KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS & STATISTICS
DHAHRAN, SAUDI ARABIA

AS484: Actuarial Risk Theory and Credibility (211) 12:30pm UTR

Course Description:

Distribution of aggregate claims associated with insurance including analysis of the risk due to variations in expected claim numbers and amounts. Frequency and severity distributions, individual and collective models, ruin theory, continuous-time compound Poisson surplus processes, reinsurance, dividend formulas, credibility models, and simulation. An introduction to empirical Bayes and statistical distributions used to model loss experience. Application of risk theory to the operation of insurance and takaful system and assessment of the credibility of data for ratemaking.

We shall often refer to the description of SOA Exam STAM at:
https://www.soa.org/globalassets/assets/files/edu/2020/2020-02-exam-stam-syllabi.pdf

Textbook and package:

1. Klugman, S. A., Panjer, H. H., and Willmot, G. E. (2012). Loss Models: from Data to Decisions 4th edition. John Wiley and Sons
2. Texas BAII Plus Calculator or Texas BAII Professional
3. *R* studio statistical package (whenever necessary)
4. SOA Exam STAM reading on Credibility https://www.soa.org/Files/Edu/2018/2018-stam-23-18.pdf

Reference:

1. Computational Actuarial Science with *R*, Edited by Arthur Charpentier, Chapman and Hall, 2015.
2. SOA Exam C/CAS Exam 4 sample on the SOA official website.
3. Tables for Exam STAM:
   https://www.soa.org/Files/Edu/2019/2019-02-exam-stam-tables.pdf
4. Exam STAM sample Questions (Only those related to AS 484 coverage of Exam STAM material):
   https://www.soa.org/Files/Edu/2018/2018-04-exam-stam-questions.pdf
   https://www.soa.org/Files/Edu/2018/2018-04-exam-stam-solutions.pdf
5. Exam STAM Past Exams Questions (Only those related to AS 484 coverage of Exam STAM material):
   http://www.soa.org/education/exam-req/syllabus-study-materials/edu-multiple-choice-exam.aspx

Instructor: Dr. Ali N. Duman **Office:** Bldg 5-rm 325 **Phone:** 2632 **E-mail:** ailduman@kfupm.edu.sa
Office Hours: MW: 2.00pm - 4:00pm and T: 10:00am-10:50am or by appointment.

Assessment

Assessment for this course will be based on attendance, homework, term paper report, two major exams and a comprehensive final exam, as in the following:

Activity	Weight
Attendance + Class participation	10%
Exam 1(Chapters 3, 4, 5, & 6) **Week 6**	20%
Exam 2(ch 8 & 9) **Week 10**	20%
Term Paper Report **Week 14**	10%
Quizzes	15%
Final Exam (Comprehensive) **(as posted by registrar)**	25%

IMPORTANT NOTE on GRADES: There is no quota on the number of students who can get an A+ or F grade.

- ✓ ***Attendance*** on time is ***very*** important. Mostly, attendance will be checked within the ***first five minutes*** of the class. Entering the class after that, is considered as late (**2 lates= 1 Absence**) and randomly during class to ensure sustained presence.
- ✓ **More than 10 minutes late = Absence** (regardless of any excuse).
- ✓ Excessive unexcused absences will result in a grade of *DN* in accordance with University rules.

Letter grade	A+	A	B+	B	C+	C	D+	D	F	DN
Cut-off	90%	85%	80%	75%	67%	60%	55%	50%	<50%	≥ 9 absences

Academic Integrity: All KFUPM policies regarding **ethics** and **academic honesty** apply to this course.

General Notes:

- Students are required to carry **pens**, **note-taking equipment** and a **calculator** to **EVERY lecture and exams**. It is strongly recommended to keep a **binder** for class-notes.
- Students are also expected to bring the book, take notes and organize their solved questions in a **binder** for easy retrieval to help them in study and review for class, exams, etc
  - It is to the student's advantage to keep a binder for storing class notes, homework, and other graded assignments. Students who are **organized** will find it **easier** to find important materials when **studying for exams**.

- To successfully prepare for the SOA exams, students MUST **solve problems** regularly and with discipline. The selected assigned problems are specifically designed to prepare you for major and final exams. Homework is due every Sunday the relevant chapters are completed. So, it is expected that you complete these problems **step-by-step** and with comprehension.
  - If you happen to stumble upon a solution manual somewhere, remember 2 important points. (1) Due to publishing costs and deadlines, these solutions are brief and may have mistakes and (2) in your career as an actuary and your exams and quizzes in this class, you are expected to know every step to a problem and to know if a solution is incorrect. Thus, the best way to solve problem is without these brief solutions.
- ***Never round*** your intermediate results to problems when doing your calculations. This will cause you to lose calculation accuracy. Your answers may then be different from the SOA exam key even when you use the right procedure.
- For every exam, so you need to bring with you ***pens***, ***pencils***, ***a sharpener***, ***an eraser***, and a ***SOA approved calculator***.

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Syllabus (Tentative)

Week	*Sections*	*Topic*	*Notes*
1	Ch 3	**Basic Distributional Quantities** (Generating functions & sums of RV, Tails of distributions, Risk Measures)	
2	Ch 4	**Characteristics of Actuarial Models**	
3	Ch 5	**Continuous Models**	Declare your Term paper topic: Sun Week 3
4	Ch 6	**Discrete Distributions**	
5	Ch 8	**Frequency & Severity with Coverage modifications**	
6	Ch 9	**Aggregate Loss Models**	
7	Ch 9	**Aggregate Loss Models (cont.)**	
8	Ch 10 & 14	**Review of Mathematical Stats (new material only)** **Frequentist Estimation of Discrete Data**	
9	Ch 17	**Introduction and Limited Fluctuation Credibility**	
10	Ch 15	**Credibility Bayesian Estimation (Review)**	
11	Ch 18	**Greatest Accuracy**	
12	Ch 19	**Empirical Bayes Credibility**	
13	Ch 20	**Simulation (Note: Not in STAM but in practice)**	
14	STAM review if time permits	**Practice format from SOA STAM exam**	
15	Review	**Review**	
6		Normal Thursday Class	
		"Comprehensive" Final Exam	

Student Learning Outcomes: (From the Society of Actuaries Exam STAM)

As a summary, the number of SOA STAM learning outcomes are distributed across the following KFUPM courses:

(1) STAT302 (2) AS 475 (3) AS 484 (majority)

For 2020 STAM learning outcomes with SOA weights discussed in this course, check

https://www.soa.org/globalassets/assets/files/edu/2020/2020-02-exam-stam-syllabi.pdf