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

AS450: Risk Modeling - Term 231   (2-2-3) UT 10-10.50

Course Objectives:

Types of Risks faced by an organization; Risk Modelling, its evaluation and Analysis; Techniques used in quantifying financial and non-financial risks. Covers value at risk (VaR), extreme value theory (EVT), scenario and stress testing, risk aggregation techniques including use of correlation, integrated risk distributions and copulas. Approaches for managing risk.

Prerequisites: AS 201 and STAT 214

Textbook and Package:

1. Sweeting, Paul (2019). Financial Enterprise Risk Management, 2nd Revised Edition, International Series on Actuarial Science. Cambridge University Press. ISBN13: 9781107184619
2. Rashid (2021). ACTEX Study Manual for SOA ERM, Fall 2021. ACTEX. ISBN: 978-1-64756-454-4
3. Texas BAII Plus Calculator or Texas BAII Professional

Reference:

Jorion, Philippe (2006). Value at Risk: The New Benchmark for Managing Financial Risk (3rd Ed.), McGraw-Hill education. ISBN-13: 978-0071464956.

Society of Actuaries ERM Exam Notes

ERM exam syllabus on SOA site.

Instructor: Dr. Mohammad H. Omar   **Office:** Bldg – 5, room – 508.   **Phone:** 2471

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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
Classwork (Attendance and Hwk)	7%
Lab work (Attendance, computer assignments, lab quizzes)	18%
Major 1 Exam (Topics 1 through 3) **Thursday (Oct 5– week 6), 6.00 pm (venue TBA)**	20%
Major 2 Exam (Topics 4 through 5) **Thursday (Nov 9 - week 11) 6.00 pm (venue TBA)**	20%
Final Exam (Comprehensive) **As announced by Registrar**	35%

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

✓ **More than 10 minutes late = Absence** (regardless of any excuse).

Letter grade	A+	A	B+	B	C+	C	D+	D	F	DN
Cut-off	90%	85%	80%	75%	70%	60%	55%	50%	<50%	≥ 9 absences

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_**.

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

Student Learning Outcomes: See Society of Actuaries Exam ERM (Enterprise Risk Management – Fall 2021) LO.

Syllabus (Tentative)

Week	*Dates*	*Topic*	*Sections*	*Topic*	*Notes*
1	Aug 27 - 31	1	1.3, 1.5, 2.3, 2.4, ch7 (except 7.10), ch 8	**Types of Risks faced by an organization (Risk Categories and Identification)**	
2	Sep. 3 - 7	2	10.3, 10.4	**Integrated risk distributions and Copulas**	
3	Sep 10 - 14	3	Ch 12	**Extreme Value Theory**	
4	Sep 17 - 21	4	Ch 14	**Techniques used in quantifying particular (financial and non-financial) risks**	
5	Sep. 25 - 28	5	15.4	**Computing VaR**	(2 wks): Midterm grade reports starts
				Thursday (Oct 5) – 1st Major Exam (Topics 1, 2, 3, and 4)	
6	Oct. 1 - 5	6	14.2	**Portfolio Risks: Analytical Methods**	
7	Oct. 8 - 12	6	Ch 11 (excp 11.7), ch 13, 9.5	**Forecasting Risks and Correlations**	
8	Oct. 15 - 19	7	Handout	**Risk Modelling, its evaluation and Analysis**	
9	Oct. 22 - 26	8	Ch 19	<mark>**Basel Committee: Technical Underpinnings of Aggregate Methods**</mark>	
10	Oct 29 - Nov2	8	9.5, 10.4, ch 18	**Aggregation of Risk and Allocation of Capital**	
11	Nov. 5 - 9	9	Lab c23-24	**Stress Testing and Scenario Analysis**	
				Thursday Nov 9 – 2nd Major Exam (Topics 5, 6, and 7)	
12	Nov 12 - 16	10	Ch 7.10, 14.10	**Measuring\Assessing Operational Risk**	
				Midterm Break: Nov. 19 - 23	
13	Nov 26 - 30	10	Ch 15	**Risk Measures**	
14	Dec.3 - 7	10	Ch 16	**Risk Management Tools & Techniques**	
15	Dec 10 - 14		Review	<mark>**Risk Management Tools & Techniques (cont.), Review**</mark>	
16	Dec 17		Review	**Review**	Normal Sunday
16	TBA TBA			"Comprehensive" Final Exam	