ACTUARIAL SCIENCE 305/505
SYLLABUS
Spring 2002

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(When you come in to Ritter Annex, take elevator 1 or 2. Get off on the 4th floor, at the rear of the elevator. Our offices are on the left.)

This course gives a thorough coverage of contingencies models, defined in Chapters 3-8, of *Actuarial Mathematics* by Bowers etal. All of the material from the above chapters needed for the Society of Actuaries Course 3 Examination will be covered.

Undergraduate Prerequisites: Act. Sci.101 and Math 233. (It is strongly recommended that a student have at least a B in each of these courses).

Graduate Prerequisite: A course in Mathematical Probability.
Corequisite: Act. Sci. 501.

Text: A study packet that will be available the second week of school.
Optional text: *Actuarial Mathematics* by Bowers etal. Second Edition (This book may be obtained from the Society of Actuaries, or from one of the Actuarial Bookstores.)

A calculator is required: Texas Instrument BA 35 Solar model. If you do not have it, it is available at the Temple Bookstore or at any store that sells calculators, such as Staples. The Society of Actuaries no longer requires a calculator with the SOA /CAS logo.

Students should look at the Course 3/Exam 3 exams on the web: www.casact.org , Education and exams. Try to identify problems in the exams that you can do as this class progresses.

There will be 3 exams and a final. Your grade will be the average of the four exams. There will be no make-ups. The percentage of the exam that you miss will be added on to the 25% value of the final. If you miss all three of the first 3 exams you will fail the course. If you are failing and miss the final you will fail the course.

Syallabus

Weeks of January 21, 28, February 4: Chapter 3

EXAM 1: February 21

Weeks of February 13, 20, 27, March 4: Chapter 4, and start Chapter 5

SPRING BREAK: March 10 - March 17

EXAM 2: March 21

Weeks of March 20, 27, April 3: Chapter 5 and start Chapter 6

Week of April 10: : Chapter 6

EXAM 3: April 18

Weeks of April 17, 24, May 1, Chapters 7, 8

FINAL EXAM: May 2:00-4:00 PM

Introduction

The material in this course is the core of actuarial mathematics.

We will see how the concepts of present value (Theory of Interest) and probability are combined to determine models that enable us to determine benefit premiums for insurance products and enable us to follow the cash flow of benefit premiums and benefits.

We will develop the 'time-until-death' and the 'age-at-death' random variables, X and T, in Chapter 3, and develop their distributions. This material is the foundation for the later chapters where new random variables are defined in terms of the Chapter 3 random variable T.

In Chapters 3-7, New random variables are defined as functions of T and K. You will notice certain types of problems are repeated in each chapter: %tile points, standard normal approximations applied to a portfolio of many policies, etc. The methods of solving these types of problems are similar in each chapter.

The difficult part of the course is the notation, which must be learned as soon as it is covered. (See Appendix 3, page 687, and Appendix 4, page 693 of Bowers.) You must keep up with the material and do all of the problems in each chapter.

Hints for studying the material

1) Learn the actuarial notation as soon as we cover it.

2) Chapter 3 is the most difficult. You will find that you have to check back when you forget one of the basic concepts.

3) In each of Chapters 3-7, a new random variable will be introduced.
Each of the random variables in Chapters 4-7 will be defined in terms of the Random variables *T* and *K*, defined in Chapter 3.

4) For each of the new random variables *W*, you will determine E(W), VAR(W), the *p*th percentile point *A*, $P(Z \le A) = p$ (i.e., the median = 50%tile point).

5) In each of these chapters you will also consider the case with *n* policies, for which the distribution of the random variable $S = \sum_{i=1}^{n} W_i$ is approximated by the normal distribution with mean, $E(\sum_{i=1}^{n} W_i)$ and variance, $Var(\sum_{i=1}^{n} W_i)$.