

# MATH 471: ACTUARIAL THEORY I

## FALL 2009

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**INSTRUCTOR:** Name: Paul H. Johnson, Jr.  
Office: 361 Altgeld Hall  
Office phone number: 244-5517  
E-mail address: [pjohnson@illinois.edu](mailto:pjohnson@illinois.edu)  
Office Hours: M 3:00 – 5:00pm, Tu 1:30 – 3:30pm, and by appointment

Please include “MATH 471” in the subject line of any e-mail pertaining to the class. Also, I will not respond to phone calls or e-mails between 9:00pm and 9:00am.

**TEACHING ASSISTANT:** Name: Sha Chen  
E-mail address: [shachen1@illinois.edu](mailto:shachen1@illinois.edu)

**COURSE DESCRIPTION:** This course will analyze the distribution of the time-until-death random variable for a single life, and its implications for evaluations of insurance and annuity functions, net premiums, and reserves. We will cover approximately the first half of the material on Exam MLC, the Life Contingencies Segment of Exam M, of the Society of Actuaries:

Chapter 3: Survival Distributions and Life Tables

Chapter 4: Life Insurance (sections 4.1 – 4.4)

Chapter 5: Life Annuities (sections 5.1 – 5.4)

Chapter 6: Benefit Premiums (sections 6.1 – 6.4)

Chapter 7: Benefit Reserves (sections 7.1 – 7.6)

Markov Chain Models (not in text – refer to Daniel’s handout on course website)

**LECTURES:** Section AL1: MWF 11:00 - 11:50am, 120 Architecture Building  
Section AL2: MWF 1:00 – 1:50pm, 140 Burrill Hall

Lectures will be used to present and illustrate the material in the text and in any course handouts. Homework will also be assigned and collected during lecture.

**DISCUSSION:** Section AD1: R 3:00 – 3:50pm, 341 Altgeld Hall  
Section AD2: R 4:00 – 4:50pm, 341 Altgeld Hall  
Section AD3: R 2:00 – 2:50pm, 343 Altgeld Hall  
Section AD4: R 12:00 – 12:50pm, 145 Altgeld Hall

The discussion sections will be proctored by Sha Chen. In each section, students will work on and present solutions to past actuarial exam questions (Exam MLC, M, 3, etc.) pertaining to the material discussed in lecture. Quizzes will also be given during discussion. All discussion sections will begin on Thursday, September 3.

**PREREQUISITES:** MATH/STAT 408 (Actuarial Statistics I) and MATH 210 (Theory of Interest). **Note: Working knowledge of the material in the two prerequisite courses will be assumed.**

**REQUIRED TEXT:** Bowers et al., *Actuarial Mathematics, Second Edition*, Society of Actuaries, 1997

**COURSE WEBSITE:** On Illinois Compass.  
All announcements, handouts, homework assignments and solutions, quizzes and solutions, midterm and final exam solutions, useful links, and more will be found here. Make sure you check this website regularly.

**CALCULATORS:** Only non-graphing scientific and/or financial calculators are allowed.

**ATTENDANCE:** I encourage you to attend class and to arrive on time. Some of the material covered and many of the examples discussed will only be presented during each lecture.

**IMPORTANT EXAM MLC INFO:** <http://www.soa.org/education/exam-req/edu-exam-m-detail.aspx>

Registration Deadline: Thursday, September 24, 2009 – student fee is \$240.

Exam Date: Tuesday, November 3, 2009 from 8:30-11:30am.

## **GRADING:**

1. **MIDTERMS:** There will be two midterms:

**Midterm 1: Wednesday, September 30, room TBD, 7:00-8:40pm**

**Midterm 2: Wednesday, November 11, room TBD, 7:00-8:40pm**

Note that midterms are not administered during the lecture sections; students in all sections will take each midterm together during the above evening times. Midterms are not cumulative *per se*, but the nature of the material in this course is such that knowledge of concepts from earlier chapters is required to learn and apply concepts in later chapters. I will announce the material to be covered on each midterm at least one week before the exam date. Both midterms are closed book, no notes.

To account for the fact that midterms are scheduled outside of class, there will be no lecture sections held on the following days:

Wed., September 30; Friday, October 2; Wed., November 11; Friday, November 13

There will also be no discussion sections held on:

Thursday, October 1; Thursday, November 12

**MISSED MIDTERM POLICY:** If students cannot take either midterm at its scheduled time, they can take a make-up midterm if they have BOTH a valid excuse and appropriate documentation; documentation must be presented prior to taking the make-up midterm, otherwise, a student may not be allowed to write the midterm. Students with conflicts should let me know as soon as possible and no later than the Friday before the exam to be missed (September 25 for Midterm 1 and November 6 for Midterm 2).

Make-up midterms will be administered around class time on September 30 for Midterm 1 and November 11 for Midterm 2.

2. **FINAL EXAM:** The final exam is scheduled for:

**Friday, December 18, room TBD, 8:00-11:00am**

Students in all lecture sections will take the final exam together. The final exam will be cumulative. You are allowed one “cheat sheet” for the final: both sides of one sheet of standard printer-sized paper (the size of the sheet this syllabus is printed on). If a student has a university-approved reason why they cannot take the final exam at its scheduled time (refer to the Student Code), they will be allowed to take the conflict final, scheduled for:

Tuesday, December 15, room TBD, 1:30-4:30pm

3. **HOMEWORK:** Homework will be assigned each Wednesday and will be due at the START OF CLASS on the following Wednesday. There will be NO make-up homework assignments. Late homework will not be accepted, nor will homework dropped off in my mailbox (unless previously approved by me). I want to emphasize: homework that is turned in after I ask for it in lecture will NOT be accepted (if there is a systematic reason why you cannot turn in your homework on time, I will work to accommodate you). The lowest two homework scores will be dropped and the remaining scores will determine your overall homework grade.

For each homework assignment, only some of the problems will actually be graded – of course, you will not know which problems these are in advance. Homework should be written on sheets of loose-leaf paper and should be neat and organized; points may be taken off if these criteria are not met. It is also preferred that each homework is bound when necessary. I will post solutions to all of the homework problems on the course website shortly after collecting the homework from both lecture sections. There will be no homework due during the week of a midterm.

4. **QUIZZES:** Quizzes will be given during the discussion sections. Each quiz will be based on one of the problems that were discussed during the previous discussion. There will be NO make-up quizzes. I will post solutions to the quizzes on the course website.

**GRADING DISTRIBUTION:**

2 Midterms	(60 points / 20% each)	= 40%
Final Exam	(90 points)	= 30%
Homework	(6 points / 2% each)	= 20%
Quizzes	(3 points / 1% each)	= 10%
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Total Points = 300 (100%)		

**GRADING SCALE:** The following scale gives the lowest grade you can earn:

98 – 100%	A+		
92 – 98%	A	72 – 78%	C
90 – 92%	A-	70 – 72%	C-
88 – 90%	B+	68 – 70%	D+
82 – 88%	B	62 – 68%	D
80 – 82%	B-	60 – 62%	D-
78 – 80%	C+	0 – 60%	F

**FOR JAMES SCHOLAR STUDENTS ONLY:** Pre-approved James Scholar students who are taking this course for honors credit will be required to complete one additional project, due by the last day of class, Wednesday, December 9. Refer to the course website for more information. Successful performance on this project will result in honors credit.