

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

**AS201: FINANCIAL MATHEMATICS (Term 211)    11am UTR**

**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.

**Prerequisites:** MATH 102

**Textbook and Package:**

1. Mathematics of Investment and Credit, 7<sup>th</sup> edition, by Broverman, S.A., ACTEX Publications Inc. (2017).
2. **EXCEL spreadsheet software** and **MATHEMATICA** (available for use at building 14)
3. **Calculator** (BA II Plus calculator or check for other SOA approved calculators)

**Reference:**

Daniel, J.W., and Vaaler, L.J.F., Mathematical Interest Theory (Second Edition), 2009, The Mathematical Association of America, ISBN: 978-0883857540.

Kellison, S.G., The Theory of Interest (Third Edition), 2009, Irwin/McGraw-Hill, ISBN: 125921544X or 978-1259215445.

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

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**Office Hours:** UT 9.55am - 10:45am & UTR: 12:30 pm - 1:20 pm or by appointment.

**Assessment**

Assessment for this course will be based on quizzes, attendance, homework, two major exams and a comprehensive final exam, as in the following:

Activity	Weight
Quizzes <sup>1</sup> , attendance, and homework	(10%+2%+8%)
Exam 1 (Chapters 1 & 2) <b>Wednesday (Sept 29 – week 5) , 6.00 pm, in TBA</b>	22%
Exam 2 (Chapters 3, 4, & 5) <b>Wednesday (Nov 10 - week 11), 6:30 pm, in TBA</b>	23%
Final Exam (Comprehensive) <b>as posted on registrar website</b>	35%

No makeup exam will be given under any circumstance.

**IMPORTANT GRADING NOTE:** Students who miss 9 or more meetings will receive a **DN** grade.

Students with **less than 50% total score** will receive an **F** grade. Students who obtain **more than 90%** on the class total will obtain an **A+** grade. Other grades starts as follows: **D (50%), D+(55%), C(60%), C+(67%), B(75%), B+(80%),** and **A(85%)**. There is no quota on the number of students who can get an A+ grade.

**General Notes:**

**Communication:**

- For regular announcements, students are advised to check Blackboard regularly.
- Social distancing is required in every class during this trying time of the Coronavirus pandemic.
- Students are required to carry **pens, note-taking equipment** and a **calculator** to **EVERY lecture, quizzes, and exams**. It is strongly recommended to keep a **binder** for class-notes.
- Students are also expected to take class notes and organize their learning material 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**.

<sup>1</sup> Once a chapter is completed, you should expect a class quiz.

- To successfully learn financial mathematics, students MUST **solve problems** and **analyze data**. The selected assigned problems are specifically designed to prepare you for class quizzes, lab, majors and final exam. 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) these solutions are brief and may have mistakes and (2) you are expected in your career as an actuary and your exams and quizzes in this class to know every step to a problem and to know when 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. Round only your final answers and you should not round less than 4 decimal places unless required otherwise.
- For every exam, so you need to bring with you **pens, pencils, a sharpener, an eraser**, and a **calculator**.

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

Important Attendance Notes:

- ✓ In accordance with University rules, **9 (NINE) unexcused absences** will automatically result in a grade of **DN**.
- ✓ **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 one late, and **every two times late** equals to one absence. The students has to be available until the end of the class.

*Home Work Problems:*

- Handout problems will be posted on the WebCT or in the instructor home page towards the end of each chapter.
- The **Homework** should be submitted in the first Saturday after completing the chapter **and no need for an announcement in advance**.
- No late homework will be accepted.

**Student Learning Outcomes:** (Consistent with **SOA professional exam FM** objectives).

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

**Syllabus (Tentative)**

<i>Week</i>	<i>Sections</i>	<i>Topics</i>	<i>Notes</i>
<b>1</b> (Aug 29- Sep 2)	1.1-1.2	<b>Measurement of Interest and Investment Rate.</b> Introduction. Accumulation and Effective rates. Present Values. (excluding 1.2.1)	4 sept Last day for late registration; Last day for adding courses.
<b>2</b> (Sept 5 - 9)	1.3-1.6	Equation of Value. Nominal Rates. Effective and Nominal Discount rates. Force of Interest.	12 sept Last day for dropping course(s) without permanent record
<b>3</b> (Sept 12-16)	1.7 2.1	Inflation and “real” rate. <b>Valuation of Annuities</b> Level Annuity Payments.	
<b>4</b> (Sept 19 - 22)	2.2-2.4	Generalized payments. Non-constant payments. Applications and Illustrations (excluding 2.4.2 & 2.4.3).	R Sept 23: National Day
<b>5</b> (Sept 26 - 30)	3.1-3.3	<b>Loan Repayment.</b> 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.	<b>Wednesday, Sept 29 – 1st Major Exam (chapters 1&amp; 2)</b>
<b>6</b> (Oct 3 - 7)	4.1-4.3	<b>Bond Valuation</b> Bond Price Determination. Bond Amortization. Applications and Illustrations. (excluding 4.3.2)	
<b>7</b> (Oct 10 -14)	5.1-5.3	<b>Measuring the Rate of Return of an Investment</b> Internal Return Rate. Net Present Value (excluding 5.1.4). Money-weighted and time-weighted return rate. Applications and Illustrations (excluding the investment year portion of 5.3.1, 5.3.2 & 5.3.3)	

<b>Student Break: Oct 17</b>			
<b>8</b> (Oct 18 - 21)	6.1 6.3	<b>The Term Structure of Interest &amp; Investment Rates</b> Spot Rates. Forward rates.	
<b>9</b> (Oct 24 - 28)	7.1	<b>Cash-flow Duration and Immunization</b> Cash-flow and Bond Durations (excluding 7.1.6)	
<b>10</b> (Oct 31 - Nov 4)	7.2	Asset-Liability Matching and Immunization.	
<b>11</b> (Nov 7 - 11)	SOA Exam FM Note	Using Duration and Convexity to approximate change in present value	<b>Wednesday, Nov 10- 2-nd Major Exam (chapters 3, 4, &amp; 5)</b>
<b>12</b> (Nov 14 - 18)	SOA Exam FM Note	Interest Rate Swaps	
<b>13</b> (Nov 21 - 25)	SOA Exam FM Note	Determinants of Interest rates	
<b>Midterm Break: Nov. 28-Dec. 2</b>			
<b>14</b> (Dec 5 - 9)	Guest Material	Introduction to Islamic Finance	
<b>15</b> (Dec 12-16)	Guest material	Introduction to Islamic Finance (continued 2 lect). Review	
<b>16</b> (Dec 19-20)	SOA previous Exams	Review \ Exam FM Practice Problems	<b>Normal Thursday Class</b>
<b>Final Exam (Comprehensive): TBA</b>			