

MA 412, Fall 2017

1 Syllabus

1.1 Instructor Information

Instructor: Jeffrey S. Scroggs

Instructor Office Hours: Posted at <http://www4.ncsu.edu/~scroggs/mywebsite/OfficeVisits.html>

Instructor email: scroggs@ncsu.edu

Office: SAS 3140

Phone Number: 919.515.7817

Instructor home page: <http://www4.ncsu.edu/~scroggs/mywebsite>

Course web site: wolfware.ncsu.edu (Moodle)

Class meeting times: MoWe, 3:00-4:15pm, 2106 SAS Hall

Communication: Moodle will be used for most communications in this course.

Final Exam (firm): Monday, Dec. 2, 1-4pm (<https://registrar.ncsu.edu/calendars/exam/#spring>)

1.2 Course prerequisites or restrictive statements.

Prerequisite: MA 241 or MA 231

Corequisite: MA 421, BUS(ST) 350, ST 301, ST 311, ST 361, ST 370, ST 371, ST 380 or equivalent

1.3 GER Designation

This class does not satisfy a GER requirement

1.4 Student learning outcomes

Goal: Students will acquire a practical knowledge of the theory of interest in both finite and continuous time, and will be able to apply the concept of present value to the building of actuarial models on future contingent cash flows and failure time random variables.

Outcomes: Students will be able to...

- A. Explain the difference between a stochastic and a deterministic model and identify the advantages/disadvantages of each.
- B. Determine the characteristics of the components and the effects of changes to the components of actuarial models. Components include a deterministic interest rate structure, a scheme for the amounts of the cash flows, a probability distribution of the times of the cash flows, and the probability distribution of the present value of the set of cash flows

- C. Apply the equivalence principle to a model to associate a pattern of costs with a set of future contingent cash flows.
- D. Characterize discrete and continuous univariate probability distributions for failure time and variables in terms of the life table functions, the cumulative distribution function, the survival function, the probability density function, and the hazard function (force of mortality), as appropriate, and establish relations between the different functions.
- E. Students will be able to determine an appropriate model for a given business problem. Business applications include premium rates for life insurance and annuity contracts, benefit reserves for insurance contracts, cost of a warranty for manufactured goods, and value of a financial instrument such as a loan or stock.

1.5 Textbook Information

Required: Actuarial Math for Life Contingent Risks, 2nd Ed, 2013, D. Dickson, M. Hardy, and H. Waters. (ISBN 9781107044074)

Strongly Recommended: Solutions Manual For Actuarial Math For Life Contingent Risk, 2nd Ed, 2013 (ISBN 9781107620261).

Supplemental Material: www.soa.org/files/edu/edu-2012-spring-mlc-studynotes.pdf

1.6 Organization and Scope (Topics and Reading Assignments)

(1 day) Chapter 1. Introduction to life insurance

(1-2 weeks) Chapter 2. Survival models

(1-2 weeks) Chapter 3. Life tables and selection

(2 weeks) Chapter 4. Insurance benefits

(2 weeks) Chapter 5. Annuities

(2 weeks) Chapter 6. Premium calculation

(2 weeks) Chapter 7. Policy Values

(if time permits) Chapter 11. Yield curves and non-diversifiable risk

1.7 Projected (TENTATIVE) schedule of homework due dates, quizzes and tests

Homework is collected every week.

There will be a quiz during dead week.

Except for the quiz during dead week, quizzes will not usually be announced in advance.

Exams will be given at natural breaks in the material

Exam 1: September 20 (tentative)

Exam 2: October 25 (tentative)

1.8 How grades are determined

Weight	Type of Assignment
15%	Homework
15%	Quizzes
20%	Exam 1
20%	Exam 2
30%	Final

Percent Range	Grade
$97.6 \leq X \leq 100$	A+
$92.3 \leq X < 97.6$	A
$90.0 \leq X < 92.3$	A-
$87.6 \leq X < 90.0$	B+
$82.3 \leq X < 87.6$	B
$80.0 \leq X < 82.3$	B-
$77.6 \leq X < 80.0$	C+
$72.3 \leq X < 77.6$	C
$70.0 \leq X < 72.3$	C-
$67.6 \leq X < 70.0$	D+
$62.3 \leq X < 67.6$	D
$60.0 \leq X < 62.3$	D-
$X < 60.0$	F

Bonus for ClassEval Participation. Every student's percent will be boosted based on participation in the end-of-semester evaluation. Let $P = \%$ participation by the class in the evaluation and $B =$ amount added to every students' earned percentage.

Participation in ClassEval	Boost added to grade earned
$90 \leq P$	$B = 3\%$
$60 \leq P < 90$	$B = 2\%$
$P < 60$	$B = 0\%$

Quizzes. You can use a calculator. The quiz will cover all the homework through the previous lecture. Most quizzes will not be announced. Each quiz is graded out of 4 points.

When the quiz is a single problem, here is the Scoring Rubric

- 4 points: conceptual understanding apparent; consistent notation, with only an occasional error; logical formulation; complete or near-complete solution/response
- 3 points: conceptual understanding only adequate; careless mathematical errors present (algebra, arithmetic, for example); some logical steps lacking; incomplete solution/response.

2 points: conceptual understanding not adequate; procedural errors; logical or relational steps missing; poor response or no response to the question posed.

1 point: does not attempt problem or conceptual understanding totally lacking.

0 points: missed the class for an unexcused absence.

Exams and Final Exam. Students that can work only the assigned homeworks problems should expect a C in the course; whereas, students that study the material and work more than just the assigned problems will likely earn an A or B.

Questions on exams will often be modifications of homework problems, examples from the textbook, and material presented in class. Some questions will be completely new.

The best way to earn a top grade is to (1) read the material before it is presented in class, (2) attend class and ask questions, (3) work homework

Exam cheat sheet: Each student can bring a single page of formulas to Hour Exams. The formula sheet must be printed on one side only, and can be no larger than 8 1/2 x 11 inches. You can discuss the formula sheet with other students, but the formula sheets should not be identical. The formula sheet may be turned in with exam, and may not be returned (keep a copy).

Final exam cheat sheet: Each student can bring a single page of formulas to Hour Exams. The formula sheet can be printed on both sides, and can be no larger than 8 1/2 x 11 inches. The formula sheet cannot be two pages stapled together. You can discuss the formula sheet with other students, but the formula sheets should not be identical. The page may be turned in with exam, and may not be returned (keep a copy).

1.9 Policy on incomplete grades and late assignments

Quizzes missed due to a excused absence will not be made up. Instead, the average score from the other quizzes will be used for the missing grade. If all quizzes are missed, the final exam grade will be used for the quiz grade.

Hourly Exams missed due to a excused absence will not be made up. Instead, the grade from the other exam will be used for the missing grade. If both exams are missed due to excused absences, then the final exam grade will be used for the missing grades.

1.10 Policy on attendance

NCSU attendance regulation is online at policies.ncsu.edu/regulation/reg-02-20-03.

1.11 Academic Integrity statement

1.11.1 NCSU policy on academic integrity

For the NCSU policy, browse to policies.ncsu.edu/policy/pol-11-35-01

Homework: Students are expected to form study groups and use the solutions manual. In other words, anything goes when working on homework.

Exams (including the Final): Students will neither give nor receive any assistance on any hourly exam, or final exam. This means there is no use of electronic communication devices during exams, no student-to-student interactions, no wondering eyes, etc. Some students may be assigned seats for exams.

1.11.2 Utilization of the Honor Pledge

All exams and quizzes must be completed independent of assistance from other people. Implicit in any submission is the pledge that "I have neither given nor received unauthorized aid on this test or assignment."

Penalty for violations: Any violation of the Academic Integrity policy will be reported to the Office of Student Conduct with a recommendation of a failing grade for the assignment and/or course.

1.12 Students with disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.01)

1.13 Laboratory safety

There are no labs or field trips for this course.

1.14 Extra expenses

There are no pass-through charges.

1.15 Transportation

All events will be held in SAS Hall, so there is no need for extra transportation.