



جامعة الملك فهد للبترول والمعادن
King Fahd University of Petroleum & Minerals

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DEPARTMENT OF MATHEMATICS & STATISTICS

DHAHRAN, 31261, Kingdom of Saudi Arabia

AS 475: Survival Models for Actuaries

Term 162 – spring 2016

Instructor: Mr. Moenes Mellouli, MA MS MBA

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Office Hours: Sunday, Tuesday and Thursday: **8:00 – 9:40** am or by appointment.

Class meeting Days: UTR 13:10 – 14:00 pm. Building – 4, Room - 237

For regular announcements, students are advised to check the **Blackboard** regularly.

Course Descriptions:

The statistical process of analyzing survival data, particularly for insurance applications. Techniques for estimating mortality rates; construction of mortality tables from the records of insured lives, employee benefit plans, and population statistics. Life tables, graph and related procedures. Graduation. Special attention to censoring and truncation. Single samples: complete or Type II censored data and Type I censored data for Exponential, Weibull, Gamma and other Distributions. Parametric regression for Exponential, Weibull and Gamma Distributions. Distribution-free methods for proportional hazard and related regression models.

Credit: (3 – 0 – 3).

Prerequisite: Stat 302 & 310

Textbook, Package & Reading Selections:

- 1- Kleinbaum, D. G. & Klein, M. (2012). Survival Analysis: A Self-Learning Text 3rd edition. New York, USA: Springer.
 - 2- Chap 11 through 16 (except 15) of Klugman, S.A., Panjer, H.H. and Willmot, G.E. (2012). Loss Models: From Data to Decisions 4th Edition. Wiley and the Society of Actuaries: Hoboken, NJ.
 - 3- ACTEX SOA exam C study manual, December 2014 edition, by Broverman
 - 4- Texas BAII plus calculator or Texas BAII professional or check for other SOA approved calculators
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Learning Objectives:

<https://www.soa.org/education/exam-req/edu-exam-c-detail.aspx>

Activity Schedule:

Assessment for this course is based on a **set of HW**, **two major exams** and a **comprehensive final exam**, as described in the following table:

Activity
HW (15%)
Major Exam I (25%) Date: Wednesday - March 15, 2017 Time: 6:30 pm – 8:30 pm Location: Building 54
Major Exam II (25%) Date: Sunday - April 16, 2017 Time: 6:30 pm – 8:30 pm Location: Building 54
Final Exam (Comprehensive) (35%) Date: Tuesday – 6 June 2017 Time: 12:30 pm Location: TBA

Attendance, cell phone use & other penalties:

- ✓ **Attendance** on time is *very* important. A 1% will be deducted from your final grade if you enter the class when the door is closed. **No excuses will be accepted.**
- ✓ **Notebook & pen/pencil** are mandatory. A 1% will be deducted from your final grade if you enter the class without your Financial Mathematics notebook and something to write with. **No excuses will be accepted**
- ✓ **Full attention in class** - A 1% will be deducted from your final grade if you are seen using your cellphone for texting or surfing the web. **No excuses will be accepted.**
- ✓ In accordance with the University rules, "a grade of **DN** in a course is given if the student's unexcused absences are more than 20% of the lecture sessions scheduled for the course". Therefore, students who accumulate **12, or more, unexcused absences** will receive a **DN** grade.

Letter Grades:

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

Exam Questions:

- ❖ The questions of HW & major exams are based on the in class examples & at home practice problems.

Missing Exam I or Exam II or Exam III:

- No makeup exam will be given under any circumstance. When a student misses Exam I or Exam II for a legitimate reason (such as medical emergencies), his grade for this exam will be determined based on the existing formula, which depends on his performance in the non-missed exams and in the final exam. It is to the professor's discretion whether to accept or refuse the student's excuse for missing an exam.

General class information:

- Students are required to carry a pen/pencil, notebook and a SOA approved calculator to EVERY lecture.
- Students are required to carry a pen/pencil, a sharpener, and eraser and a SOA approved calculator to every exam.

General SOA FM exam information:

- To successfully prepare for the SOA C exam, students MUST solve problems regularly. The selected assigned problems are specifically designed to prepare you for quizzes, major and final exams and the SOA C exam. So, it is expected that you complete these problems step-by-step and with comprehension.
- The SOA C examination is a four and a half hour multiple-choice examination.

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

**AS 475 – Survival Models for Actuaries
2016-2017 (162)**

Notes: The pace of coverage and material to be covered given in this table is tentative and may be modified when needed.

<i>Week</i>	<i>Dates</i>	<i>Sections</i>	<i>Topic</i>
1	5-Feb - 9-Feb	Ch 1 KK	Introduction to Survival Analysis (2-1/2 class).
2	12-Feb - 16-Feb	Ch 11 KPW	KPW11 Estimation of Modified Data
3	19-Feb - 23-Feb	Ch 12 KPW	Estimation of Actuarial Survival Data Nelson-Aalen Estimate
4	26-Feb - 2-Mar	Ch 2 KK	Kaplan-Meier Survival Curves and the Log-Rank Test
5	5-Mar - 9-Mar	Ch 3 KK	The Cox Proportional Hazards Model and its Characteristics
6	12-Mar - 16-Mar	Ch 4 KK	Evaluating the PH Model assumptions
		Ch 5 KK	The Stratified Cox Procedure
7	19-Mar - 23-Mar	Ch 5 KK	The Stratified Cox Procedure (cont.)
		Ch 6 KK	Extension of the Cox PH Model for Time-Dependent Variables
8	26-Mar - 30-Mar	Ch 6 KK	Extension of the Cox PH Model for Time-Dependent Variables (cont.)
		Ch 13 KPW	Parametric Survival Models
	2-Apr - 6-Apr	Midterm Break	
9	9-Apr - 13-Apr	Ch 13 KPW	Parametric Survival Models (continued)
10	16-Apr - 20-Apr	Ch 16 KPW	Model Selection
		Ch 7 KK	
11	23-Apr - 27-Apr	Ch 7 KK	Model Selection (continued)
12	30-Apr - 4-May	Ch 8 KK	Recurrent Event Survival Analysis
13	7-May - 11-May	Ch 9 KK	Competing Risks Survival Analysis
14	14-May - 18-May	Additional Topics, Catch, & review	
15	21-May - 25-May	Additional Topics, Catch up, & Review	
16	Tuesday 6-June 12:30 pm	"Comprehensive" Final Exam	