statement which will include his/her personal teaching philosophy, strategies and objectives. Further, the portfolio will include suggested activities to improve instruction. The instructor will evaluate the teaching portfolio. Following the completion of the course, the TA will be able
to include documentation of teaching in the form of student evaluations.

Grading scale
A = 90-100%
B = 80-89%
C = 70-79%
D = 60-69%
F = ≤59%

Attendance and Make-up Policies

Students are expected to attend all laboratories and complete all assignments. Students are highly encouraged to attend all lectures. [http://student-rules.tamu.edu/rule07]

Course Topics, Calendar of Activities, Major Assignment Dates

This course will progress through the anatomic analysis of small animals. The course will begin with prosection times for TA familiarity. The superficial structures will be identified and studied. As the course proceeds, deeper structures will be identified and studied. Exams are not given. Prosection times and days are flexible. The students will follow the calendar provided. TAs are expected to attend each laboratory session and be prepared by performing prosections ahead of schedule.

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture</th>
<th>Lab (corresponds to pages in Guide to the Dissection of the Dog)</th>
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<tbody>
<tr>
<td>8/25-29</td>
<td>Course expectations Osteology, body regions, thoracic limb joints</td>
<td>1-26</td>
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<tr>
<td>9/1-5</td>
<td>Arthrology, synovial structures Myology; pelvic limb joints</td>
<td>27-53</td>
</tr>
<tr>
<td>9/8-12</td>
<td>Stifle joint; clinical features Axial skeleton</td>
<td>54-69</td>
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<tr>
<td>9/15-19</td>
<td>Endochondral ossification; clinical features Vertebral ligaments IV discs; trunk muscles</td>
<td>70-92</td>
</tr>
<tr>
<td>9/22-26</td>
<td>Thorax; pleura; respiratory muscles Respiratory mechanisms; clinical features</td>
<td>92-119</td>
</tr>
<tr>
<td>9/29-10/3</td>
<td>Circulatory principles; heart Heart; PMI's; pericardium</td>
<td>120-136</td>
</tr>
<tr>
<td>10/6-10/10</td>
<td>Peritoneum; inguinal canals; reproductive system Testicular descent</td>
<td>137-158</td>
</tr>
<tr>
<td>10/13-10/17</td>
<td>Male reproductive – spermatic cord/ castration Male reproductive – penis</td>
<td>159-172</td>
</tr>
<tr>
<td>10/20-24</td>
<td>Selected clinical features of digestive system Female reproductive – anatomy / OHE</td>
<td>173-192</td>
</tr>
<tr>
<td>11/3-7</td>
<td>Nervous system – spinal nerves Nervous system- autonomic nervous system Exam 3</td>
<td>208-229</td>
</tr>
<tr>
<td>11/10-14</td>
<td>Head- skull, joints and sinuses Head – teeth, dental formulae</td>
<td>230-244</td>
</tr>
<tr>
<td>11/17-21</td>
<td>Head – pharynx, larynx and swallowing Cranial nerves; clinical features</td>
<td>245-256</td>
</tr>
<tr>
<td>11/24-28</td>
<td>Clinical anatomy of the cat Clinical anatomy of the cat review</td>
<td>Cat anatomy</td>
</tr>
<tr>
<td>12/1-5</td>
<td>Cranial nerves; clinical features Fatal circulation; clinical conditions</td>
<td>257-261</td>
</tr>
</tbody>
</table>
Americans with Disabilities Act (ADA)

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Academic Integrity

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

Resources

VIBS 910 Class Notes, Anton Hoffman, 2013


Center for Teaching Excellence at Texas A&M University. Cte.tamu.edu


Center for Teaching Excellence http://cte.tamu.edu/