

TITLE: Actex 10-Week Online Exam FM/2 Prep Course

Instructor: Rich Owens

Course Dates: March 27, 2017 – June 19, 2017

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Live Office Hours via Moodle: Monday 8:00 - 9:00pm Eastern Time,

Individual Office Hours via Skype: by Appointment

Prerequisites:

The Financial Mathematics Exam assumes a basic knowledge of calculus and an introductory knowledge of probability. As an exam prep course, a review course, this course assumes the student has completed a college-level financial mathematics course that has a mathematical emphasis.

Course Description:

While this course does not provide college credits, the course is designed to provide the student an experience similar to a university course and is similar to the one the instructor teaches at a state university. The student is provided with the discipline of a university course including weekly assigned readings, problem solving video lectures, discussion board topics, homework assignments and timed multiple-choice test similar to what may be encountered in Exam FM/2. The prior week's test will be reviewed during weekly office hours.

The SOA syllabus states, "The goal of the syllabus for this examination is to provide 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 instructor believes a key to successfully working the text problems, and passing Exam FM/2, is an understanding of the financial language. The SOA learning objectives include the following, "The candidate will be able to define and recognize the definitions of the following terms." As such, language, finance terminology, will be emphasized. If you do not understand the language, it is difficult to solve the problems.

Exam FM/2 learning objectives and learning outcomes are emphasized as shown below.

Course Goals:

The goal of the course is to sharpen students' financial math and problem-solving skills so that they can answer at least 80% of Exam FM/2 questions correctly, which we expect should lead to passing Exam FM/2.

Texts for Course:

Actex Study Manual for Exam FM, Spring 2017, John Dinius
Derivatives Markets, 3rd Edition, Robert McDonald

Other Materials for Course

Exam FM/2 Financial Mathematics Sample Exam Questions and Solutions (on Moodle)

Calculators

The SOA exams assume the use of a calculator. Being consistent with the SOA rules for calculator use during an exam, only the following Texas Instrument calculator models, with the memory cleared, should be used for all course tests, and the course exam. This will also allow you to get accustomed to using these calculators under exam-like conditions:

- BA-35 TI-30Xa
- BA II Plus* TI-30XIIS*
- BA II Plus Professional Edition* TI-30XIIB*
- TI-30XS MultiView*
- TI-30XB MultiView*.

Review of Calculator Functions for the Texas Instruments BA-35

<http://www.soa.org/files/pdf/FM-22-05.pdf>

Review of Calculator Functions for the Texas Instruments BA II Plus

<http://www.soa.org/files/pdf/FM-23-05.pdf>

TECHNICAL INFORMATION

Become familiar with the class interface before the course begins and seek help if necessary.

IT Technical Assistance

If you have IT technical questions, you can contact Actex's Help Desk. The helpdesk can be contacted at: 860-379-5470 / 1-800-282-2839 Ext 14 or email at onlinecourses@actexamdriver.com.

Course PoliciesExpectations

As a not-for-credit course, all assignments are voluntary. However, for you to get the most from the course, the expectation is that you will complete the assignments as scheduled.

Participation and Timeliness

Your regular participation and timeliness are important to your exam success. In online courses, this takes the form of participation in discussion via forums, chat, and other electronic

means provided.

As this is an online course, it is up to every student to stay on track and not fall behind. You must be self-motivated and disciplined to meet all due dates. Developing a routine is essential. It is best if all assignments are submitted by the specified time and date.

Communication

Do not hesitate to contact me with any questions or concerns. My office hours are indicated above. As individual office hours will be done via Skype, please email me your Skype name so that I can add it to my list of recognized contacts. Calls from unrecognized contacts are blocked by my system. I will typically respond to e-mail questions usually within 24/48 hours.

Reading Homework

Students are expected to read the section of the study manual before the listening to the video lectures.

Problem Solving Homework

Homework problems will be assigned from both the text and the SOA sample problems (on Moodle). If you do not understand a problem, ask a specific question, preferably on the Discussion Board so others can be helped by seeing your question and the responses. As Exam FM/2, which is totally problem based, much of the homework involves doing problems. However, it is important to read the text as it provides key insights into the subject matter.

As both the text and the SOA Sample Problems include solutions to the problems, it is important that you give the problem your best effort before you look at the solution. It is too easy to look at the solution and say, "Yea, I understand that". You must think through the problem yourself in order to succeed.

Students must work consistently on the homework in order to succeed in the course.

Individual Feedback on Homework Problems

This course provides the opportunity, but not the requirement, to receive individual feedback on up to six worked problems per week. It is up to you if you wish to submit any problems for review. If you do so, it is recommended that the problems be nicely organized with space between problems and include a statement of each problem with its solution. Please show all the steps in the solution of the problems so I can tell where there may be any misunderstanding and provide you with feedback.

Discussion Board

There will be a discussion forum each week in which students may participate. Instructions for discussion postings are an initial posting by midweek and a follow-up response post to a classmate's posting by the end of the week. To discuss a topic you will probably want to post more than two times per discussion. Discussion forums are meant to replicate a face-to-face classroom discussion.

Tests

The course will have 10 tests, one in each week of the course. The majority of the tests will consist of 24 multiple-choice questions similar to those that might be expected on Exam FM/2. You will have two hours to complete the test. There are one “mid-term” test, 24 questions, two hours. Tests in the final two weeks will be 35 questions, the same as Exam FM/2, and you will have three hours to complete. The tests will have questions both specific to the corresponding sections of the text and a few questions from prior sections of the test.

Tests will be administered on Moodle and should be completed by the end of the week, for this purpose 11:30 pm Eastern time on Sunday. However, if you are unable to take a test "on-time", tests will be available throughout the remainder of the course. Tests are closed book and closed notes. Please remember the SOA/CAS Candidate Code of Conduct, which is on Moodle, and will apply during Exam FM/2.

Weekly Journal

The purpose of the journal is for you to analyze and learn from your mistakes, to make clear to you where your learning needs improvement. The journal should be a tool to help you study for tests, our final exam, and Exam FM/2.

For each homework problem and prior week test problem that you initially did incorrectly, write in your journal a description of what you misunderstood, what you did incorrectly, what fact/formula/technique you needed to know in order to correctly solve the problem and what you learned.

For example, for the probability course, one student wrote, “On SOA problem 3, I was stumped by the problem as I did not remember the formula $P(A) = P(A \cap B) + P(A \cap B')$ where B' is not B . With this formula, I was able to get to the correct answer. On SOA problem 1, I subtracted incorrectly. Fixing this mistake leads to the correct answer.”

SOA Exam FM LEARNING OBJECTIVES

A. Time Value of Money (10-15%)

1. The candidate will be able to define and recognize the definitions of the following terms: interest rate (rate of interest), simple interest, compound interest, accumulation function, future value, current value, present value, net present value, discount factor, discount rate (rate of discount), convertible m -thly, nominal rate, effective rate, inflation and real rate of interest, force of interest, equation of value.
2. The candidate will be able to:
 - a. Given any three of interest rate, period of time, present value, current value, and future value, calculate the remaining item using simple or compound interest. Solve time value of money equations involving variable force of interest.
 - b. Given any one of the effective interest rate, the nominal interest rate convertible m -thly, the effective discount rate, the nominal discount rate convertible m -thly, or the force of interest, calculate any of the other items.
 - c. Write the equation of value given a set of cash flows and an interest rate.

B. Annuities/cash flows with payments that are not contingent (15-20%)

1. The candidate will be able to define and recognize the definitions of the following terms: annuity-immediate, annuity due, perpetuity, payable m -thly or payable continuously, level payment annuity, arithmetic increasing/decreasing annuity, geometric increasing/decreasing annuity, term of annuity.
2. For each of the following types of annuity/cash flows, given sufficient information of immediate or due, present value, future value, current value, interest rate, payment amount, and term of annuity, the candidate will be able to calculate any remaining item.
 - a. Level annuity, finite term
 - b. Level perpetuity
 - c. Non-level annuities/cash flows
 - (1) Arithmetic progression, finite term
 - (2) Arithmetic progression, perpetuity
 - (3) Geometric progression, finite term
 - (4) Geometric progression, perpetuity
 - (5) Other non-level annuities/cash flows

C. Loans (15-20%)

1. The candidate will be able to define and recognize the definitions of the following terms: principal, interest, term of loan, outstanding balance, final payment (drop payment, balloon payment), amortization, sinking fund.
2. The candidate will be able to:
 - a. Given any four of term of loan, interest rate, payment amount, payment period, principal, calculate the remaining item.
 - b. Calculate the outstanding balance at any point in time.
 - c. Calculate the amount of interest and principal repayment in a given payment.
 - d. Given the quantities, except one, in a sinking fund arrangement calculate the missing quantity.
 - e. Perform similar calculations to a-d when refinancing is involved.

D. Bonds (15-20%)

1. The candidate will be able to define and recognize the definitions of the following terms: price, book value, amortization of premium, accumulation of discount, redemption value, par value/face value, yield rate, coupon, coupon rate, term of bond, callable/non-callable.
2. Given sufficient partial information about the items listed below, the candidate will be able to calculate the any of the remaining items.
 - a. Price, book value, amortization of premium, accumulation of discount
 - b. Redemption value, face value
 - c. Yield rate
 - d. Coupon, Coupon rate
 - e. Term of bond, point in time that a bond has a given book value, amortization of premium, or accumulation of discount

E. General Cash Flows and Portfolios (10-15%)

1. The candidate will be able to define and recognize the definitions of the following terms: yield rate/rate of return, dollar-weighted rate of return, time-weighted rate of return, current value, duration (Macaulay and modified), convexity (Macaulay and modified), portfolio, spot rate, forward rate, yield curve, stock price, stock dividend.
2. The candidate will be able to:
 - a. Calculate the dollar-weighted and time-weighted rate of return.
 - b. Calculate the duration and convexity of a set of cash flows.
 - c. Calculate either Macaulay or modified duration given the other.
 - d. Use duration to approximate the change in present value due to a change in interest rate.
 - (1) Using 1st-order linear approximation based on modified duration.
 - (2) Using 1st-order approximation based on Macaulay duration.
 - e. Calculate the price of a stock using the dividend discount model.

F. Immunization (10-15%)

1. The candidate will be able to define and recognize the definitions of the following terms: cash flow matching, immunization (including full immunization), Redington immunization.
2. The candidate will be able to:
 - a. Construct an investment portfolio to fully immunize a set of liability cash flows.
 - b. Construct an investment portfolio to match present value and duration of a set of liability cash flows.
 - c. Construct an investment portfolio to exactly match a set of liability cash flows.

G. Interest Rate Swaps (0-10%)

1. The candidate will be able to define and recognize the definitions of the following terms: swap rate, swap term or swap tenor, notional amount, market value of a swap, settlement dates, settlement period, counterparties, deferred swap, amortizing swap, accreting swap, interest rate swap net payments.
2. The candidate will be able to:
 - a. Calculate the swap rate in an interest rate swap, deferred or otherwise, and with either constant or varying notional amount.
 - b. Calculate the market value of an interest rate swap, deferred or otherwise, and with either constant or varying notional amount.

H. Determinants of Interest Rates (0-10%)

1. The candidate will be able to define and recognize the components of interest rates including: real risk-free rate, inflation rate, default risk premium, liquidity premium, and maturity risk premium.
2. The candidate will be able to identify the real interest and the nominal interest rate in the context of loans with and without inflation protection and calculate the effect of changes in inflation on loans with inflation protection.
3. The candidate will be able to explain how the components of interest rates apply in various contexts, such as commercial loans, mortgages, credit cards, bonds, government securities.
4. The candidate will be able to explain the roles of the Federal Reserve and the FOMC in carrying out fiscal policy and monetary policy and the tools used by the Federal Reserve and the FOMC including targeting the Federal Funds rate, setting reserve requirements, and setting the discount rate.
5. The candidate will be able to explain the theories of why interest rates differ by term, including liquidity preference (opportunity cost), expectations, preferred habitat, and market segmentation.
6. The candidate will be able to explain how interest rates differ from one country to another (e.g., U.S. vs. Canada).