New Course Requests:

CSCE 635. AI Robotics. (3-1). Credit 3. This course is an introduction and survey of artificial intelligence methods for mobile robots (ground, aerial, or marine) for science and engineering majors. It covers both the theory and the practice of unmanned systems, focusing on biological and cognitive principles which are often quite different from control theory formulations.

ECEN 711. Sustainable Energy and Vehicle Engineering. (3-0). Credit 3. Forms of sustainable and unsustainable energy resources and the basic system engineering limits of each; specific problems of sustainable transportation energy will be discussed on the bases of vehicle and power engineering. Issues related to energy efficiency, life cycle analysis, global warming, pollution, economic and social considerations will be discussed. Prerequisite(s): Graduate standing in Engineering.

ECEN 720. High-Speed Links Circuits and Systems. (3-1). Credit 4. This course covers system and circuit design of high-speed electrical and optical link systems. Topics include channel properties, communication techniques, and circuit design of drivers, receivers, equalizers, and synchronization systems. The course project consists of link design with a statistical bit error rate simulator and interface circuit design. Prerequisite(s): ECEN 474.

NUEN 662. Nuclear Materials under Extreme Conditions. (3-0). Credit 3. Fundamentals of materials degradation under reactor environments; linkage from radiation induced microstructure changes to materials thermal properties, mechanical properties, corrosion resistance, swelling, creep, and overall integrities; materials issues of nuclear fuel, cladding, out-core structural components and waste storage managements. Prerequisite(s): Graduate classification or approval of instructor.

NUEN 663. Fundamentals of Ion Solid Interactions. (3-0). Credit 3. Fundamentals of neutron and ion interactions with solid state materials, and subsequent damage cascade formation, defect clustering, and structural changes; electronic stopping and nuclear stopping mechanisms based on classic and quantum mechanics treatments; development of basic modeling capabilities to carry out simulations for relevant research topics. Prerequisite(s): Graduate classification or approval of instructor.

PETE 684. Professional Internship. (0-0). Credit 4. Training under the supervision of practicing professional engineers in settings appropriate to the student.
Texas A&M University

Departmental Request for a New Course
Undergraduate • Graduate • Professional
Submit original form and attach a course syllabus.

1. Request submitted by (Department or Program Name):
Department of Computer Science and Engineering

2. Course prefix, number and complete title of course:
CSCE 635 AI Robotics

3. Catalog course description (not to exceed 50 words):
This course is an introduction and survey of artificial intelligence methods for mobile robots (ground, aerial, or marine) for science and engineering majors. It covers both the theory and the practice of unmanned systems, focusing on biological and cognitive principles which are often quite different from control theory formulations.

4. Prerequisite(s):

Cross-listed with: Stacked with:

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

5. Is this a variable credit course?  □ Yes  ☑ No
   If yes, from ________ to ________

6. 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

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

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

9. Prefix Course # Title (excluding punctuation)

<table>
<thead>
<tr>
<th>Lect.</th>
<th>Lab</th>
<th>SCH</th>
<th>CIP and Fund Code</th>
<th>Admin. Unit</th>
<th>Acad. Year</th>
<th>FICE Code</th>
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Approval recommended by:

Donald K. Friesen
9/5/11

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

Chair, College Review Committee
9/7/11

Dean of College
9/7/11

Chair, OCI or UCCI
9/11/2011

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 – 3/10

2 of 25
Course title and number: CSCE 635 AI Robotics
Term (e.g., Fall 200X): Fall 2011
Meeting times and location: T/Th

Course Description and Prerequisites
This course is an introduction and survey of artificial intelligence methods for mobile robots (ground, aerial, or marine) for science and engineering majors. It covers both the theory and the practice of unmanned systems, focusing on biological and cognitive principles which are often quite different from control theory formulations. The course emphasizes software organization and algorithms.

Programming. Students should be competent in Java or C. No prior knowledge of AI or robotics is required.

Learning Outcomes or Course Objectives
Programming projects may be either done on CRASAR ground or aerial robots or on robots being used for thesis research. Specific Objectives. By the end of the Fall Semester, the student should be able to:

- describe the different levels of teleoperation and autonomy
- describe the 4 primitives of AI robotics (sense, act, plan, learn) and how those are represented within a hybrid deliberative/reactive architecture
- understand the major ways of organizing and combining behaviors in behavior-based systems
- list the most common sensors, their strengths and weakness and state of the art
- show familiarity with the major path planning and simultaneous localization and mapping (SLAM) algorithms
- understand the dimensions and facets of coordination of teams of robots
- be able to discuss the merits of affective computing and the principles of human-robot interaction.

Instructor Information
Name: Robin R. Murphy
Telephone number: 979-845-8737
Email address: Murphy@cse.tamu.edu
Office hours: 
Office location: 333 H.R.Bright Building
Textbook and/or Resource Material
The required textbook is Introduction to AI Robotics by Murphy, MIT Press. This book is under revision and additional material will be supplied. Due to instructor travel, some lectures will be provided as podcasts.

Grading Policies
Tests (3, approximately 1X month): 30% Literature Survey: 15% Behavioral programming project (mid-term): 25% Final programming project: 30%

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<td>F</td>
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Course Topics, Calendar of Activities, Major Assignment Dates

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Required Reading</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Automation &amp; Autonomy</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Architectures, teleoperation</td>
<td>2,4,7</td>
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<tr>
<td>4</td>
<td>Biological Behaviors</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Behavioral Control</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Locomotion</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Sensing</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>Case studies of Behavioral Robots</td>
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<tr>
<td>9</td>
<td>Topological Navigation</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>SLAM</td>
<td>11</td>
</tr>
<tr>
<td>11</td>
<td>Learning and Natural language</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Human-robot interaction</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Multi-agents: tasks and teams</td>
<td>8</td>
</tr>
<tr>
<td>14</td>
<td>Case studies of Deliberative Robots; Ethics</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Project Reviews</td>
<td></td>
</tr>
</tbody>
</table>

Other Pertinent Course Information
Americans with Disabilities Act (ADA) Policy Statement

The following ADA Policy Statement (part of the Policy on Individual Disabling Conditions) was submitted to the University Curriculum Committee by the Department of Student Life. The policy statement was forwarded to the Faculty Senate for information.

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, the 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.

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 such handouts, unless the author expressly grants permission.

Scholastic Dishonesty

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 the 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/rule20.htm], under the section "Academic Misconduct".

Academic Integrity Statement

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

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

On all course work, assignments, and examinations at Texas A&M University, the following Honor Pledge shall be preprinted and signed by the student: "On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."
Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional
Submit original form and attach a course syllabus.

1. This request is submitted by the Department of
   Electrical and Computer Engineering

2. Course prefix, number and complete title of course:
   ECEN 711 Sustainable Energy and Vehicle Engineering

3. Catalog course description (not to exceed 50 words):
   Forms of sustainable and unsustainable energy resources and the basic system engineering limits of each; specific problems of sustainable transportation energy will be discussed on the bases of vehicle and power engineering. Issues related to energy efficiency, life cycle analysis, global warming, pollution, economic and social considerations will be discussed.

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

5. Is this a variable credit course? □ Yes □ No
   If yes, from _______ to _______

6. 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

7. 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 engineering)

M.S., M.E.N, Ph.D. in Engineering

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

9. Prefix Course # Title (excluding punctuation)
   ECEN 711 Sustainable Energy

   Lect. Lab SCH CIP and Fund Code Admin. Unit Acad. Year HCE Code
   0 3 0 0 0 3 1 4 1 0 0 1 0 0 0 6 0 9 3 6 1 1 - 1 2 0 0 3 6 3 2

   Approval recommended by:
   Dr. C. Georgiades Date 9/9/11
   Department Head - Type Name & Sign
   Date
   Department Head - Type Name & Sign
   (if cross-listed course)
   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 – 3/09
Course title and number        ECEN 711 Sustainable Energy and Vehicle Engineering
Term (e.g., Fall 200X)         Spring 2012
Meeting times and location

Course Description and Prerequisites

Forms of sustainable and unsustainable energy resources and the basic system engineering limits of each; specific problems of sustainable transportation energy will be discussed on the bases of vehicle and power engineering. Issues related to energy efficiency, life cycle analysis, global warming, pollution, economic and social considerations will be discussed.

Learning Outcomes or Course Objectives

The students will develop critical judgments about sustainable energy production, sustainable vehicle technologies, sustainable energy utilization, and their associated costs and complexities.

Instructor Information

Name                        Mehrdad Ehsani
Telephone number            845-7582
Email address               ehsani@ece.tamu.edu
Office hours                Wed. 10-12
Office location             216F ZEC

Textbook and/or Resource Material

Hand outs and instructor book manuscript

Grading Policies

<table>
<thead>
<tr>
<th>Mini Projects</th>
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<tr>
<td>Class Participation</td>
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<td>Term Project</td>
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<td>TOTAL:</td>
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Grade Distribution:

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<td>60 - 69</td>
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Course Topics, Calendar of Activities, Major Assignment Dates

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<tr>
<th>Week</th>
<th>Topic</th>
<th>Required Reading</th>
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<tr>
<td>1</td>
<td>Introduction to Energy and Environment</td>
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<tr>
<td>2</td>
<td>Conversion of Energy</td>
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</tr>
<tr>
<td>3</td>
<td>Energy and Power Relationship</td>
<td>Hand out</td>
</tr>
<tr>
<td>4</td>
<td>Human Needs for Energy</td>
<td>Hand out</td>
</tr>
<tr>
<td>5</td>
<td>Industrial Use of Energy</td>
<td>Hand out</td>
</tr>
<tr>
<td>6</td>
<td>Impact of User Energy Efficiency on Energy Sustainability</td>
<td>Hand out</td>
</tr>
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<td>7</td>
<td>The Relationship Between the Load and the Source of Power</td>
<td>Hand out</td>
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<td>8</td>
<td>Matching Loads and Sources of Power</td>
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<td>9</td>
<td>Sustainable Energy</td>
<td>Hand out</td>
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<td>10</td>
<td>Engineering of Near Term Sustainable Energy Conversion</td>
<td>Hand out</td>
</tr>
<tr>
<td>11</td>
<td>Wave and Tidal Power Production</td>
<td>Hand out</td>
</tr>
<tr>
<td>12</td>
<td>Vehicles</td>
<td>Hand out</td>
</tr>
<tr>
<td>13</td>
<td>Closed Cycle Carbon Based Bio Fuel Transportation Complex</td>
<td>Hand out</td>
</tr>
<tr>
<td>14</td>
<td>Future</td>
<td>Hand out</td>
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</tbody>
</table>

Other Pertinent Course Information

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

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
Texas A&M University

Departmental Request for a New Course
Undergraduate • Graduate • Professional

Submit original form and attach a course syllabus.

Electrical and Computer Engineering

1. This request is submitted by the Department of 

   **ECEN 720  High-Speed Links Circuits and Systems**

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

3. Catalog course description (not to exceed 50 words):
   
   This course covers system and circuit design of high-speed electrical and optical link systems. Topics include channel properties, communication techniques, and circuit design of drivers, receivers, equalizers, and synchronization systems. The course project consists of link system design with a statistical bit error rate simulator and interface circuit design.

4. Prerequisite(s):

   Cross-listed with:

5. Is this a variable credit course? □ Yes ☑ No

   If yes, from _____ to _____

6. Is this a repeatable course? □ Yes ☑ No

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

    If yes, this course may be taken _____ times.

7. 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 electrical and computer engineering

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

   Attach approval letters.

9. Prefix | Course # | Title (excluding punctuation)

   | ECEN 720 | HIGH SPEED LINKS CIRCUIT |

   | Lec. | Lab | SCH | CRIP and Fund Code | Admin. Unit | Acad. Year | FICE Code |

   | 0 | 3 | 0 | 1 | 0 | 9 | 3 | 1 |

   Approval recommended by:

   Dr. Costas Georgiades

   Department Head - Type Name & Sign

   Date

   Chair, College Review Committee

   Date

   Dean of College

   Date

   Dean of College

   Mark J. Zoran

   Date

   Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-6201 or sandra.williams@tamu.edu.
ECEN 720: High-Speed Links Circuits & Systems

Spring 2012
Meeting Times & Location TBD
http://www.ece.tamu.edu/~spalermo/ecen689.html

Instructor: Sam Palermo
Office: 315-E WERC
Office Hours: TBD
Phone: 458-4114
E-mail: spalermo@ece.tamu.edu

Prerequisite: ECEN 474 or Approval of Instructor

Textbook: Class Notes and Technical Papers

References:

Class Notes:
- Posted on the web and will hand out hard copies in class

Objectives: At the end of this course, students be able to
1. Understand high-speed electrical and optical channel properties, modeling, measurements, and communications techniques
2. Understand the design specifications and implementation details of high-speed serial link circuits such as drivers, receivers, equalizers, and synchronization systems.
3. Understand link system design utilizing statistical bit-error-rate analysis and modeling tools.
4. Understand the challenges and some of the link architectures proposed to realize electrical and optical serial link standards.

Grading:
- Exams 50%
  o Two Midterm Exams (25% each), No Final Exam
  o Closed book
  o One double sided 8.5x11 note sheet allowed
  o No make-up exams except for university excused absences
- Lab/Homework 25%
  o Labs (Prelab + Report) and homework assignments are weighted equally
  o You are encouraged to work together with your colleagues on the homework and labs. However, each student must turn in an independent write-up.
  o Assignments due at beginning of class/lab
  o No late assignments will be graded
- Final Project 25%
Grading Policy:

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<td>C</td>
<td>79.99 ≥ x ≥ 70.00</td>
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<tr>
<td>D</td>
<td>69.99 ≥ x ≥ 60.00</td>
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<tr>
<td>F</td>
<td>59.99 ≥ x</td>
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Outline & Preliminary Schedule

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<th>Week</th>
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<tr>
<td>I. Channels</td>
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<tr>
<td>II. Communication Techniques</td>
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<tr>
<td>III. Equalizers</td>
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<tr>
<td>IV. Transmitter/Receiver Circuits</td>
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<tr>
<td>V. Equalizer Circuits</td>
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<tr>
<td>VI. Clocking Circuits</td>
<td>Week 8-14</td>
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<tr>
<td>VII. Clocking Systems</td>
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<tr>
<td>VIII. Link Modeling</td>
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<td>IX. Link Examples</td>
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<tr>
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*Exam dates are approximate and subject to change with reasonable notice.

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

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

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

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

Departmental Request for a New Course
Undergraduate • Graduate • Professional
• Submit original form and attach a course syllabus.

Form Instructions

1. Request submitted by (Department or Program Name): Nuclear Engineering

2. Course prefix, number and complete title of course: NUEN 662 Nuclear Materials under Extreme Conditions

3. Catalog course description (not to exceed 50 words): Fundamentals of materials degradation under reactor environments; linkage from radiation induced microstructure changes to materials thermal properties, mechanical properties, corrosion resistance, swelling, creep, and overall integrities; materials issues of nuclear fuel, cladding, out-core structural components and waste storage managements.

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

   Cross-listed with: N/A
   Stacked with: 

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

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

6. 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 [ ]

7. 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. and Ph.D. in Nuclear Engineering

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

9. Prefix | Course # | Title (excluding punctuation) | Lect. | Lab | SCL | CIP and Fund Code | Admin. Unit | Acad. Year | FICE Code | Approval recommended by: 
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | Raymond J. Juzenas: Department Head or Program Chair (Type Name & Sign) | Date: 6/22/11

| | | | | | | | | | | Robin Autenrieth: Chair, College Review Committee | Date: 8-10-11

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

Submitted to Coordinating Board by:

Associate Director, Curricular Services

Date: Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu.
Course title and Number: NUEN 662 – Nuclear Materials under Extreme Conditions
Term (e.g., Fall 200X): Spring 2012
Meeting times and location: To be determined

Course Description and Prerequisites

This course will review fundamentals of materials degradation under reactor environments. The course will provide a linkage from radiation induced microstructure changes to materials thermal properties, mechanical properties, corrosion resistance, swelling, creep, and overall integrities. Materials issues of nuclear fuel, cladding, out-core structural components and waste storage managements will be covered.

Prerequisites: Graduate classification or approval of instructor

Learning Outcomes or Course Objectives

Instructor Information

Name: Lin Shao
Telephone Number: 845-4107
Email address: Ishao@tamu.edu
Office Hours: Open door policy
Office Location: ZACH 122E

Textbook and/or Resource Materials

Reference Texts:


Course Web Page: WebCT
(Lectures, HW information, selected readings and grades posted here)

Grading Policies

The course grade will be based upon homework assignments and three exams.

Homework 30%
Exam I 20%
Exam II 20%
Final Exam 30%

The grades will be determined on the following scale:

A = 90-100%
B = 80-89%
C = 70-79%
D = 60-69%
F = below 60%
Homework: Homework will be assigned in-class with a 1-week turnaround time.

Guidelines for homework preparation:
- Show all work, not just the final answer.
- Present your work neatly (extremely "messy" work will not be graded)

Final Exam: The final exam may consist of true/false questions, multiple choice questions, short answer problems, and problem solving calculations.

Course Topics, Calendar of Activities, Major Assignment Dates

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>• Reactor Materials Properties and Requirements</td>
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<tr>
<td>2</td>
<td>• Displacements and Damage Cascade Formation</td>
<td>HW1</td>
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<tr>
<td>3</td>
<td>• Atomic Diffusion and Thermal Dynamics of Diffusion</td>
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<td>4</td>
<td>• Defect Clustering, Void Formation and Swelling</td>
<td>HW2</td>
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<td>5</td>
<td>• Solid State Transformation: Dislocation interaction and recrystallization</td>
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<tr>
<td>6</td>
<td>• Solid State Transformation: Precipitation</td>
<td>HW3, Exam I</td>
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<tr>
<td>7</td>
<td>• Stress Analysis</td>
<td></td>
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<tr>
<td></td>
<td>• Macroscopic Aspects of Fractures and Fracture Mechanics</td>
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<tr>
<td>8</td>
<td>• Radiation Hardening</td>
<td>HW4</td>
</tr>
<tr>
<td></td>
<td>• Fracture and Creep</td>
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<tr>
<td>9</td>
<td>• High Temperature Alloys</td>
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<tr>
<td>10</td>
<td>• Irradiation Embrittlement</td>
<td>HW 5</td>
</tr>
<tr>
<td></td>
<td>• Materials Decay and Phase Segregation</td>
<td></td>
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<tr>
<td>11</td>
<td>• Materials Issues in Fuel Materials, and Cladding Materials</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>• Materials Issues in Control, Shielding and Safety System Materials</td>
<td>HW 6</td>
</tr>
<tr>
<td>13</td>
<td>• Materials Issues in Piping System and Pressure Vessel</td>
<td>Exam II</td>
</tr>
<tr>
<td>14</td>
<td>• Materials Issues of Next Generation Reactors</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>• Final Exam</td>
<td>Date follows university schedule</td>
</tr>
</tbody>
</table>

Other Pertinent Course Information

None

Americans with Disabilities Act (ADA)

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

Academic Integrity

For additional information please visit: [http://www.tamu.edu/aggiehonor](http://www.tamu.edu/aggiehonor)

"An Aggie does not lie, cheat, or steal, or tolerate those who do."
Texas A&M University

Departmental Request for a New Course
Undergraduate ▶ Graduate ▶ Professional

Submit original form and attach a course syllabus.

1. Request submitted by (Department or Program Name): Nuclear Engineering
2. Course prefix, number and complete title of course: NUEN 663 Fundamentals of Ion Solid Interactions
3. Catalog course description (not to exceed 50 words):
   Fundamentals of neutron and ion interactions with solid state materials, and
   subsequent damage cascade formation, defect clustering, and structural changes; electronic stopping and nuclear stopping mechanisms based
   on classic and quantum mechanics treatments; development of basic modeling capabilities to carry out simulations for relevant research
   topics.

4. Prerequisite(s):
   Graduate classification
   Approval of instructor

5. Cross-listed with: N/A
   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 this course may be taken _______ times.
   Will this course be repeatable within the same semester? □ Yes    □ No

8. 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. and Ph.D. in Nuclear Engineering

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

   Prefix:  NUEN
   Course #: 663
   Title (excluding punctuation): Fundamentals of Ion Solid Interactions

   Lect.  Lab  SCH  CIP and Fund Code  Admin. Unit  Acad. Year  FICE Code
   0  3  0  0  0  3  1  4  2  3  0  1  0  0  0  6  2  0  9  0  1  2  -  1  3  0  0  3  6  3  2

   Approval recommended by:
   Raymond J. Juzaitis
   Department Head or Program Chair (Type Name & Sign) Date

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

   Submitted to Coordinating Board by:
   Associate Director, Curricular Services

   Date

Questions regarding this form should be directed to Sandra Williams at 845-8201 or sandra.williams@tamu.edu.
Course title and Number: NUEN 663 – Fundamentals of Ion Solid Interactions
Term (e.g., Fall 200X): Fall 2012
Meeting times and location: To be determined

Course Description and Prerequisites
This course will review fundamentals of neutron and ion interactions with solid state materials, and subsequent damage cascade formation, defect clustering, and structural changes. The course will focus on details of electronic stopping and nuclear stopping mechanisms based on quantum mechanics treatment, and practice series of modeling approaches to simulate damage creations. The students expect to develop basic modeling capabilities to carry out simulations for their relevant research topics.

Prerequisites: Graduate classification or approval of instructor

Learning Outcomes or Course Objectives

Instructor Information
Name: Lin Shao
Telephone Number: 845-4107
Email address: lshao@tamu.edu
Office Hours: Open door policy
Office Location: ZACH 122E

Textbook and/or Resource Materials

Reference Texts:

Course Web Page: WebCT
(Lectures, HW information, selected readings and grades posted here)

Grading Policies
Grading: The course grade will be based upon homework assignments and three exams.

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>30%</td>
</tr>
<tr>
<td>Exam I</td>
<td>20%</td>
</tr>
<tr>
<td>Exam II</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
</tr>
</tbody>
</table>
The **grades** will be determined on the following scale:

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

**Homework:**

Homework will be assigned in-class with a 1-week turnaround time.

Guidelines for homework preparation:
- Show all work, not just the final answer.
- Present your work neatly (extremely "messy" work will *not* be graded)
- Staple all pages together (2% penalty)

**Final Exam:**

The final exam may consist of true/false questions, multiple choice questions, short answer problems, and problem solving calculations.

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**Course Topics, Calendar of Activities, Major Assignment Dates**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overview of radiation materials science in nuclear reactors and microelectronics</td>
</tr>
<tr>
<td>2</td>
<td>Neutron, electron and gamma ray interactions with solids</td>
</tr>
<tr>
<td>3</td>
<td>Classical ion scattering theory</td>
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<td></td>
<td>Quantum mechanics treatment of ion scattering</td>
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<td>4</td>
<td>Linhard dielectric theory</td>
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<tr>
<td></td>
<td>Nuclear energy loss of ions</td>
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<tr>
<td></td>
<td>Electronic energy loss of ions</td>
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<tr>
<td>5</td>
<td>Defect and impurity diffusion in solids</td>
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<td></td>
<td>Ostwald ripening and defect clustering</td>
</tr>
<tr>
<td>6</td>
<td>Monte Carlo simulation of ion bombardment</td>
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<tr>
<td></td>
<td>Boltzmann transport equation simulation</td>
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<tr>
<td>7</td>
<td>Thermal spike and damage cascade formation</td>
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<td></td>
<td>Molecular dynamics simulation</td>
</tr>
<tr>
<td>8</td>
<td>Boltzmann transport equation</td>
</tr>
<tr>
<td></td>
<td>Kinetic Monte Carlo simulation</td>
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<td>9</td>
<td>Continuum method based rate theory calculation</td>
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<td>10</td>
<td>Sputtering</td>
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<tr>
<td>11</td>
<td>Channeling</td>
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<tr>
<td>12</td>
<td>Ion beam analysis techniques</td>
</tr>
<tr>
<td>13</td>
<td>Ion doping</td>
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<tr>
<td>14</td>
<td>Characterization of irradiated samples</td>
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<tr>
<td></td>
<td>Accelerator development</td>
</tr>
<tr>
<td>15</td>
<td>Final Exam</td>
</tr>
</tbody>
</table>

**Notes**

- HW1
- HW2
- HW3, Exam I
- HW4
- HW5
- Exam II
- HW6

**Other Pertinent Course Information**

None
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Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional
Submit original form and attach a course syllabus.

1. This request is submitted by the Department of Petroleum Engineering

2. Course prefix, number and complete title of course: PETE 684 - Professional Internship

3. Catalog course description (not to exceed 50 words): Training under the supervision of practicing professional engineers in settings appropriate to the student's professional objectives.

4. Prerequisite(s): Graduate classification and one semester of graduate work completed.

Cross-listed with: ____________________________________________________________________________

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

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

6. 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

7. 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., M.E., Ph.D. in Petroleum Engineering or related Engineering

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

9. Prefix Course # Title (excluding punctuation)

<table>
<thead>
<tr>
<th>PETE</th>
<th>684</th>
<th>PROFESSIONAL INTERNALSHIP</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Lect.</th>
<th>Lab</th>
<th>SCH</th>
<th>CIP and Fund Code</th>
<th>Admin. Unit</th>
<th>Acad. Year</th>
<th>FICE Code</th>
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</thead>
<tbody>
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<td>0</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

Approval recommended by: ____________________________________________

Stephen A. Holditch Department Head / Type Name & Sign / Date

Chair, College Review Committee

Dean of College

Dean of College / 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.