

COURSE SYLLABUS
SOUTHEAST MISSOURI STATE UNIVERSITY

Department of Mathematics
Title of Course: Actuarial Modeling

Course No. MA 525
March 1, 2013

I. Catalog Description and Credit Hours of Course:

Introduction to actuarial models such as aggregate models, empirical models, survival models, severity models, credibility models, and frequency models. (3 credit hours).

II. Prerequisite(s):

MA524

III. Objectives of Course:

Students are required to understand the steps involved in modeling process, understand underlying assumptions and apply appropriate model to make decisions.

IV. Expectations of Students:

The students are expected to participate in classroom activities, do assignments, and pass examinations.

V. Student Learning Outcomes:

- 1) Students will identify the application in which each distribution is used and reasons for various actuarial models.
- 2) Students will estimate failure time and loss distributions using Kaplan-Meier estimator.
- 3) Students will estimate the parameters of failure time and loss distributions using maximum likelihood and method of moments.

VI. Course Outline:

	Hours
1. Severity models	9
a. Basic distributional properties	
b. Effect of change in parameter on distributions	
c. Identify their applications, and	
d. Apply distribution to an application	
e. Evaluate the impacts of deductibles, limits, and coinsurance	
f. Calculate loss elimination ratios and evaluate effects of inflation on losses	
2. Frequency models	5
a. Effect of change in parameter on distributions	
b. Identify their applications, and	
c. Apply distribution to an application	
d. Evaluate the impacts of deductibles, limits, and coinsurance	
e. Calculate loss elimination ratios and evaluate effects of inflation on losses	
3. Aggregate models	5
a. Compute relevant parameters and statistics for collective risk models	
b. Evaluate compound models for aggregate claims	
c. Compute aggregate claims distributions	
d. Evaluate the impacts of deductibles, limits, and coinsurance	
e. Calculate loss elimination ratios and evaluate effects of inflation on losses	
4. Risk measures	2
a. Calculate VaR, and TVaR and explain their use and limitations	
5. Construction of empirical models	6
a. Estimate failure time and loss distributions using	

i. Kaplan-Meier estimator	
ii. Nelson-Aalen estimator	
iii. Kernel density estimators	
6. Estimate parameters of failure time and loss distributions using	4
a. Maximum likelihood	
b. Method of moments	
7. Estimate failure time and loss distributions using	4
a. Cox proportional hazards model and other basic models	
8. Credibility	4
a. Apply limited fluctuation (classical) credibility including criteria for both full and partial credibility	
9. Simulation of discrete and continuous random variables using inversion method	3
10. Exams	3
	Total
	45

VII. Suggested Textbook:

Klugman, S.A., Panjer, H.H. and Willmot, G.E. (2012): Loss Models: From Data to Decisions, (Fourth Edition), John Wiley & Sons.

VIII. Basis of Student Evaluation:

A. Assignments	20%
B. Exams	70%
C. Projects	10%

IX. Grading Scale

Graduate Student	Undergraduate Student
90% - 100% = A	90% - 100% = A
80% - 89% = B	80% - 89% = B
70% - 79% = C	70% - 79% = C
0% - 69% = F	60% - 69% = D
	0% - 59% = F

The weight of the evaluation criteria may vary according to each instructor and will be communicated at the beginning of the course.

X. Academic Policy Statement:

Students will be expected to abide by the University Policy for Academic Honesty regarding plagiarism and academic honesty. Refer to:
<http://www6.semo.edu/judaffairs/code.html>

XI. Student with Disabilities Statement:

If a student has a special need addressed by the Americans with Disabilities Act (ADA) and requires materials in an alternative format, please notify the instructor at the beginning of the course. Reasonable efforts will be made to accommodate special needs.

Questions, comments or requests regarding this course or program should be taken to your instructor. Unanswered questions or unresolved issues involving this class may be taken to the Chairperson of the Department of Mathematics.