

Actuarial Science 303 – Spring 2016

Instructor: Kirk Peter

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Texts: *Financial Mathematics, A Guide for Actuaries and other Business Professionals, 2nd ed.*, BPP Professional Education
Exam FM Study Program Upgrade, BPP Professional Education
These two texts are sold as a bundled package, you cannot easily find the program upgrade as an individual text, so make sure that you buy the two texts together.

Exam FM Question and Answer Bank, BPP Professional Education – available at the Grainger copy center

Office: 5252C Grainger Hall

Office hours: Tuesdays – 11:00-Noon
Thursdays – 11:00 – 1:00
or by appointment

Lecture: M/W 1:00 – 2:15pm, 1175 Grainger
M/W 2:30 – 3:45 pm, 1195 Grainger

Course Objectives:

- Teach the theoretical foundations of actuarial science.
- Develop critical thinking to solve complex problems from first principles rather than memorization.
- Incorporate examples and problems both in class and in homework
- Provide an understanding of the time value of money and its impact among many different payment streams
- Provide an introduction to financial instruments, including and especially derivatives and their use in risk management.
- Give an opportunity for students to work together in groups to complete computer assignments. This will allow you to meet some of your fellow students, learn how to work together in a team and also give you good exposure to Microsoft Excel.
- Cover material for nearly all of the learning objectives and prepare students for the taking of Exam FM.

Exam Dates:	Exam #1	Friday, Feb 19th (4:00 pm)
	Exam #2	Friday, April 1st (4:00 pm)
	Exam #3	Friday, May 13th (5:05 pm)

Course Grading:	Exams – 30% each	90%
	Homework	10%

Grading Scale:	A	94-100
	AB	89-93
	B	80-88
	BC	75-79
	C	65-74
	D	55-64
	F	0-55

Course requirements:

- Because we will be going through the material at a fast pace, you are expected to have read the material in the book prior to us covering it in lecture.
- Participation in the educational process
- Completion of weekly homework and exams
- Everyone is to have one of the SOA approved financial calculators for use in exams (and homework).
Society of Actuaries approved financial models are BAI Plus, and BAI Plus Professional.

Examinations:

The examinations are not cumulative, although there is overlap in coverage from exam to exam and later topics build on earlier ones. I will announce the examination topics one week before the examination. All examinations will be closed book and closed notes.

Homework:*Written assignments:*

Weekly assignments are due to be uploaded to our course website 6:00 p.m. on Fridays. Assigned problems will be given in class on the prior Wednesday (9 days before the due date).

Computer Assignments

There will be multiple computer assignments using Excel, some of them will be group based assignments. You will be asked to scan and upload the results of your work and write up a summary of your analysis from the spreadsheet (what did you learn, what does the spreadsheet illustrate). Each assignment must identify all of the team members and be turned in by 6:00 p.m. on Fridays.

Personal Electronic Technology:

As per the Wisconsin School of Business policy, the use of personal electronic technology (e.g. cell phone, iphone, ipod, blackberry, laptop computers, mp3 player, etc.) is not allowed during lectures or exams. We believe that classroom use of such technology can serve as a distraction for the user, classmates, and the instructor, and can hinder instruction and learning. Please disable your device prior to lectures so it does not become a distraction. Any student who uses such technology during lecture will simply be asked to leave. Any student who uses such technology during an exam is in violation of the code of academic honesty of the University of Wisconsin – Madison.

Other:

- If you need accommodations due to a disability please see me as soon as possible.
- Class will start on time.
- Please bring calculators, textbooks, notes and homework to class to effectively participate.
- Class participation is important – It will help me understand how well the topics are being understood and will also help others benefit that likely have some of the same questions.
- Working through homework and plenty of practice problems is the best way to get an understanding of the material.
- Your feedback is important to me. My goal is to be as effective of a teacher as I can be – I need to know what you think.

Key Dates:

May 2nd - Exam FM Registration Deadline

June 9-20 – Exam FM Computer Based Testing

TO BE COVERED (AND TESTED) IN ACT SCI 303

Text Reference	Sections covered	Topics covered
BPP Chapter 1	1.1 through 1.9	Rates of interest, Simple interest, Compound interest, Accumulation function, Present value, Future value, Discount factor, Rate of discount, Constant and varying force of interest
BPP Chapter 2	2.1 through 2.6	Annuity immediate, Annuity due, Deferred annuity, Level payment annuity, Continuously payable annuity, Terms of annuities, Perpetuities, Equations of Value
BPP Chapter 3	3.1 through 3.6	Arithmetically increasing/decreasing annuity due & immediate, Geometrically increasing/decreasing annuity due & immediate, Continuously payable varying annuities
BPP Chapter 4	4.1 through 4.6	Nominal rates of interest (convertible p-thly), Nominal rates of discount (convertible p-thly), Effective rates of interest, Annuities due and immediate payable p-thly, Increasing & decreasing p-thly annuities
BPP Chapter 5	5.1 through 5.6	Net present value, Internal rate of return, Real rates of return, Time weighted rate of return, Dollar weighted rate of return, Investment year method, Portfolio rate method, Loans: Principal, Interest, Term, of loan, Outstanding balance, Balloon payment, Amortization schedule, Sinking fund loans
BPP Chapter 6	6.1 through 6.3	Bonds: (Term, Coupon rate, Par value, Face Value, Redemption value, Price, Yield rate, Book value, Callable/non-callable bonds, Convertible/mandatorily convertible bonds, Amortization of premium/write-up of discount), Stocks: (Price, Dividends, Dividend discount model)
BPP Chapter 7	7.1 through 7.9 (excl 7.4)	Price as a function of yield, Modified duration, Macaulay duration, Convexity, Duration and convexity of portfolios, Immunization, Full immunization, Redington Immunization, Exact cash flow matching (dedication)
BPP Chapter 8	8.1 through 8.4	Yield to maturity, Spot rates, Forward rates, Yield curves, Arbitrage opportunities related to yield rates
BPP Session 9	9.1 through 9.4	Stocks: (Ask price, Bid price, Bid-ask spread, Short selling, Short and long positions, Spot price, Stock Index), Intro to derivatives, Underlying assets, Exchange/over-the-counter trading, Credit risk, Diversifiable/non-diversifiable risk
BPP Session 10	10.1 through 10.7 (excl 10.5)	Calls, Puts, Forwards, Expiration, Expiration date, Strike price, Exercise price, Type of options: European, American, Bermudan, In-the-money, Out-of-the-money, At-the-money, Impact of Dividends on options, Payoff and net profit of option,
BPP Session 11	11.1 through 11.6	Derivative strategies, Hedging, Arbitrage, Covered Call, Naked writing, Put-call parity, Synthetic forwards, Bull spread, Bear spread, Box spread, Ratio spread, Collar, Zero-cost collar, Paylater strategies, Straddle, Strangle, Butterfly spread, Payoff and profit of all strategies
BPP Session 12	12.0 through 12.4	Hedging risk, Derivatives in the use of hedging, Reasons to hedge, Reasons not to hedge
BPP Session 14	14.1, 14.3, 14.4, 14.5	Swap, Prepaid swap, Swap spread, Swap term, Notional amount, Deferred swap, Commodity swap, Interest rate swap

TO BE COVERED (NOT TESTED) IN ADDITIONAL SCHEDULED CLASS TIME

Text Reference	Sections covered	Topics covered
BPP Session 13	13.1, 13.2, 13.3, 13.5	Prepaid forwards, Outright Purchase, Fully leveraged purchase, Futures contracts, Relationship between forwards/futures

LEARNING OBJECTIVES FROM EXAM FM WE WILL NOT COVER

Text Reference	Sections covered	Learning Objectives
BPP Session 13	13.4	Implied repo rate, Cash and carry, Reverse cash and carry, Cost of carry, Lease rate