ASC302: Probability
Section A
Spring 2017
10:00 - 11:50 am TR
BERG 101

Instructor: John Symms
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Email: jsymms@carrollu.edu
Office Hours: 9:00-9:50 am and 4:00-4:50 pm TR, or by appointment
Calculator: Any SOA approved calculator.
Prerequisite: MAT207

Course Overview
This course develops fundamental probability tools for quantitatively assessing risk. Topics include general probability, univariate probability distributions and multivariate probability distributions. Application of these tools to problems encountered in actuarial science is emphasized. In terms of the text, we will cover all topics in sections 0 through 10. You will also attempt to complete all practice problems in the study manual, including all 8 practice exams.

Course Objective
This course will introduce students to the required topics in probability and risk management needed to pass Exam P.

Learning Outcomes
By the end of this course, students should be able to apply the following concepts in a risk management context:

1. General Probability (10-20%)  
   - Set functions including set notation and basic elements of probability
   - Mutually exclusive events
   - Addition and multiplication rules
   - Independence of events
   - Combinatorial probability
   - Conditional probability
   - Bayes Theorem / Law of total probability

1These are direct from the Fall 2016 P syllabus.
2From the syllabus, “The ranges of weights shown are intended to apply to the large majority of exams administered. On occasion, the weights of topics on an individual exam may fall outside the published range. Candidates should also recognize that some questions may cover multiple learning outcomes.”
2. Random Variables with univariate probability distributions (including binomial, negative binomial, geometric, hypergeometric, Poisson, uniform, exponential, gamma, and normal) (35-45%)

- Probability functions and probability density functions
- Cumulative distribution functions
- Sums of Independent Random Variables (Poisson and normal)
- Mode, median, percentiles, and moments
- Variance and measures of dispersion
- Moment generating functions
- Transformations

3. Random Variables with multivariate probability distributions (including the bivariate normal) (35-45%)

- Joint probability functions and joint probability density functions
- Joint cumulative distribution functions
- Central Limit Theorem
- Conditional and marginal probability distributions
- Moments for joint, conditional, and marginal probability distributions
- Joint moment generating functions
- Variance and measures of dispersion for conditional and marginal probability distributions
- Covariance and correlation coefficients
- Transformations and order statistics
- Probabilities and moments for linear combinations of independent random variables

Assessment will be conducted via worked sample problems and exams.

Attendance
Students are expected to attend all classes. Classes will frequently involve activities that will impact your overall grade.

Weekly Effort and Professional Exam Preparation
In studying for Exam FM, you already know that the rule-of-thumb in this industry is that for each hour of an exam, one should study 100 hours. Like FM, Exam P is a three hour exam. Studying means trying to understand content in the textbook, working practice problems or trying to figure them out, deconstructing provided solutions to ferret out errors or to improve understanding, and exam simulations.

Most of you should plan on taking the exam in July 2017, giving you about 5 months to put in 300 hours of studying. I expect you to study at least 8 hours per week outside of class, but if you plan to pass in July, realistically you’ll need to spend more than 8 hours per week.

For purposes of giving a grade for “weekly effort,” a “week” will be defined as the time spanning from the end of a class meeting on a Tuesday to the beginning of the following Tuesday meeting.
Each week keep track of your daily study hours using the “StudyHours” Excel file (available on the portal). Upload your updated Excel file before each Tuesday class meeting.

**Homework Journal**
You will do lots of practice problems. Get a notebook (which we will call your “journal”) to record your work. Bring it to class each week. I will use the notebook weekly to gauge work completed. You can work in groups, if you find working in groups useful, but avoid parasite-host relationships.

**Daily Problems**
On most days you will be given one or two “Daily Problem(s)” to hand in at the start of the next class. These problems will be graded on the following scale: 4 = essentially flawless; 3 = minor errors, but no major errors; 2 = one major error; 1 = at least two major errors; 0 = no attempt or your solution is unintelligible. Late Daily Problems will not be accepted.

**Exams**
Exams will measure both your conceptual understanding of the material and your problem solving skills. There will be three 2-hour comprehensive exams each consisting of 20 multiple choice questions. You may use an SOA approved calculator and approved formula sheets for these exams. No other notes, books, or calculators will be allowed during exams. I expect to give the first two 2-hour exams on February 23 and April 6. The last will be given at 8:00 am on Friday, May 5. If you miss an exam, acceptable written documentation for the absence must be supplied to be eligible for a make-up.

Exams will simulate an actual professional exam, i.e., problems will be multiple choice with five possible answers for each. There will be no penalty for wrong answers. A good rule-of-thumb for passing a professional exam is to get 70% or higher on the problems, so exams will be graded as follows: 70% or higher = 100 points; less than 70% but at least 60% = 80 points; less than 60% but at least 50% = 70 points; less than 50% but at least 40% = 60 points; less than 40% = Actual Score.

**Academic Honesty**
All work on assignments, quizzes and tests is expected to be your own and represent your ability in course content. The Carroll University Academic Integrity Policy is located in your student handbook. Please familiarize yourself with this policy. If a student violates this policy in any way, the instructor or College reserves the right to impose a sanction of failure on the assignments/assessment or failure in the course.

**Grades**
The grading scheme is as follows:

<table>
<thead>
<tr>
<th></th>
<th>Points</th>
<th>Percent Interval</th>
<th>Grade</th>
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<tbody>
<tr>
<td>Weekly Effort</td>
<td>15%</td>
<td>[92, 100)</td>
<td>A</td>
</tr>
<tr>
<td>Homework Journal</td>
<td>15%</td>
<td>[88, 92)</td>
<td>AB</td>
</tr>
<tr>
<td>Daily Problems</td>
<td>20%</td>
<td>[82, 88)</td>
<td>B</td>
</tr>
<tr>
<td>Exam I</td>
<td>15%</td>
<td>[78, 82]</td>
<td>BC</td>
</tr>
<tr>
<td>Exam II</td>
<td>15%</td>
<td>[68, 78]</td>
<td>C</td>
</tr>
<tr>
<td>Exam III</td>
<td>20%</td>
<td>[58, 68)</td>
<td>D</td>
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<tr>
<td>Total</td>
<td>100%</td>
<td>(0, 58)</td>
<td>F</td>
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Final day to drop: Wednesday, April 5.

Carroll Portal (LMS)
This course will use the Carroll Portal for various purposes, including for your grades. Keep track of your grades, and notify the instructor should you spot an error.

Final Notes
1. Special accommodations for this course may be granted via direct orders from the Walter Young Center (WYC). It is your responsibility to notify the WYC of your special needs. (They will require certain forms of verifiable documentation or diagnoses.) Such accommodations will be made only after the instructor has received notification from the WYC, and will not be given retroactively for previous assignments or exams.

2. The instructor and the College reserve the right to modify, amend, or change the syllabus (course requirements, grading policy, etc.) as the curriculum and/or program require(s).