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

AS 201: Financial Mathematics  
Term 191 – Fall 2019

Instructor: Ali Nabi Duman  
Office: Building 5 – Room 325  
Phone: 2632  
Email: aliduman@kfupm.edu.sa  
Office Hours: MW 12:10 AM – 01:00 PM or by appointment

Time: MW 10:00 AM – 11:15 AM  
Place: Building 6 – Room 211

Prerequisite: Math 102  
Credit Hours: (3-0-3)

Course Description:

Theory of compound interest and the mathematics of investment and credit. Measurement of interest, annuities certain (level, non-level, and continuous), amortization schedules, sinking funds, investment yield rates, and valuation of bonds and other securities. Methods of loan measurement and payments (Islamic and Conventional) are illustrated in amortization and sinking fund schedules. Islamic views on interest and investments.

Course Material:

1. Course Syllabus: Posted on Blackboard.  
3. Notes: Class Notes.  

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. Unexcused 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 (100 points: 20 points Homework & 80 Points Quizzes), two major exams (80 points each), and Final Exam (140 points). The following scale gives the cut-off points for the course grades.

<table>
<thead>
<tr>
<th>Letter grade</th>
<th>A+</th>
<th>A</th>
<th>B+</th>
<th>B</th>
<th>C+</th>
<th>C</th>
<th>D+</th>
<th>D</th>
<th>F</th>
<th>DN</th>
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<tbody>
<tr>
<td>Cut-off</td>
<td>90%</td>
<td>85%</td>
<td>80%</td>
<td>75%</td>
<td>67%</td>
<td>60%</td>
<td>55%</td>
<td>50%</td>
<td>&lt;50%</td>
<td>≥ 9 absences</td>
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</table>

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<thead>
<tr>
<th>Activity</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td></td>
</tr>
<tr>
<td><strong>Exam 1 Date:</strong> TBA, Time and Location TBA</td>
<td>100 points (25%)</td>
</tr>
<tr>
<td>Exam 2</td>
<td></td>
</tr>
<tr>
<td><strong>Exam 2 Date:</strong> TBA, Time and Location TBA</td>
<td>100 points (25%)</td>
</tr>
<tr>
<td>Class Work (Attendance + Quizzes)</td>
<td></td>
</tr>
<tr>
<td><strong>In class</strong></td>
<td>60 points (15%)</td>
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<tr>
<td>Final Exam (Comprehensive)</td>
<td></td>
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<tr>
<td><strong>Final Exam Date : TBA, Time: TBA</strong></td>
<td>140 points (35%)</td>
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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. The selected assigned problems are specifically designed to prepare you for major and final exams, and SOA Exam FM. So, it is expected that you complete these problems step-by-step and with comprehension.
- For every exam, you need to bring with you pens, pencils, a sharpener, an eraser, and a SOA approved calculator.

Student Learning Outcomes:


Academic Integrity:

All KFUPM policies regarding ethics and academic honesty apply to this course.
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Section</th>
<th>Topics</th>
<th>Important Dates</th>
</tr>
</thead>
</table>
| 1    | Sep 1\(^{st}\) – Sept 5\(^{th}\) | Chapter 1 1.1 1.2 | **Interest rate Measurement**  
Interest Accumulation and Effective Rates of Interest  
Present Value (excluding 1.2.1)                      |                                                          |
| 2    | Sep 8\(^{th}\) – Sept 12\(^{th}\) | 1.3 1.4 1.5 | Equation of Value  
Nominal rates of Interest  
Effective and Nominal Rates of Discount               |                                                          |
| 3    | Sep 15\(^{th}\) – Sep 19\(^{th}\) | 1.6 1.7 2.1 | The force of Interest  
Inflation and the “Real” rate of Interest  
Level Payment Annuities                               |                                                          |
| 4    | Sep 22\(^{nd}\) – Sep 26\(^{th}\) | Chapter 2 2.1 Cont. 2.2 | **Valuation of Annuities**  
Level Payment Annuities  
Level payment Annuities – Some Generalizations        | Sep 23rd: National Day Holiday                        |
| 5    | Sep 29\(^{th}\) - OCT 3\(^{rd}\) | 2.3 2.4 | Annuities with Non-Constant payment  
Applications and Illustrations (excluding 2.4.2 &2.4.3)       |                                                          |
| 6    | Oct 6\(^{th}\) - Oct 10\(^{th}\)  | Chapter 3 3.1 3.2 3.3 | **Loan Repayment**  
The amortization model of Loan Repayment  
Amortization of a Loan with Level Payments (excluding 3.2.1 & 3.2.2)  
The sinking Fund Method of Loan Repayment               | Oct 10\(^{th}\): Last day for dropping course(s) with grade of “W” thru KFUPM Portal* |
| 7    | Oct 13\(^{th}\) – Oct 17\(^{th}\) | Chapter 4 4.1 4.2 4.3 | **Bond Valuation**  
Determination of Bond Prices  
Amortization of a Bond  
Applications and Illustrations (excluding 4.3.2)       | First Major Exam                                        |
| 8    | Oct 20\(^{th}\) – Oct 24\(^{th}\) | Chapter 5 5.1 5.2 5.3 | **Measuring the Rate of Return of an Investment**  
Internal Rate of Return defined and Net Present Value (excluding 5.1.4)  
Dollar-weighted and Time-Weighted Rate of return Applications and Illustrations (excluding the investment year portion of 5.3.1, 5.3.2 & 5.3.3) |                                                          |
| 9    | Oct 27\(^{th}\) – Oct 31\(^{st}\) | Chapter 6 6.1 6.3 | **The term structure of interest rates**  
Spot Rates of Interest  
Forward rates of Interest                               |                                                          |
| 10   | Nov 3\(^{rd}\) – Nov 7\(^{th}\)  | Chapter 7 7.1 | **Cash flow duration and Immunization**  
Duration of a set of Cash flows and Bond duration (excluding 7.1.6) | Nov 7\(^{th}\): Last day for withdrawal from all courses with grade of “W” thru the Univ. Registrar Office* |
| 11   | Nov 10\(^{th}\) – Nov 14\(^{th}\) | 7.2 8.1 | Asset-liability Matching and Immunization  
Additional Topics in Finance and Investment.  
The dividend discount model of stock valuation            |                                                          |
| 12   | Nov 17\(^{th}\) – Nov 21\(^{nd}\) | SOA Exam FM Note | Using Duration and Convexity to approximate change in present value.  | Second Major Exam.                                        |
| 13   | Nov 24\(^{th}\) – Nov 28\(^{th}\) | SOA Exam FM Note | Interest Rate Swaps                                                   |                                                          |
| 14   | Dec 1\(^{st}\) – Dec 5\(^{th}\)   | SOA Exam FM Note | Determinants of Interest rates                                        | Dec 5\(^{th}\): Last day for withdrawal from all courses with grade of “WP/WF” thru the University Registrar Office* |
| 15   | Dec 8\(^{th}\) – Dec 12\(^{th}\)  | SOA previous Exams | Review \ Exam FM Practice Problems                                     |                                                          |

**Final Examination**  
**Day:** TBA **Date:** TBA **Time:** TBA **Location:** TBA