Spring 2013 BUS 490 - Topics
Financial Mathematics

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Website: D2L
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 online)
http://www.bpptraining.com/Html/examFM.htm

Office: 1614 H Sage Hall
Office hours: T 5-6, Th 3-4:30
Lecture: Tuesday (1 x week from 6-9) Sage Hall Room TBD

Course Objectives:
• Teach the theoretical foundations of actuarial science used in financial valuations
• Develop critical thinking to solve complex problems from first principles – not just from a calculator
• Cover material for nearly all of the learning objectives and prepare students for the taking of Exam FM
• Extensive use of problems and examples for partial preparation for SOA Exam 2- FM
• 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

Prerequisites: Math 172 and Math 301 or Econ 473, or consent of instructor

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 or 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 BAII Plus, and BAII Plus Professional.

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

Grading Scale:
92 - 100 = A
90 - 92 = A-
88 - 90 = B+
82 - 88 = B
80 - 82 = B-
78 - 80 = C+
72 - 78 = C
70 - 72 = C-
60 - 70 = D
BELOW 60 = F

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.
Exam Dates:
- Exam #1 Due March 5th (Chapters 1-5)
- Exam #2 Due April 9th (Chapters 6-10)
- Exam #3 Due May 7th (Chapters 11-14)

Homework:
Written assignments:
Weekly assignments are due in the D2L dropbox by 11:59 p.m. on Fridays. Assigned problems will be given in class on the prior Wednesday (~9 days before the due date). Assignments may require you to use Excel. Any work completed in Excel should also be placed in the dropbox (along with your write-up). You will be asked to present your solutions in class and explain them in detail – so be prepared!!

To BE COVERED (AND TESTED) IN BUS 499: Financial Mathematics

<table>
<thead>
<tr>
<th>Text Reference</th>
<th>Sections covered</th>
<th>Topics covered</th>
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</thead>
<tbody>
<tr>
<td>BPP Chapter 1</td>
<td>1.1 through 1.9</td>
<td>Rates of interest, Simple interest, Compound interest, Accumulation function, Present value, Future value, Discount factor, Rate of discount, Constant and varying force of interest</td>
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<tr>
<td>BPP Chapter 2</td>
<td>2.1 through 2.6</td>
<td>Annuity immediate, Annuity due, Deferred annuity, Level payment annuity, Continuously payable annuity, Terms of annuities, Perpetuities, Equations of Value Arithmetically increasing/decreasing annuity due &amp; immediate, Geometrically increasing/decreasing annuity due &amp; immediate, Continuously payable varying annuities</td>
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<tr>
<td>BPP Chapter 3</td>
<td>3.1 through 3.6</td>
<td>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 &amp; decreasing p-thly annuities</td>
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<tr>
<td>BPP Chapter 4</td>
<td>4.1 through 4.6</td>
<td>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</td>
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<tr>
<td>BPP Chapter 5</td>
<td>5.1 through 5.6</td>
<td>Bonds: (Term, Coupon rate, Par value, Face Value, Redemption value, Price, Yield rate, Book value, Callable/non-callable bonds, Convertible/mandatory convertible bonds, Amortization of premium/write-up of discount), Stocks: (Price, Dividends, Dividend discount model), 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)</td>
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<tr>
<td>Exams</td>
<td>1.1-5.6</td>
<td>Sections 1-5</td>
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<tr>
<td>Spring Break</td>
<td>6.1 through 6.3</td>
<td>Yield to maturity, Spot rates, Forward rates, Yield curves, Arbitrage opportunities related to yield rates</td>
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<td>7.1 through 7.9</td>
<td>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</td>
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<td>(excl 7.4)</td>
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<td>8.1 through 8.4</td>
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<td>9.1 through 9.4</td>
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Note: The table above provides a summary of the topics covered in each chapter of the BPP textbook for BUS 499: Financial Mathematics. The sections covered and topics are based on the schedule and assignments provided in the course.
<table>
<thead>
<tr>
<th>Session/Week</th>
<th>Topics</th>
</tr>
</thead>
</table>
| BPP Session 10  
Week 9  
April 2nd | 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, |
| Exam 2  
Take Home  
No Class  
Week 10  
April 9th | 6.1-10.7 (excl 10.5)  
Sections 6-10 |
| BPP Session 11  
Week 11  
April 16th | 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  
BPP Session 13  
Week 12  
April 23rd | 12.0 through 12.4  
13.1, 13.2, 13.3, 13.5  
Hedging risk, Derivatives in the use of hedging, Reasons to hedge, Reasons not to hedge Prepaid forwards, Outright Purchase, Fully leveraged purchase, Futures contracts, Relationship between forwards/futures |
| BPP Session 14  
Week 14  
April 30th | 14.1, 14.3, 14.4, 14.5, 13.4  
Swap, Prepaid swap, Swap spread, Swap term, Notional amount, Deferred swap, Commodity swap, Interest rate swap, Implied repo rate, Cash and carry, Reverse cash and carry, Cost of carry, Lease rate |
| Exam 3  
Take Home  
No Class  
Week 15  
Sections 11-14 |

**Attendance:** Attendance of classes is very important in gaining an understanding of the material put forth in the lectures and the text. It is expected that you will attend classes regularly. Attendance will be used to determine borderline grades.

**Academic Dishonesty:** “Dishonesty of any kind with respect to examinations, course assignments, alteration of records or illegal possession of examinations shall be considered cheating. It is the responsibility of the student not only to abstain from cheating, but also avoid making it possible for others to cheat. Any student who knowingly helps another student to cheat is as guilty of cheating as the student he/she assists. As permitted by University policy, it is the practice of the instructor to assess a penalty to any student found guilty of academic dishonesty on exams or other course work. The penalty imposed shall be commensurate with the degree of seriousness of the offense and may range from a lowered grade on a given assignment, examination, paper, or project to a failing grade for the course.

**Special Accommodations:** Any student with special needs is encouraged to make arrangements with the instructor early in the semester.

**Ethics**

Academic dishonesty is a very poor investment; the risk/return profile is most unfavorable. In particular, in the event of academic dishonesty, I will, with 100 percent certainty, (1) immediately dismiss you from the class with a failing grade and (2) forward your case with a recommendation for immediate and permanent expulsion from the university. You are responsible for the knowing the UW Oshkosh Student Code of Conduct! Furthermore, ethical behavior is valued by most firms. I, again, suggest that you become familiar with the CFA Institute Code for Professional Conduct. Posted on the CFA institute’s Web Page ([www.cfai.org](http://www.cfai.org))