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 Industrial and Systems Engineering

2. Course prefix, number and complete title of course: ISEN 660 Quantitative Risk Analysis

3. Course description (not more than 50 words): Fundamental concepts, techniques, and applications of quantitative risk analysis and risk-informed decision making for students in all engineering fields. Practical uses of probabilistic methods are demonstrated in exercises and case studies from diverse engineering areas.

4. Prerequisite(s) Graduate or Senior status Cross-listed with CHEN 660, SENG 660
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 the course be repeated within the same semester/term? ☑ Yes ☐ No

7. Has this course been taught as a 289/489/689? ☑ Yes ☐ No If yes, how many times? ______ Indicate the number of students enrolled for each academic period it was taught.

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)
      B.S., M.S., M.Eng., Ph.D. in 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.

10. Prefix Course # Title (excluding punctuation)

<table>
<thead>
<tr>
<th>Lect.</th>
<th>Lab</th>
<th>SCH</th>
<th>Subject Matter Content Code</th>
<th>Admin. Unit</th>
<th>Acad. Year</th>
<th>FICE Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0300031401010006162008-0903632</td>
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Approval recommended by:

Brett A. Peters 10-25-07
Head of Department

Chair, College Review Committee 11/6/07
Date

Dean of College

Dean of College

Submitted to Coordinating Board by:

Director of Academic Support Services

Questions regarding this form should be directed to Sandra Williams at 845-8836.
OAR/AS – 04/07
DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

660 COURSE SYLLABUS

Number and Title of Course: ISEN 660 Quantitative Risk Analysis

Hours: Theory 3, Practice 0, Total 3, Credits 3

Description of Course (Concise statement of purpose or design): Fundamental concepts, technique, and applications of quantitative risk analysis and risk-informed decision making for students in all engineering fields. Practical uses of probabilistic methods are demonstrated in exercises and case studies from diverse engineering areas.


Prerequisites: none

Grading:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Exam I</td>
<td>17.5%</td>
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<tr>
<td>Exam II</td>
<td>17.5%</td>
</tr>
<tr>
<td>Final</td>
<td>25%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Homework</td>
<td>15%</td>
</tr>
<tr>
<td>Projects</td>
<td>15%</td>
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Objectives
Lean the fundamentals of risk analysis and their utility for engineering applications and risk decisions.

Materials, Exams
Each of the 2-hour exams, Exam I and II will cover about 1/3 of the course applications and will be based on material covered or distributed in class and homework. The Final Exam will be comprehensive and cover all course materials. The text will supplement class lectures, which will include some material that is not covered in the text.

Homework
A homework problem set will be assigned every week and will be due the following week.

Projects
Each team of 3 students will perform and present a project consisting of a literature search, analysis, and a project report with a presentation to involve the entire class in questions and discussions following the presentation.

Course Outline

<table>
<thead>
<tr>
<th>Topic</th>
<th>Text</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>Ch 1,2</td>
<td>4</td>
</tr>
<tr>
<td>Risk concepts; hazard &amp; risk analysis; risk management</td>
<td></td>
<td></td>
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<tr>
<td>2. Quantitative risk assessment (QRA) methods</td>
<td>Ch 3</td>
<td>9</td>
</tr>
<tr>
<td>QRA structure, risk ranking</td>
<td></td>
<td></td>
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<tr>
<td>Logic modeling, fault tree, event tree, dependant failures</td>
<td></td>
<td></td>
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<tr>
<td>Basic reliability mathematics; review of probability</td>
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</tbody>
</table>
3. Performance assessment  
  Equipment data analysis, availability  
  Distribution function parameter estimations  
  Bayesian parameter estimations; classical estimations  
  Human reliability  
4. Uncertainty analysis  
  Uncertainty propagation methods and comparisons  
5. Risk contributors  
  Risk ranking  
  Precursor analysis  
6. Risk values, risk acceptance criteria  
  Individual and societal criteria, ethics  
  Economic risk and performance acceptance criteria  
7. Decision making techniques  
  Economic methods and assessment models  
  Non-economic methods  
8. Risk communication and safety culture  
  Risk perception  
  Effective risk communication  
9. Exams and reviews  
  Two exams outside class hours  

Americans with Disabilities Act (ADA) Policy Statement  
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room 126 of the Koldus Building, or call 845-1637.

Academic Integrity Statement  
"Aggies do not lie, cheat, or steal, nor do they tolerate those who do." It is the responsibility of students and instructors to help maintain scholastic integrity at the university by refusing to participate in or tolerate scholastic dishonesty. (Please see the Honor Council Rules and Procedures at http://www.tamu.edu/aggiehonor)
MEMORANDUM

TO:        Dr. Michael Pishko, Department Head
           Chemical Engineering Department

FROM:      Brett A. Peters  Brett A. Peters
           Department Head

SUBJECT:   ISEN 660  "Quantitative Risk Analysis"

The Industrial and Systems Engineering Department supports SENG 660, "Quantitative Risk Analysis", as proposed by the Chemical Engineering Department. We appreciate working with you in this area and will be processing paperwork to create a new course ISEN 660 to be cross listed with SENG 660.

xc:  Executive Committee, Faculty Senate