



King Fahd University of petroleum & minerals

College of Computing & Mathematics

DEPARTMENT OF MATHEMATICS

AS201: Financial Mathematics

Instructor	Email	Location	Office Hours
Esam Al-Sawi	Using BB/MS teams	B5-R310	UT:12-12:40 M: 10-11:40

Course Objective:

The course develops the candidate's understanding of the fundamental concepts of financial mathematics.

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.

Textbook:

Broverman, S.A., Mathematics of Investment and Credit (Fifth Edition), 2010, ACTEX Publications, ISBN 978-1-56698-767-7.

Additional References

- 1) Daniel, J.W., and Vaaler, L.J.F., Mathematical Interest Theory (Second Edition), 2009, The Mathematical Association of America, ISBN: 978-0883857540. 6.

Assessment:

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

Activity	Weight
Homeworks (10%)	10%
Class Work : It is based on quizzes, class tests or other class activities determined by the instructor.	10%
Exam 1 (chapters 1 & 2) : (TBA)	22%
Exam 2 (chapters 3,4 &5): (TBA)	23%
Final Exam (Registrar Website) (Comprehensive)	35%
Total	100%

Notes Regarding Homework Problems

- Homework should be submitted on the first day after a chapter/section ends.
- No **late** homework will be accepted.
- Homework **not submitted** will get a score of zero.
- Homework problems solutions should be complete with **justifications and reasons** for all steps by referencing theorems, equations and discussion from your textbook.
- **Copying** from any source, human, print or electronic will result in a zero on the homework and will be reported to the department chairman for appropriate action in accordance with University rules.

Rounding:

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.

Announcements

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

Class notes

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.

Exam Issues:

- No student will be allowed to take the exam if he/she does not bring his/her KFUPM ID, or National/Iqama ID, or Driver's License with him/her to the exam hall.
- Students are not allowed to have their mobiles, smart watches, or any electronic device in the exam hall. A violation of this will be considered an attempt of cheating.

Missing an Exam: In case a student misses an exam (Exam I, Exam II, or the Final Exam) for a legitimate reason (such as medical emergencies), she/he must bring an official excuse from Students Affairs. Otherwise, she/he will get zero in the missed exam.

The Usage of Mobiles in Class: Students are not allowed to use mobiles for any purpose during class time. Students who want to use electronic devices to take notes must take permission from their instructor. Violations of these rules will result in a penalty decided by the instructor.

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





Syllabus

Week	Section	Material	Problems
1	Chapter 1	Interest rate Measurement	
	1.1	Interest Accumulation and Effective Rates of	5, 7, 9, 10
	1.2	Interest Present Value (excluding 1.2.1)	5, 8, 11, 12
2	1.3	Equation of Value	17, 18
	1.4	Nominal rates of Interest	3, 5, 7, 8
	1.5	Effective and Nominal Rates of Discount	4, 8, 9, 11
3	1.6	The force of Interest	2, 4, 6, 9, 11
	1.7	Inflation and the "Real" rate of Interest	1, 2, 3, 4, 7
4	Chapter 2	Valuation of Annuities	
	2.1	Level Payment Annuities	1, 7, 11, 12, 16, 19
	2.2	Level payment Annuities – Some Generalizations	1, 3, 4, 5, 9, 13
5	2.3	Annuities with Non-Constant payment	2, 3, 4, 5, 8, 10, 11, 14, 17, 18
	2.4	Applications & Illustrations (excluding 2.4.2 & 2.4.3)	3, 6, 7, 9, 11
6	Chapter 3	Loan Repayment	
	3.1	The amortization model of Loan Repayment	1, 2, 4, 5, 7, 9
	3.2	Amortization of a Loan with Level Payments (excluding 3.2.1 & 3.2.2)	3, 4, 6, 7, 8, 11, 26
7	3.3	The sinking Fund Method of Loan Repayment	3, 4, 6, 7
	Chapter 4	Bond Valuation	
8	4.1	Determination of Bond Prices	1, 3, 4
	4.2	Amortization of a Bond	3, 4, 5, 7
	4.3	Applications and Illustrations (excluding 4.3.2)	2, 4, 5, 9, 10, 14, 21
9	Chapter 5	Measuring the Rate of Return of an Investment	
	5.1	Internal Rate of Return defined and Net Present Value (excluding 5.1.4)	2, 3, 5, 6/a, 7, 10
	5.2	Dollar-weighted and Time-Weighted Rate of	1, 3, 4, 5, 6
10	5.3	return Applications and Illustrations (excluding the investment year portion of 5.3.1, 5.3.2 & 5.3.3)	1, 2, 3
	Chapter 6	The term structure of interest rates	
11	6.1	Spot Rates of Interest	1, 2, 3(a-i,b-i,c-i), 5
	6.3	Forward rates of Interest	4, 5
12	Chapter 7	Cash flow duration and Immunization	
	7.1	Duration of a set of Cash flows and Bond duration (excluding 7.1.6)	
13	7.2	Asset-liability Matching and Immunization	
	Chapter 8	Additional Topics in Finance and Investment.	
14	8.1	The dividend discount model of stock valuation	
	SOA Exam	Using Duration and Convexity to approximate	
15-16	FM Note	change in present value.	
		Review \ Exam FM Practice Problems	