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

AS484: Actuarial Risk Theory and Credibility Lab– **Term 231 3.20pm M**

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 ASTAM 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 ASTAM:
   https://www.soa.org/Files/Edu/2019/2019-02-exam-stam-tables.pdf
4. Exam ASTAM sample Questions (Only those related to AS 484 coverage of Exam STAM material):
   https://www.soa.org/globalassets/assets/files/edu/2023/fall/intro-notes/2023-fall-astam-intro-note.pdf
5. Exam ASTAM Past Exams Questions (Only those related to AS 484 coverage of Exam STAM material):
   https://www.soa.org/globalassets/assets/files/edu/2023/fall/intro-notes/2023-fall-astam-intro-note.pdf

Instructor: Dr. Mohammad H. Omar **Office:** Bldg 5-rm 508 **Phone:** 2471 **E-mail:** omarmh@kfupm.edu.sa
Office Hours: M: 2.00pm-3:00pm (office), T: 12.35pm-1.20pm (office) and R: 10am–10.50am (bldg. 24 158) or by appointment on MS Teams chat

Assessment

Assessment for this course will be based on the following:

Activity	Weight	Marks
Attendance and Lab Participation	10%	2
Lab Assignments	30%	6
Lab Tests	60%	12
Total	100%	20

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.

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. 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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Lab Syllabus (Tentative)

Week	*Dates*	*Sections*	*Topic*	*Notes*
1	Aug 28	Ch 3	The R Studio program, the SRM, PA, and IFoA exams	
		Ch 3	**Basic Distributional Quantities** (Generating functions & sums of RV, Tails of distributions, Risk Measures)	
2	Sep. 4	Ch 4	**Characteristics of Actuarial Models**	
3	Sep 11	Ch 5	**Continuous Models**	Declare your Term paper topic: Sun Sep 10
4	Sep. 18	Ch 6	**Discrete Distributions**	The National Day Holiday Sept 23-24
5	Sep. 25	Ch 8	**Frequency & Severity with Coverage modifications** **Lab Quiz 1**	(2 wks): Midterm grade reports starts
6	Oct. 2	Ch 9	**Aggregate Loss Models**	
Sunday, Oct 8 – Midterm Exam (chapters 3, 4, 5,& 6)				
7	Oct. 9	Ch 9	**Aggregate Loss Models (cont.)**	
8	Oct. 16	Ch 10 & 14	**Review of Mathematical Stats (new material only)** **Frequentist Estimation of Discrete Data** **Lab Quiz 2**	
9	Oct. 23	Ch 17	**Introduction and Limited Fluctuation Credibility** **Lab Midterm Exam (ch 3, 4, 5, & 6)**	
Monday, Oct 30 – Term Paper due to instructor				
10	Oct 30	Ch 15	**Credibility Bayesian Estimation (Review)**	
11	Nov. 6	Ch 18	**Greatest Accuracy**	
12	Nov. 13	Ch 19	**Empirical Bayes Credibility** **Lab Quiz 3**	
Midterm Break: Nov. 19 - 23				
13	Nov. 27	Ch 20	**Simulation (Note: Not in ASTAM but in practice)**	
14	Dec.4	STAM review if time permits	**Practice format from SOA ASTAM exam**	
15	Dec. 11	Review	**Review** **Lab Final Exam (chap 17, 18, 19, 20)**	