

Math 437 Online Course Syllabus

Course Title

Actuarial Financial Math

Course Number

Math437-01

Instructor, Office, Email

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Class Schedule and Location

Section 1 (12/17/2021-1/24/2022), Location: Moodle online course

Office hours

There is no specified office hours. Questions can be answered through question forum on Moodle or schedule a zoom meeting by an email.

Prerequisites

Math 131 and Math 132

Recommended materials

Textbook: I have notes, the textbook is not required. If you want a book, you may buy ASM Study Manual for Exam FM 15th Edition by Cherry & Shaban at <https://www.studymanuals.com/Product/Show/453142747>

Calculator (required): Texas Instruments BA II plus calculator is recommended or following models approved by SOA,

- BA-35
- BA II Plus (**Recommended**)
- BA II Plus Professional
- TI-30Xa
- TI-30X II (IIS solar or IIB battery)
- TI-30XS MultiView (or XB battery)

Teaching Assistants

Grader: N/A

Description

This 3 credit hours course serves as a preparation for SOA's second actuarial exam in financial mathematics, known as Exam FM or Exam 2. The course provides an understanding of the fundamental concepts of financial mathematics, and how those concepts are applied in calculating present and accumulated values for various streams of cash flows as a basis for future use in: reserving, valuation, pricing, asset/liability management, investment income, capital budgeting, and valuing contingent cash flows. The main topics include time value of money, annuities, loans, bonds, general cash flows and portfolios, immunization, interest rate swaps and determinants of interest rates etc. Many questions from Past Exam FM will be practiced in the course.

Learning Objectives

1. Time Value of Money: students will understand and be able to perform calculations relating to present value, current value, and accumulated value
2. Annuities/cash flows with non-contingent payments. Students will be able to calculate present value, current value, and accumulated value for sequences of non-contingent payments
3. Loans. Students will understand key concepts concerning loans and how to perform related calculations
4. Bonds. Students will understand key concepts concerning bonds, and how to perform related calculations
5. General Cash Flows and Portfolios. Students will understand key concepts concerning yield curves, rates of return, and measures of duration and convexity, and how to perform related calculations
6. Immunization. Students will understand key concepts concerning cash flow matching and immunization, and how to perform related calculations

7. Interest Rate Swaps. Students will understand key concepts concerning interest rate swaps, and how to perform related calculations
8. Determinants of Interest Rates. Students will understand key concepts concerning the determinants of interest rates, the components of interest, and how to perform related calculations

Study Groups

When you log on the Moodle course, you may see the item “math437 study group self-selection”, where you can organize or join a study group. Group members can work together to do homework. I encourage that you should join a study group to discuss homework questions, keystrokes, course materials and formulas, which may help you understand material better, and be a quick path to prepare Exam FM.

Course Requirements

As a three-credit course running over 5-weeks you should plan to spend between 20-30 hours a week to learn, study, and interact in our online classroom. This course runs over the holiday break so you can take some days off from your studies, but you should log into our course site every two to three days to review announcements, participate in ongoing discussions, check for grades and feedback, and ensure you are engaging with the course material, your classmates, and with me.

Students should make a study plan to attend online course regularly to watch the lecture videos and complete exercises.

Complete assigned homework on Moodle.

Attend and complete the midterm and the final exam.

Course Schedule

The following is meant to give a general idea of which sections are covered in which times.

Times	Lecture	Events
12/17-19	1.1-1.11 Time Value of Money	Lectures start on Friday, 12/17
12/20-21	2.1-2.5 Practical applications Rpnw practice	

12/22-24	3.1-3.3 Annuities	Last day to add or drop 12/23
12/25-28	3.4 Annuities 4.1-4.2 Complex Annuities	12/25, Holiday christmas
12/29-31	4.3-4.5 Complex Annuities 5.1 Comparing investment	
1/1-4	4.6 Complex Annuities Midterm 5.1 Comparing investment	1/1 new year's day, Holiday Midterm is on 1/3, 10-12am EST, covers Chapter 1-4
1/5-7	5.2-5.3 Comparing investment 6.1 Loans	1/7 last day to drop with "W".
1/8-10	6.1-6.3 Loans 7.1 Bonds	
1/11-13	7.2-7.3 Bonds 8.1 Financial Instruments	
1/14-16	9.1-9.3 Determinants of Interest Rates	
1/17-20	10.1-10.3 Duration Immunization	1/17 Holiday – Martin Luther King day
1/21-23	11.1-11.3 Swap	
1/24	Final exam	Last day of classes. Final exam is on 1/24, 10-12am EST. Final exam covers chapter 5-11
Note		Final grades due 1/31

Course information and communication

This is a Moodle online course where you may find printable syllabus, PDF notes, lecture videos, exercises and homework. If you have any questions, you may ask questions through question forum on Moodle or schedule a zoom meeting by an email.

Weights of Individual Assignments toward final grade

Exercise: there is an exercise right after each video lecture. Most of exercises are the multiple-choice questions; you may follow the instruction to use the corresponding keystrokes to complete the exercise so that you can practice the keystrokes. A few

exercise are true/false questions. Exercises (138 questions) will be 30% of final grading.

Homework: We have 9 homework sets in total and there are about 111 multiple-choice questions in each homework set. Homework will be 30% of final grading.

Midterm: we will hold a 2-hour midterm with 10 multiple choice questions in total. The midterm will be 20% of final grading.

Final Exam: we will hold a 2-hour final with 10 multiple choice questions in total. The final exam will be 20% of final grading.

Online Practice SOA Exam FM: if you want to practice more questions, you take Exam FM mock test at <http://q40542.questionwritetracker.com/N8BXPANM/>

Grading Scale

The final score is calculated by adding Exercise portion (30%), Homework portion (30%), midterm portion (20%) and final exam (20%). The letter grade will be assigned by following score intervals. To receive a passing grade in the course, the average of all midterm and final exam scores must be at least a 50%.

A = 90 - 100%

A- = 87 - 89.99%

B+ = 83 - 86.99%

B = 79 - 82.99%

B- = 75 - 78.99%

C+ = 71 - 74.99%

C = 67 - 70.99%

C- = 63 - 66.99%

D+ = 59 - 62.99%

D = 55 - 58.99%

F = 0 - 54.99%

Exam Policy

The department will require one proctored midterm and a proctored final exam in this course. In order to promote the academic integrity of its UWW courses in a consistent manner, the Department of Mathematics and Statistics is requiring the use of proctoring software (RPnow) for all of its proctored exams in winter 2022. All proctoring software will provide video recordings to the instructor and reviewed as necessary. Students who enroll in this online course will have to take the midterm and the final exam within the scheduled exam time frame. Students will need to have a computer (desktop or laptop) that has a reliable internet connection and a webcam. During each proctored exam, students must follow proctoring rules and requirements set by the instructor for the course.

Please arrive 15 minutes early. You will not be admitted to the exam more than 30 minutes late.

- Do not bring any cheat sheets, formula sheet and class notes to the midterm and final exam.
- Bring your student ID to the exam.
- Calculator policy: you can only use a calculator approved by SOA during the exam.

Attendance and other class policies

Attendance: you can attend the online course flexibly to complete the assign course work in pointed period.

Special Accommodation: The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services (DS), you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify me within the first two weeks of the semester so that we may make appropriate arrangements.

Makeup Policy: For homework, you may work independent or with your group members together. This is an online course, so you can devote the homework. Therefore, there is no extension or make-up for homework unless a student has a special accommodation.

For the midterm and the final exam, unless there is an unpredicted reason, you should provide me an official document at least two week early to request a make-up exam.

Contingency plan

Before the semester, please test the technology that we use. If you have a difficulty to access the Moodle, please contact UMass OIT support <https://www.umass.edu/it/support>.

Help

The best way to get help is to send me an email at lian@math.umass.edu to schedule a zoom meeting or ask questions directly through an email.

Drops, Withdrawals, and Incompletes

The last day to drop with no record is Thursday, 12/23. The last day to drop with a W or to submit a Pass/Fail option is Friday, 1/7.

An Incomplete is possible only if: (1) you had a compelling personal reason, e.g., serious illness; (2) your work has clearly been passing; and (3) there is a good chance you'll complete the course with a passing grade within the allotted time. Thus, **failing work is no reason in itself for an Incomplete.**

Academic Honesty Statement

Since the integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, academic honesty is required of all students at the University of Massachusetts Amherst. Academic dishonesty is prohibited in all programs of the University. Academic dishonesty includes but is not limited to cheating, fabrication, plagiarism, and facilitating dishonesty. Appropriate sanctions may be imposed on any student who has committed an act of academic dishonesty. Instructors should take reasonable steps to address academic misconduct. Any person who has reason to believe that a student has committed academic dishonesty should bring such information to the attention of the appropriate course instructor as soon as possible. Instances of academic dishonesty not related to a specific course should be brought to the attention of the appropriate department Head or Chair. Since students are expected to be familiar with this policy and the commonly accepted standards of academic integrity, ignorance of such standards is not normally sufficient evidence of lack of intent (http://www.umass.edu/dean_students/codeofconduct/acadhonesty/).

Information about Exam FM

(1) You may check 2021 Computer-Based Testing (CBT) Schedule [here](#).

(2) **How can I register the test? you may register the test online**
here <https://www.soa.org/Education/Exam-Req/Registration/edu-registration.aspx>.

(3) Where should I take the Test?

2525: Springfield - West Springfield
59 Interstate Drive
Suite 25
West Springfield, MA 01089

Phone 413-733-2374

(4) What kind of calculators can I use in this course? <https://www.soa.org/education/exam-req/exam-day-info/edu-calculators.aspx>

(5) How many questions in Exam FM? How are they distributed? <https://www.soa.org/education/exam-req/edu-exam-fm-detail.aspx>

(6) Exam FM pass rate: http://www.casact.org/admissions/studytools/exam2/exam_2pass.pdf

(7) Where can I check the result of the test? <https://www.soa.org/education/exams/exam-results/edu-exam-results-detail.aspx>.

(8) Where can I find the sample exam? <https://www.soa.org/Education/Exam-Req/Syllabus-Study-Materials/edu-exam-p-online-sample.aspx>

(9) Where can I find some useful instruction for using TI BA II Plus calculator? see a brief instruction at <http://www.utdallas.edu/~merville/calculator.htm> or a detailed instruction at www.soa.org/files/pdf/FM-23-05.pdf.

Reimburse your Exam FM expense

The department will reimburse the full fee for any of the first three exams that are successfully passed. For detailed information, you may look over the following page.

<https://www.math.umass.edu/undergraduate/actuarial-science#Exam%20Fund>