MA457 Investment and Financial Markets **Fall 2019**
Classes meet: Mo,We,Fr 08:00-9:20am in E 382

Department of Mathematical Sciences
ELIZABETHTOWN COLLEGE

Office hours: Mo,Tu,We,Th, Fr 2:00-3:30pm.

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web page for the course: `http://users.etown.edu/d/doytchinovb/ma457/`

SYLLABUS

TEXTS.

- Berk, J. and DeMarzo, P. *Corporate Finance*, (4th Edition) 2017m Pearson, ISBN: 978-0-13408-327-8.
- Robert L. McDonald *Derivatives Markets*, (3rd Edition) Addison Wesley, ISBN: 978-0-321-54308-0.
- Study note IFM-21-18: Measures of Investment Risk, Monte Carlo Simulation, and Empirical Evidence on the Efficient Markets Hypothesis.
- Study note IFM-22-18: Actuarial Applications of Options and Other Financial Derivatives.

CALCULATOR. The only calculators permitted in this course are the ones approved by SOA in their catalog. SOA permits on their exams only the following calculators:

- the battery- or solar-powered Texas Instruments BA-35 model calculator,
- the BA II Plus, the BA II Plus Professional,
- the TI-30Xa or TI-30X II (IIS solar or IIB battery).
- the TI-30XS MultiView (or XB battery)

Candidates may use more than one of the approved calculators during an examination.

For this course you are welcome to use any and all of these calculators. A TI-30XS MultiView is strongly recommended.

PREREQUISITES. MA351 Theory of Probability, MA255 Financial Mathematics

COURSE GOALS and COVERAGE. This course is designed to introduce the students to financial economics topics relevant to the actuarial field, and to prepare them for the IFM Actuarial Examination. We will cover Chapters 8 to 13, 16, and 22 to 24 of Berk and DeMarzo, most of chapters 1, 2, 3, 5, 9 to 14, and 18 of McDonald's book, and also the study notes as suggested in the SOA catalog.

A detailed list of topics can be found in the schedule on the last page of this syllabus. An even more detailed list is available as a document called *July 2019 Syllabus with Learning Objectives/ Outcomes and Readings* which available on Canvas and also at
`https://www.soa.org/globalassets/assets/files/edu/2019/2019-07-exam-ifm-syllabus.pdf`

STUDENT LEARNING OUTCOMES. By the end of this course you will be able to:

- solve problems involving actuarial models for financial economics, using fundamental concepts of calculus, probability, and interest theory.
- use mathematical software and specialized calculators to solve actuarial problems and demonstrate mathematical ideas.
- apply your learning to situations relevant to actuarial science in the areas of financial mathematics, option and bond pricing.
- communicate the results of inductive quantitative analysis effectively, both orally and in writing.
- communicate precise deductive mathematical arguments, both orally and in writing, using professionally accepted conventions of language.
- offer well-reasoned critiques of mathematical arguments presented in professional contexts.
- demonstrate the ability to work cooperatively with others.
- demonstrate the ability to engage in lifelong learning and professional growth.

ASSESSMENT. Your final grade for the course will be based on the degree of mastery of the learning outcomes listed above, as measured by performance in class, and on quizzes, tests, and the final exam.

ATTENDANCE. You are supposed to attend all lectures. Excessive absences will hurt your grade. If you miss a class, it is your responsibility to make a copy of the classnotes from another student and make sure you learn what you have missed.

You should come to class prepared to discuss homework, ask questions, and share solutions. Some homework problems will be discussed briefly in class. If all your questions are not addressed during this time, do not hesitate to seek additional help (e.g. office hours).

Absence on any occasion of evaluation (tests and exams) will result in a grade of zero for that evaluation. The only exceptions will be prior approval and written documentation. If some unavoidable circumstance comes up that will prevent you from taking an exam or test as scheduled, you must talk to me about this personally (face to face or on the telephone) and in advance.

HOMEWORK. Homework will be assigned at each lecture. It is an essential component of the learning process and should be taken seriously. Test and exam problems will be similar to homework problems, so discipline yourself to write clear and complete solutions. You are encouraged to discuss homework problems with each other.

EXAMS and GRADING POLICY. There will be four in-class tests, on (tentatively): Wednesday, September 18, Wednesday, October 9, Friday, November 1, Friday, November 22.

Each test is timed and will take 80 minutes. This time limit will be strictly enforced. There will be a comprehensive final exam on Monday, December 9, 7:30–10:30am.

All exams and tests are closed-book. For some of them you will be given formula sheets and statistical tables. No other books or notes of any sort are allowed. You should bring your approved calculator(s) to the tests and final exam.

Your final grade will be calculated in the following way:
55% of the grade come from the four Tests, (10% lowest, the others 15% each),
30% of the grade come from the Final Exam,
15% of the grade come from the Homework.

These are combined into a number of points, between 0 and 100. The ranges for the final grades are:

A	93-100
A–	90-92.9
B+	87-89.9
B	83-86.9

B–	80-82.9
C+	77-79.9
C	73-76.9
C–	70-72.9

D+	67-69.9
D	63-66.9
D–	60-62.9
F	0-59.9

SCHOOL CLOSURE POLICY. Occasionally, the college is closed and classes are cancelled due to inclement weather or other emergency situations. To minimize the negative impact of such disruptions on your learning, the following School Closure Policy will be in effect for this course. In case of school closure, an alternative form of the lecture will be provided (voice-over slides, instructional video, additional assigned reading, or a combination of these), and you will still need to complete the homework assignment. Concrete details will be communicated to you at the time of the closure announcement. In case the closure falls on an exam day, an alternative date and time for the exam will be announced.

INTEGRITY. All work you submit for grading must be your own and must comply with the Standards of Integrity set forth in the Elizabethtown College Catalog. In particular, no collaboration on quizzes or exams is allowed.

DISABILITIES. Elizabethtown College welcomes otherwise qualified students with disabilities to participate in all of its courses, programs, services, and activities. If you have a documented disability and would like to request accommodations in order to access course material, activities, or requirements, please contact the Director of Disability Services, Lynne Davies, by phone (717-361-1227) or e-mail daviesl@etown.edu.

If your documentation meets the college's documentation guidelines, you will be given a letter from Disability Services for each of your professors. Students experiencing certain documented temporary conditions, such as post-concussive symptoms, may also qualify for temporary academic accommodations and adjustments.

As early as possible in the semester, set up an appointment to meet with me, the instructor, to discuss the academic adjustments specified in your accommodations letter as they pertain to my class.

STATEMENT ON RELIGIOUS OBSERVANCES. The College is eager to facilitate individual religious beliefs and practices whenever possible while retaining course student learning outcomes. It is your responsibility to meet with the class instructor in advance to request arrangements related to your religious observances that may conflict with this class, and to make appropriate plans to make up any missed work.

The most current college policies on Disability Services and Religious Observances can be found at this link.

The following is a tentative schedule. Most of the time, we will be following it closely, but occasional deviations are to be expected.

MA457, Fall 2019 SCHEDULE

Day	Date	Topic	Textbook	ASM	Actex
Mo	08/26	The stock market and stock prices	BdM S9.5		M1L1
We	08/28	Market efficiency	BdM Ch13, IFM 21-18	4	M8L4
Fr	08/30	Mean-variance portfolio theory	BdM Ch10, Ch11	5	M1L2
We	09/04	Capital Asset Pricing Model	BdM Ch10, Ch11	6,7	M1L3
Fr	09/06	Investor behavior. Estimting cost of capital	BdM Ch12, Ch13	7,8	M2,M8
Mo	09/09	Capital structure. Modigliani-Miller theory	BdM Ch14, Ch15	9,10	M7L1
We	09/11	Financial distress and information	BdM Ch16	11	M7
Fr	09/13	Long-term financing	BdM Ch23, Ch24	12,13	M9
Mo	09/16	Review			
We	09/18	**TEST 1**			
Fr	09/20	Financial Markets and derivatives	McD 1.1-1.5	1	M3L1
Mo	09/23	Forwards and prepaid forward contracts	McD 2.1, 5.1-5.3	14,15	M3L2
We	09/25	Calls and Puts. Comparing Contracts	McD 2.2, 2.3, 2.4	16	M3L1
Fr	09/27	Synthetic forwards, put-call parity	McD 3.1, 3.2	17,18	M3L3
Mo	09/30	Spreads and collars. Convexity	McD 3.3	17,18	M3L3
We	10/02	Other combinations of options	McD 3.4	17,18	M3L3
Mo	10/07	Review			
We	10/09	**TEST 2**			
Fr	10/11	Futures contracts	McD 5.4	15	M3L4
Mo	10/14	Put-Call parity. Comparing options	McD 9.1,9.2,9.3	19	M3L3
We	10/16	Parity bounds for American options	McD 9.3,9.A,9.B	19	M6L3
Fr	10/18	Binomial pricing - single step	McD 10.1,10.3	20	M4L1
Mo	10/21	Binomial pricing - multistep	McD 10.2,10.3,10.4	21	M4L2
We	10/23	Pricing American options, foreign currency	McD 10.5, 10.6	21,22	M4L3
Fr	10/25	Options on Futures. Additional topics	McD 11.1	21,22	
Mo	10/28	Review			
We	10/30	**TEST 3**			
Fr	11/01	Lognormality. Brownian Motion	McD 18.1-18.4,18.A	23	M5L1
Mo	11/04	Estimating volatility. Historical volatility	McD 18.5	23	M5L2
We	11/06	The Black-Scholes formula	McD 12.1,12.2,12.A	24	M5L2
Fr	11/08	The "Greeks" and elasticity. Sharpe Ratio	McD 12.3,12.B	25	M5L3
Mo	11/11	Implied volatility. Sharpe Ratio. Hedging	McD 12.5,13.1–13.6,13.B	26	M5L4
We	11/13	Exotic options (Asian, Barrier, Compound)	McD 14.1–14.4,14.A	27	M6L1
Fr	11/15	Exotic options (gap, exchange, other)	McD 14.5–14.6,14.A	28	M6L2
Mo	11/18	Review			
We	11/20	**TEST 4**			
Fr	11/22	Project Analysis.	BdM S8.5	2	M6L4
Mo	11/25	Real options	BdM Ch22	30	M6L4
We	11/27	Monte-Carlo simulation	IFM 21-18, McD 19.3–19.5	3	
Mo	12/02	Measures of investment risk	IFM 21-18		M2L3
We	12/04	Actuarial applications of options	IFM 22-18	31	M8,M10
Fr	12/06	Review			
Mo	12/09	**FNAL EXAM** (7:30–10:30am, E 370)			