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

AS201: FINANCIAL MATHEMATICS (Term 251) 9AM 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, 7th 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. Ridwan A. Sanusi **Office:** Bldg – 5, room – 203/2. **Phone:** 7642
E-mail: ridwan.sanusi@kfupm.edu.sa **(Not by WebCT/Blackboard email)**
Office Hours: UTR: 10:00 AM - 10:50 AM 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, attendance, and homework	25%(10%+5%+10%)
Exam 1 (Chapters 1 & 2) **Wednesday (Sept 29 – week 5) , 6.00 pm, in TBA**	20%
Exam 2 (Chapters 3, 4, & 5) **Wednesday (Nov 10 - week 11), 6:30 pm, in TBA**	20%
Final Exam (Comprehensive) **as posted on registrar website**	35%

No makeup exam will be given under any circumstance.

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).
- ✓ Out of the 5 marks for attendance, the first four absences will result in 0.5 mark reduction each while the next 4 will result in 0.75 mark reduction each.
- ✓ Official warning will be sent on the 4th and 8th Absence.

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

General Notes:

Communication:

- For regular announcements, students are advised to check Microsoft Teams and Blackboard regularly.
- 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.

- 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.

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)

Week	*Dates*	*Sections*	Topics	*Notes*
1	Aug 24-28	1.1-1.2	**Measurement of Interest and Investment Rate.** Introduction. Accumulation and Effective rates. Present Values. (excluding 1.2.1)	
2	Aug 1– Sept 4	1.3-1.6	Equation of Value. Nominal Rates. Effective and Nominal Discount rates. Force of Interest.	
3	Sep 7 – 11	1.7 2.1	Inflation and "real" rate. **Valuation of Annuities** Level Annuity Payments.	
4	Sep 14 – 18	2.2-2.4	Generalized payments. Non-constant payments. Applications and Illustrations (excluding 2.4.2 & 2.4.3).	
5	Sep 21 – 25	3.1-3.3	**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.	Sept 23: National Day **Wednesday, Sept 24 – 1st Major Exam (chapters 1& 2)**
6	Sep 28 – Oct 2	4.1-4.3	**Bond Valuation** Bond Price Determination. Bond Amortization. Applications and Illustrations. (excluding 4.3.2)	
7	Oct 5 – 9	5.1-5.3	**Measuring the Rate of Return of an Investment** 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)	
8	Oct 12 - 16	6.1 6.3	**The Term Structure of Interest & Investment Rates** Spot Rates. Forward rates.	
9	Oct 19 - 23	7.1	**Cash-flow Duration and Immunization** Cash-flow and Bond Durations (excluding 7.1.6)	

Midterm Break: Oct.26 - 30, 2025				
10	Nov 2 – 6	7.2	Asset-Liability Matching and Immunization.	
11	Nov 9 – 13	9.1	Additional Topics in Finance and Investment. The dividend discount model of stock valuation	**2nd Major Exam (chapters 3, 4, & 5)**
12	Nov 16 – 20	SOA Exam FM Note	Using Duration and Convexity to approximate change in present value.	
13	Nov 23 – 27	SOA Exam FM Note	Interest Rate Swaps Determinants of Interest rates	
14	Nov 30 – Dec 4	Guest Material	Introduction to Islamic Finance	
15-16	Dec 7 -	SOA previous Exams	Review \ Exam FM Practice Problems	
	Final Exam (Comprehensive): TBA			