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

AS 251: Mathematics of Financial Derivatives
Term 212 – Spring 2021

Instructor: Ali N. Duman
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Office Hours: UTR 9:00 AM – 10:00 AM or by appointment

Time: UT 07:00 AM – 07:50 AM, M 10:00 AM – 11:50
Place: 59-1005

Prerequisite: AS 201 & Stat 214
Credit Hours: (2-2-3)

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Course Description:

Introductory Derivatives: Forwards and Futures. Options and Related Strategies. European put and call options. Put-call parity. Arbitrage opportunities. Rational valuation of derivative securities. Binomial tree and Black-Scholes Pricing Models. Actuarial Applications of Options Embedded in Insurance Products. Risk Management and Hedging. Introductory Stochastic differential equations. Ito's formula. Other SOA FM and IFM/MFE topics. Spreadsheet programming software.

Course Material:

1. *Course Syllabus:* Posted on Blackboard.
2. *Textbook:* **Robert L. McDonald. (2013). Derivatives Markets 3rd Edition. Pearson.**
3. *Notes:* Class Notes.
4. *Calculator:* Texas BA II Plus Calculator or Texas BA II Professional.
5. *Lab Manual:* Selected chapters from **Simon Benninga, Financial Modelling.**

Attendance:

The student is responsible for all material presented in class. Some of the material presented in class might not be in the textbook. Generally, attendance will be checked once the teacher enters the class room. Entering the class after that, is considered as late where two late cases will be considered as one Absence. Students' late more than 10 minutes will be considered absent regardless of any excuse. Unexcused absences and late cases might be penalized by grade deductions as announced by the instructor. Excessive unexcused absences will result in a grade of *DN* in accordance with University rules.

Communication:

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

Grading:

Your course grade will be based on the total of points accumulated on class work, lab work, two major exams, and Final Exam. The following scale gives the cut-off points for the course 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

Activity	Weight
Quizzes	15%
Labwork	20%
Class Work (Class participation+Attendance)	10%
Exam 1	15%
Exam 2	15%
Final Exam (Comprehensive) **Final Exam Date : TBA Time: TBA**	25%

Missing Exam I or II:

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 exam 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 Comments:

- It is essential that you keep up with the material as it is presented. This, unfortunately, is not one of those course where it is possible to catch up the last minute. In particular, it is important to do the problems as the material is presented.
- I encourage you to discuss the assigned problems with other students and work on them in groups. Discussing the assigned problems with others will also help you explain them clearly in the quizzes or exams.
- Students are required to carry pens, note-taking equipment and a calculator to EVERY lecture and exam. It is strongly recommended to keep a binder for class-notes.
- Bonus points might be awarded for showing alertness and participation in class discussions.
- The schedule is tentative and might be adjusted based on the progress of the class.
- To successfully prepare for the SOA exams, students MUST solve problems regularly.
- For every exam, you need to bring with you *pens*, *pencils*, *a sharpener*, *an eraser*, and a *SOA approved calculator*.

Academic Integrity:

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

Week	Section	Topics	Important Dates
1	**McDonald** 1.1, 1.2, 1.4	Introduction to Derivatives	
2	**McDonald** 1.5 2.1, 2.2	Introduction to Derivatives (cont.) An Introduction to Forwards and Options	
3	**McDonald** 2.3, 2.4 3.1, 3.2	An Introduction to Forwards and Options (cont.) Insurance, Collars, and Other Strategies	
4	**McDonald** 3.3, 3.4 4.1	Insurance, Collars, and Other Strategies (cont.) Introduction to Risk Management	
5	**McDonald** 5.1, 5.2, 5.3	Financial Forwards and Futures	
6	**McDonald** 9.1, 9.3	Parity and Other Option Relationships	
7	**McDonald** 10.1, 10.2, 10.3	Binomial Option Pricing: Basic Concepts	
8	**McDonald** 10.4, 10.5, 10.6	Binomial Option Pricing: Basic Concepts (cont.)	
9	**McDonald** 11.1 121,12.2	Binomial Option Pricing: Selected Topics The Black-Scholes Formula	
10	**McDonald** 12.3 Appendices A, B	The Black-Scholes Formula (cont.)	
11	**McDonald** 13.1, 13.2, 13.3	Market-Making and Delta-Hedging	
12	**McDonald** 13.4, 13.5, 13.6	Market-Making and Delta-Hedging (cont.)	
13	**Mcdonald** 14.1, 14.2, 14.3	Exotic Options: I	
14	**Mcdonald** 14.3, 14.4, 14.5	Exotic Options: I (cont.)	
15	**Mcdonald** 18.1, 18.2, 18.3, 18.4	The Lognormal Distribution	