Course Description & Philosophy

This is the first part of a two-semester sequence covering the construction and evaluation of actuarial models. Loss Models I covers topics in probability theory relevant to the construction of actuarial models. After a review of random variables and basic probability distributional properties, we will examine severity and frequency loss models. Aggregate loss models, risk measures and the impact of coverage modifications on both frequency and severity will also be discussed. Finally, we will explore various ways of simulating random variables.

The exams (described below) will be based on problems. Most of the course will be geared to helping work through the problems. The lecture will be devoted to explaining the key concepts of the material and working illustrative examples. Throughout the semester students will have the opportunity to demonstrate their understanding through practice problems, quizzes, computer assignments and exams. The course is guided toward the professional actuarial exams; however, the actuarial exams will not determine the entire content or pace of the class. The course syllabus provides a general plan for the course; deviations announced to the class by the professor may be necessary.

Course Objectives

- Understand the foundations of the construction and analysis of mathematical loss models.
- Develop critical thinking to solve complex problems from first principles rather than from memorization.
- Encourage students to present their own analysis in a confident, organized and coherent manner.
- Incorporate examples and problems, both in class and as assignments, that link theory with real world applications.
- Provide an opportunity to use computers in problem solving as computer work is critical for understanding SOA Exam C/CAS Exam 4 material.
- Provide sufficient background for SOA Exam C/CAS Exam 4 where applicable.

Course Materials

- A copy of this text along with its solutions manual is on reserve in the School of Business library.
- The errata link for this text is: http://www.soa.org/files/edu/edu-exam-c-correction-loss-models-4e.pdf
- Supplemental readings and documents available from the class web page or distributed in class. (HO)

Academic Integrity

You are responsible for maintaining the highest standards of integrity in every phase of your academic career. The penalties for academic misconduct are severe, and ignorance is not an acceptable defense. You are expected to understand and uphold the core values of academic integrity of the University of Wisconsin – Madison which is available from the Dean of Students Office or the following website: http://www.students.wisc.edu/doso/academic-integrity/. You are responsible for informing yourself about
these standards before performing any academic work. It is my responsibility to uphold the University’s academic misconduct policy and report my suspicions of misconduct to the Dean of Students Office.

Attendance
Lecture attendance is strongly advised. Exams will be based primarily on material covered in class. Should you miss class for any reason, it is your responsibility to obtain lecture notes from another student.

Personal Electronic Technology
As per the Wisconsin School of Business policy, the use of personal electronic technology (e.g. cell phone, iphone, ipod, ipad, blackberry, laptop computers, tablets, etc.) is not allowed during lectures or exams. We believe that classroom use of such technology can serve as a distraction for the user, classmates, and the instructor, and can hinder instruction and active learning. Please disable your device prior to lectures so it does not become a distraction. You may use a laptop computer for the sole purpose of taking original notes during lecture. If you choose to do so, you must sit in the designated area where laptop computers are allowed. Any student who uses other technology during lecture will simply be asked to leave; consider this as your warning. Any student who uses any of the above mentioned technology during an exam is in violation of the core values of academic integrity of the University of Wisconsin – Madison.

Exam Policy
There will be three exams during the semester, two midterms and one final exam. The midterm exams will not be cumulative, although there is some overlap in material from one midterm to the next. The final exam will be comprehensive, but with an emphasis on the most recent material. Exam topics will be announced the week prior to the exam. All exams will be closed book and closed notes. For all exams, you are also expected to have a small electronic calculator, having at least one memory and capable of taking a logarithm, exponential and square roots. Appendix tables that primarily consist of Appendix A and a portion of Appendix B in the text will be provided. These are the tables that are consistent with the ones used for the professional actuarial exams. Exams will consist of quantitative problems and short answer questions. Exam material will come from lectures, text and any material distributed in class or through the course web page (see below).

Please do not miss an exam. If you should miss a midterm exam because of a University approved excuse (e.g. written medical excuse), your final exam score will be used as the score for the missed exam.

Quizzes
There will be weekly quizzes except for the exam weeks. There will be no make-up quizzes for any missed quizzes. Quizzes are closed-book, closed note except for the appendix tables that will be provided when necessary.

Each weekly quiz will consist of one problem taken directly from the homework assigned during the previous week, or text and lecture examples discussed during the previous week, with at least some numbers simply changed. Quizzes will be during the first ten minutes of class. Your single lowest quiz score will be dropped.

Grade Composition

<table>
<thead>
<tr>
<th>Exam</th>
<th>Weight</th>
<th>Quizzes &amp; Computer Assignments</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>30%</td>
<td></td>
<td>15%</td>
</tr>
<tr>
<td>#2</td>
<td>30%</td>
<td>Final Exam</td>
<td>25%</td>
</tr>
</tbody>
</table>

Grade Scale
Lower bounds for AB, BC, C, and D final grades will be no higher than 90, 80, 70, and 60 percent of the total available points, respectively. All other grades (A, B and F) will be determined at the end of the semester based upon the performance of the class. Grades will be curved if necessary.

WEB Resources
A course page has been established as a means for me to efficiently administer this class. The web page allows you to obtain a copy of the syllabus, obtain lecture notes, link to other important web pages, etc. You are responsible for accessing the course web page on a regular basis. You may log on to the web page through the following address: http://courses.bus.wisc.edu.

Additional, official sample problems and solutions (some with video), provided by the SOA and CAS are available through our own Technology Enhanced Learning in Actuarial Science website devoted to SOA Exam
C/CAS Exam 4 Problems:
http://instruction.bus.wisc.edu/jfrees/UWCAELearn/Lists/Course%20%20Problems/AllItems.aspx
For helpful review of calculus and probability ideas: https://www.khanacademy.org/.

Email
Announcements regarding the class may be sent from me to you via mail. Any announcement sent via email is assumed to be communicated to the entire class. Thus, it is imperative you check your email regularly.
I will answer simple, factual questions via email; however, more thoughtful questions need to be asked during class, office hours, or review sessions. Email is useful for simple communication but is limited in the ability to develop firm understanding of material. Should you need to email me, please type Act Sci 652 in the subject line. Otherwise, your email may be filtered into junk mail. I will respond to individual emails in a reasonable amount of time.

Risk and Insurance Homepage
The address for the Risk and Insurance Department homepage is http://bus.wisc.edu/knowledge-expertise/academic-departments/actuarial-science-risk-management-insurance. For those interested in the major, you should familiarize yourself with this site. Important dates, events, and announcements related to our program appear here, as well as information regarding Career Opportunities, Scholarships, Career Fair, and other important topics.

Actuarial Exam Information
The following websites provide useful information on actuarial exams related to this class.

CAS Spring 2016 Info: http://www.casact.org/admissions/process/
SOA Spring 2016 Info: http://soa.org/education/general-info/

Special Needs
Any student who feels that he or she may need an accommodation for a disability of any sort should consult with me as soon as possible so that appropriate arrangements may be made.
All readings are to be done prior to class. Additional material, such as handouts, notes and announcements, may be retrieved from the course web page or will be distributed in class. Please come prepared.

*The schedule is subject to change. Actual depth of coverage will depend on available time.

**Introduction**

<table>
<thead>
<tr>
<th>Modeling</th>
<th>Chapter 1 (KPW)</th>
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<tbody>
<tr>
<td>Random Variables</td>
<td>Chapter 2 (KPW)</td>
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<tr>
<td>Simulation</td>
<td>Chapter 20.1 (KPW)</td>
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<tr>
<td>Basic Distributional Quantities</td>
<td>Chapter 3 (KPW)</td>
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</table>

**Actuarial Models**

<table>
<thead>
<tr>
<th>Characteristics of Actuarial Models</th>
<th>Chapter 4 (KPW)</th>
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<tr>
<td>Continuous Models</td>
<td>Chapter 5 (KPW)</td>
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<tr>
<td>Discrete Distributions</td>
<td>Chapter 6 (KPW)</td>
</tr>
<tr>
<td>Frequency and Severity with Coverage Modifications</td>
<td>Chapter 8 (KPW)</td>
</tr>
<tr>
<td>Simulation</td>
<td>Chapter 20, Sections 20.2-20.4 (KPW)</td>
</tr>
</tbody>
</table>

**Important Dates**

<table>
<thead>
<tr>
<th>Submit Student Information Form:</th>
<th>Thurs, Jan 21</th>
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<tbody>
<tr>
<td>R and I Department: Dr. Robert Hartwig, CPCU</td>
<td>Tues, Jan 26, Grainger 2239, 6:30 – 7:30p.m.</td>
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<tr>
<td>Exam #1:</td>
<td>Tues, Feb 23 (in class)</td>
</tr>
<tr>
<td>CCLB Spring Semester Case Competition:</td>
<td>Fri, Mar 4, Grainger TBD, 3:30 – 8:30p.m.</td>
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<tr>
<td>No Class (Spring Recess):</td>
<td>Tues, Mar 22 &amp; Thurs, Mar 24</td>
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<tr>
<td>Exam #2:</td>
<td>Tues, Apr 19 (in class)</td>
</tr>
<tr>
<td>R and I Department Spring Banquet:</td>
<td>Fri, Apr 29, Lowell Center, 5 – 9p.m.</td>
</tr>
<tr>
<td>Last Day of Class:</td>
<td>Thurs, May 5</td>
</tr>
<tr>
<td>Final Exam:</td>
<td>Tues, May 10, 7:45 – 9:45a.m.</td>
</tr>
</tbody>
</table>
Name _______________________
Preferred name to be used in class _______________________

Major(s) _______________________
Expected Date of Graduation _______________________

Prior/Concurrent Math Courses (Indicated if you have taken or are taking these courses):
   Math 221 ___ Math 222 ___ Math 234 ___

Prior/Concurrent Statistics Courses (Indicated if you have taken or are taking these courses):
   Math 431 ___ Stat 309 ___ Stat 310 ___ Stat 311 ___ Stat 312 ___

Prior/Concurrent Actuarial Science Courses (Indicated if you have taken or are taking these courses):
   AS/Math 303 ___ AS 300 ___ AS 301 ___ AS 650___ AS 651 ___ AS 654 ___

Please list any other math/stat/actuarial science courses that you have taken or are taking:

Please list any actuarial exams that you have passed:

Please list which actuarial exams you intend to take this Spring 2016:

What did you do during the summer of 2015? (e.g. internship, job, travel, etc.) Please provide some details such as who you worked for and where you worked.

Provide any other interesting information about yourself such as hobbies, hometown or plans for summer 2016.