Instructor: Dr. Ed Pohl  
Office: 4167 Bell Engineering  
Telephone: 575 - 6029 (Office)  
871-1304 (Cell)  
Email: epohl@uark.edu  
Office Hours: Wednesday 9:30 - 11:0 am  
Thursday 3:00 – 5:00 pm  
by appointment

Required Textbook: *Risk Analysis in Engineering: Techniques, Tools and Trends*  

Additional References:  
*Risk Modeling, Assessment, and Management (3rd Edition)*, 

Prerequisites: Engineering Statistics, INEG 3313 or equivalent

Grading:  
<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
<th>Percentage</th>
<th>Final Grades</th>
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<tbody>
<tr>
<td>Homework/Participation</td>
<td>100</td>
<td>10%</td>
<td>A ≥ 90%</td>
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<tr>
<td>Exams</td>
<td>2 @ 200pts</td>
<td>40%</td>
<td>B 80 – 89%</td>
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<tr>
<td>Paper Reviews/Presentation</td>
<td>2 @ 150pts</td>
<td>30%</td>
<td>C 70 – 79%</td>
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<tr>
<td>Course Project</td>
<td>1 @ 200pts</td>
<td>20%</td>
<td>D 65 – 69%</td>
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<tr>
<td>Total</td>
<td>1000 pts</td>
<td>100%</td>
<td>F ≤ 64%</td>
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All graded material will be returned to students during class. Once a graded item has been returned, you have **48 hours to challenge the grade**. To challenge a grade, you must submit a typed description of the grading error (attached to the graded item) tome. Your description must include your name and e-mail address. I will respond to your challenge within 48 hours of its receipt.

**Course Objective:** Present the engineering student with the fundamentals of modeling risk, analyzing risk, and managing risk in a variety of industrial and government decision making settings, with a focus on the transportation and logistics problem domain. Upon completion of the course, students will have gained an appreciation for the importance of considering risk and uncertainty in their decision making process. Students will understand how to measure risk, quantify uncertainty, how to build risk models, how to define appropriate distributions from data or from expert opinion, model dependencies, and analyze trade-offs in a multi-objective environment using a variety of tools and techniques. Students who complete this course will be capable of modeling and assessing risks as well as have a basic understanding of how to manage risk and make informed decisions in the face of uncertainty in whatever domain they are operating.
Course Policies:

Communication - Students should check their e-mail on a frequent basis. Class announcements including unexpected cancellations will be e-mailed to you. A course web page is located on UA’s Blackboard page at [http://learn.uark.edu](http://learn.uark.edu). You must log onto Blackboard and enter your Courses area. This web page will be used for course-related email and discussion lists, dissemination of materials and access to on-line grades. Students should check this site daily for updates and emails related to the course.

Homework – Homework problems will be assigned periodically. These problems will be due by the stated time on blackboard or in the class period on the assigned due date. Late homework problems will not be accepted unless a documented emergency prevents you from turning it in on time. The purpose of these assignments is to help you learn the course material. It is okay to discuss assignments with other students. *The written solutions to homework must be your own and not copied from anyone else.*

The following guidelines must be followed in preparing your homework for submission.

1. Show *all work* leading to your conclusions.
2. Define all notation not defined in the problem statement.
3. Provide answers in the context of the problem (with appropriate units).
4. Clearly indicate answers.
5. When necessary, provide written interpretations and conclusions from your data.
6. Work from left to right and from the top down.
7. Clearly indicate the breaks between each part of a problem and the breaks between problems.
8. Write neatly. *Use engineering paper for all handwritten work.*
9. Staple all pages together and *number each page.*

My requirements for assignments are *neatness, completeness and correctness*, and I consider these requirements to be equally important.

Course Project

A course project will be assigned later in the semester. **Graduate students** will do *individual* projects, while **undergraduate students** may work in *teams of three*. The projects will focus on modeling, analyzing and developing a management strategy for a student developed case study that utilizes the tools and techniques from the class on a relevant transportation, logistics, security, or infrastructure problem. Details will be provided later in the semester.

Paper Reviews

Graduate students will be required to review three papers from the scholarly literature that discusses advances in risk analysis or demonstrates specific tools and techniques through the use of examples and case studies. The paper reviews should be 2-3 typed pages that summarize the article and demonstrate your understanding of the material. In addition, student will develop a 15 minute PowerPoint presentation on their paper. The presentation should include an illustrative example of the tool or technique discussed in the paper. **Undergraduate students** will work in *teams of two* for each of these assignments.

Inclement Weather - If the University is closed due to inclement weather on the day of a lecture, any assignment (homework or test) scheduled for that day will automatically be re-scheduled for the next lecture.

Academic Honesty - You are expected to read, understand and abide by the university policy on academic honesty. Collaboration is permitted on homework problems. *However, your solutions and write-ups must be your own.*

Software: The software package @Risk will be utilized throughout the semester. Student versions of the software are available on the computers in the Department of Industrial Engineering Faust Laboratory. Students are expected to go through the self paced tutorials on how to use the software. These tutorials are available at the manufacturer’s web site ([www.palisade.com/training/risk45.html](http://www.palisade.com/training/risk45.html)). We will also use some
the Reliasoft tools (FMEA, Fault Trees, RENO, WEIBULL++) in the R³M center during the semester. In class demonstrations will be provided. Other risk tools are available on the web and many have 90 day trial licenses that you can use to explore and possibly use on your course projects.

**Risk Analysis**

**Tentative Course Outline**

The topics to be covered in this course are listed below:

- The Art and Science of Systems and Risk Analysis
- Probability Modeling Fundamentals
- Review of Basic Probability Distributions
- Introduction and Basic Risk Definitions
- Elements of a Risk Assessment
- Probabilistic Risk Assessment
- Performance Assessment: Data Analysis and Modeling
  - Determining Distributions of Variability from Data
  - Determining Distributions from Experts
  - Building a basic Risk Analysis Model
  - Modeling Dependencies
- Uncertainty Analysis
- Identifying, Ranking and Predicting Contributions to Risk
- Representing Risk Value and Risk Acceptance Criteria
- Decision Making Using Risk Information
  - Economic Methods
  - Non-Economic Techniques
- Uncertainty and Sensitivity Analysis
- Risk of Extreme Events and the Fallacy of Expected Value
- Multi-Objective Decisions
- Case Studies
  - Transportation Systems
  - Infrastructure
## Important Dates

<table>
<thead>
<tr>
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<th>Due by COB</th>
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<tbody>
<tr>
<td><strong>Paper One</strong></td>
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<tr>
<td>Presentation One</td>
<td>3 November 2014</td>
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<tr>
<td><strong>One Page Final Project</strong></td>
<td>10 November 2014</td>
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<td>Description</td>
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<td><strong>Paper Two</strong></td>
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<td>Presentation Two</td>
<td>17 November 2014</td>
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<td><strong>Mid Term Exam</strong></td>
<td>26 November 2014</td>
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<tr>
<td><strong>Final Project</strong></td>
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<tr>
<td>Final Presentation</td>
<td>11 December 2014</td>
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<tr>
<td><strong>Final Exam</strong></td>
<td>18 December 2014</td>
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