Instructor
Prof. David Blum

Email and Phone
dblum7@jhu.edu, 703-272-4067 (email preferred)

Class
Lectures: Mondays beginning September 14, 6pm-8:45pm; location WDC Center, 1717 Mass Ave, Rm 207
Final exam: December 14, 6pm

Note that there is no class on September 7, so the first day of class will be the following week on the 14th.

Office Hours
By appointment

Objective
The objective of this class is to introduce you to a set of methods and tools that have been developed to analyze risky events (in other words, events whose occurrence is uncertain and that have consequences associated with them) as they occur in the real world. Outside of the imaginations of classical modelers, trials are not repeated under identical conditions (if at all), there is no such thing as random Gaussian error, and there are very few probabilities that one could argue are objective in any sense of the word. In light of this, the notion of risk as the variance of return is of limited use beyond the financial sector. We approach uncertainty from the point of view of an odds maker, and we employ a logic that treats all uncertainties consistently regardless of their apparent subjectivity. This logic has a variety of applications, from engineering reliability, to ecology and medicine, to government policy, to business, project investment, and finance. My professional experience is in the field of national security, and several of the assigned readings focus on national security applications.

What to Expect
There will be no textbook. Your readings will consist entirely of journal articles that I have selected (all freely and electronically available through the Sheridan Libraries) to teach the core concepts as well as illustrate actual application of those concepts to solve problems, usually three per week, sometimes four. Typically, in the first ~90 minutes or so of class I will give a lecture with the goal of fleshing out the concepts introduced in the readings. The remainder of class will be spent either working through one or two examples of problems in which we apply the concepts presented, or else in the computer lab. I encourage questions and discussion during lecture. This class is heavy on probability and statistics – you are encouraged to review your course notes from classes you have taken on the subject. You will also get a taste of some computer programming, although prior experience with computer programming is by no means required.

Grading Basis
Final exam 40% / project 30% / homework 30%

The final exam will be December 14, and it will be open-note/open-reading. Instead of a midterm, I will assign you a short project, which will require you to analyze the risk associated with a real-world activity or event using the concepts and tools presented in class. (I will provide you with notional data.) You should perform the project in teams of two or three and turn in a single submission for all teammates. Unlike the homework assignments, the project will require you both to formulate problems involving risk in addition to solving them. Please let me know if you have difficulty forming a team.
Class participation is not graded explicitly, but it is a “differentiator”. If you participate in class discussion and in the Blackboard online forum, I will give you the benefit of the doubt if your grade is borderline.

Most weeks I will assign homework problems to go along with your readings. Their purpose is to get you thinking about new concepts as well as how you might apply the theory to solve real world problems. Problems will be graded on a 4 point scale. A rough interpretation of each point is:

4 - you clearly demonstrated grasp of the concepts and/or how to apply them
3 – you demonstrated partial grasp of the concepts, or else I cannot tell whether you grasp them (for instance because you did not show enough of your work)
2 - you did not demonstrate that you grasp the concept
1 - you skipped the problem or made no effort

Homeworks will be due at the time of class and should be submitted electronically via email. If you do any problems by hand, please scan your assignment (and write clearly). I will post answers to the problems a few days after class. Late homeworks will be accepted before the answers are posted but will result in a 10% penalty in the number of possible points. Once the answers are posted, late homeworks will no longer be accepted regardless of reason. If you have a significant extenuating circumstance, contact me before class and I will consider delaying posting the answers.

Technology

We will utilize Blackboard whenever possible. Your assigned readings and homeworks will be posted to Blackboard, as will class announcements, homework solutions, and my lecture notes. (Homeworks, however, should be submitted via email.) Finally, I encourage you to use Blackboard to discuss class-related topics and to ask questions. (Please use good “netiquette.”) I will monitor the forums, and you should do the same.

You will be expected to utilize the following software to solve certain homework problems:

- Norsys Netica, available at www.norsys.com, the free version suffices for class purposes
- Mathworks MATLAB, academic license $99 through www.mathworks.com, possibly available free to JHU students (contact software@jhu.edu for details)

Additionally, you should use MS Excel to solve decision trees, and you are encouraged to obtain a plug-in to automate computation and generate graphics. Two such plug-ins are:

- Treeplan (plugin for MS Excel), cost $59, available at www.treeplan.com
- Simple Decision Tree, free, available at sites.google.com/site/simpledecisiontree/

You may find that you are able to use Python or R in lieu of Netica and MATLAB, given the necessary libraries/toolkits/packages. I will not insist on your using Netica and MATLAB for your assignments, but I will teach using those software platforms in the computer lab, since they are industry-standard in the fields of operations research, decision analysis, and risk analysis. If you use Python, R, or other software platforms not listed above to solve an assignment, the burden is on you, doubly so, to clearly demonstrate your grasp of a concept. Do not assume that I will follow your code.

Policy on collaboration

You are welcome to work in groups on your homework, but you must write up your answers individually and list your collaborators. Please do not abuse this policy -- a “divide-and-conquer” strategy to homework collaboration is not acceptable, nor is it acceptable for the project. If I decide to give any take-home exam problems in connection with the final exam, it is expected that you will not collaborate to solve these questions, as described in the Johns Hopkins University AAP Code of Conduct (http://advanced.jhu.edu/wp-content/uploads/2013/03/AAP1101_CodeofConduct1.pdf).

Schedule

The following schedule is tentative and subject to change. Please note that I expect you to come to the first class on September 14 having completed the assigned readings. Your project will be due on November 2.

Readings are marked with three different letters to assist you in deciding how to approach them. They are listed by number
inside square brackets [ ] in the table below. Those numbers refer to the numbering scheme in this syllabus beginning on the next page. Please be aware that the numbering scheme in Blackboard may be different (the E-Reserves staff assigns numbers to each E-Reserve item on Blackboard, and unfortunately I cannot control what number they assign).

C: Core  You are responsible for knowing the material in these readings. Exam questions will draw on them, and subsequent weeks' readings may build on this material.

E: Examples  These readings demonstrate the implementation of some of material presented in the core readings. They are assigned to assist you in understanding how one might use that material in practice. You will not be tested on them directly, but you may find them helpful to understand how the concepts are applied to problems, such as those on the exam.

O: Optional  These readings go into greater depth on some facet of the core material. We will discuss this material in the classroom, but it will not be tested on the exams.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>09/14/15</td>
<td>Nature of Probability</td>
<td>[9]C (read first) [1]C (focus on logic, not eqs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[13]C (sections 1, 2, 3.1, 3.2, 7 only) [14]O</td>
</tr>
<tr>
<td>3</td>
<td>09/28/15</td>
<td>Decision Analysis</td>
<td>[11]C (pp. 211-217 stop at “Informational Phase”, remainder O) [35]E (focus on sections 2.5, 2.6, 2.7, other sections useful for context) [27]O</td>
</tr>
<tr>
<td>8</td>
<td>11/2/15</td>
<td>Monte Carlo simulation (meet in comp lab)</td>
<td>PROJECT DUE</td>
</tr>
<tr>
<td>11</td>
<td>11/23/15</td>
<td>NO CLASS (Thanksgiving vacation)</td>
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<tr>
<td>13</td>
<td>12/7/15</td>
<td>TBD / Review</td>
<td></td>
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<tr>
<td>14</td>
<td>11/14/15</td>
<td>FINAL EXAM</td>
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We have a very aggressive schedule and are covering material that could fill several graduate level courses. I anticipate that we might fall behind somewhere. Accordingly, week 13 is labeled TBD, and my intention is to use that week to catch up, as well as to review some key concepts before the final.

**Other Notes**

Students with documented disabilities and who require reasonable accommodations should contact the AAP accommodations coordinator list at http://advanced.jhu.edu/current-students/current-students-resources/disability-accommodations/

If you encounter any technical difficulty with Blackboard, please contact the 24hr help desk at 866-311-6658 and email me.
Readings


