Course outline: the course has two goals:

1. to introduce basic notions of the theory of interest,
2. serve as a preparation for a portion of the SOA/CAS Exam FM/2.

You’ll have an in-class problems, homework assignments, four 1 hour exams during the session, and a final exam.

In-Class Problems: An in-class problem set (ICPS) will be given at least once a week. You are encouraged to discuss ICPs with one or two of your classmates.

Homework: This is important information: I will not accept homework that does not conform to the guidelines that follow! The homework is available on blackboard. Please print out the homework, complete the assignment on the printed sheets. Homework assignments you turn in must be organized and stapled.

In-term exams: Four exams will be administered during regular lecture time and will take place in the same classroom. Each exam will focus mostly on the material covered since the previous exam, but - due to the cumulative nature of the course material - it is quite possible that some of the problems will refer to earlier material. Anybody whose overall average score in is at least 93 and has a perfect attendance will get an automatic A and will not be required to take the final exam. To clarify the last point: If you want to be exempt from the final exam, you must take all four in-term exams, do all ICPS and all homework assignments and the overall average score must be 93% or more and must have a perfect attendance.

Final exam: The final exam is going to be comprehensive. That means that any material covered in class or assigned as reading can (and probably will) appear. The date and time of the final will be announced by the registrar’s office about 1-2 weeks prior to the end of the term.

These are the things you should bring to the exams:

1. a sufficient amount of paper to work on and hand-in your solutions on;
2. Calculators of any kind - the following are allowed at CAS/SoA exams: Texas Instruments BA-35 or BA II Plus or TI-30X or TI-30Xa or TI-30XI.

Your scores during the semester will be incorporated into your final grade according to the following scheme:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>5%</td>
</tr>
<tr>
<td>ICPS</td>
<td>7%</td>
</tr>
<tr>
<td>In-term Exams</td>
<td>48% (12% each)</td>
</tr>
<tr>
<td>Final</td>
<td>40%</td>
</tr>
</tbody>
</table>

Letter grades are determined from the numerical grades as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93-100</td>
</tr>
<tr>
<td>A-</td>
<td>90-92</td>
</tr>
<tr>
<td>B+</td>
<td>87-89</td>
</tr>
<tr>
<td>B</td>
<td>83-86</td>
</tr>
<tr>
<td>B-</td>
<td>80-82</td>
</tr>
<tr>
<td>C+</td>
<td>77-79</td>
</tr>
<tr>
<td>C</td>
<td>73-76</td>
</tr>
<tr>
<td>C-</td>
<td>70-72</td>
</tr>
<tr>
<td>D+</td>
<td>67-69</td>
</tr>
<tr>
<td>D</td>
<td>63-66</td>
</tr>
<tr>
<td>D-</td>
<td>60-62</td>
</tr>
<tr>
<td>F</td>
<td>0-59</td>
</tr>
</tbody>
</table>

As a matter of Math Department policy, the I grade (incomplete) will be given only rarely. It is intended to cover real emergency situations in which a student who is doing reasonably well (C- or better) is unable due to circumstances beyond the student's control, to complete all course requirements (e.g., is unable to take the final exam due to hospitalization). An I grade may not be used to rescue a failing grade, or to postpone the final.
In the end, let me caution you that
– no late homework will be accepted and
– there will be no make-up in-term exams. If you provide me with a written proof that your absence was
“legitimate”(e.g., a note from your doctor or your lawyer), you can expect one and ONLY one in-term grade
dropped and your in-term average calculated based on the remaining two scores. If you miss an in-term exam,
you are immediately out of contention for the automatic A based on the in-term average.

**Attendance:** Students are expected to attend all classes, and are responsible for all the information given when
they are absent. The best way to learn the material is to attend *every* class, and pay *full* attention in class. In this
course, if you miss three classes, you will be dropped two letter grades from whatever you attain as a final
average. Missing four or more classes, you will be asked to withdraw from the class.

**Issues with the Course/Instructor:** If you have issues with this course and/or instructor which you are not
comfortable discussing with your instructor, you should contact the Teaching Director, Prof. Massey, at
d.massey@northeastern.edu.

**Academic Honesty:** Collaboration on tests is not allowed. From Student Code of Conduct (see
http://www.northeastern.edu/osccr/academicintegrity): ”A necessary prerequisite to the attainment of the goals of
the University is maintaining complete honesty in all academic work. Students are expected to present as their
own only that which is clearly their own work in tests and in any material submitted for credit. Students may not
assist others in presenting work that is not their own. ... Offenders are subject to disciplinary action.” For more on
Academic Integrity see:  http://www.northeastern.edu/registrar/courses/cat1213-univ-proc.pdf

**Miscellaneous Policies:**

1- Any student with a disability is encouraged to meet with the instructor during the first week of classes to
discuss accommodations. The student must bring a current Memorandum of Accommodations from the
Office of Student Disability Services.

2- If you are an athlete and have conflicts with an important class activity (in-term exams, or final), you should
let me know before the end of second week of classes. You should also bring an official letter from the
Office of Athletics.

3- All electronic devices (mobile phones, laptops etc.) should be turned off during class time, quizzes, and
exams. **Any student who fails to abide by this policy will lose 1% of the final grade each time this
policy is violated.**

4- Please complete the TRACE evaluations at the end of the course.

Note: It is your responsibility to be aware of any changes the instructor may make to the syllabus as they
are announced in class. Students are responsible for all information given when they are absent.

**Some Important Dates:**

**September 27** is the last day to drop a class without a W grade.

**September 30** is the last day to file a Final Exam Conflict Form.

**December 8** is the last day to drop a class with a W grade.

Topics drawn from Theory of Interest, including {rates of interest, annuities, amortization, bonds, tocks.
Applications and practice with problems from finance.
The growth of money
1.2 What is interest?
1.3 Accumulation and amount functions
1.4 Simple interest / Linear accumulation functions
1.5 Compound interest (The usual case!)
1.6 Interest in advance / The effective discount rate
1.7 Discount functions / The time value of money
1.8 Simple discount
1.9 Compound discount
1.10 Nominal rates of interest and discount
1.11 A friendly competition (Constant force of interest)
1.12 Force of interest

Equations of value and yield rates
2.2 Equations of value for investments involving a single deposit made under compound interest
2.3 Equations of value for investments with multiple contributions
2.4 Investment return
2.5 Reinvestment considerations
2.6 Approximate dollar-weighted yield rates
2.7 Fund performance

Annuities (annuities certain)
3.2 Introduction
3.3 Annuities immediate
3.4 Annuities due
3.5 Perpetuities
3.6 Deferred annuities and values on any date
3.7 Outstanding loan balances
3.8 Nonlevel annuities
3.9 Annuities with payments in geometric progression
3.10 Annuities with payments in arithmetic progression
3.11 Yield rate examples involving annuities
3.12 Annuity symbols for nonintegral terms
3.13 Annuities governed by general accumulation functions

Annuities with different payment and conversion periods
4.2 Introduction
4.3 Level annuities with payments less frequent than each interest period
4.4 Level annuities with payments more frequent than each interest period
4.5 Annuities with payments less frequent than each interest period and payments in arithmetic progression
4.6 Annuities with payments more frequent than each interest period and payments in arithmetic progression
4.7 Continuously paying annuities

Loan repayment
5.2 Introduction
5.3 Amortized loans and amortization schedules
5.4 The Sinking Fund method

Bonds
6.2 Introduction
6.3 Bond alphabet soup and the basic price formula
6.4 The premium-discount formula
6.5 Other pricing formulas for bonds
6.6 Bond amortization schedules
6.9 Yield rate examples

Arbitrage, term structure of interest rates, and derivatives
8.2 Introduction
8.3 Arbitrage

Interest rate sensitivity
9.2 Overview
9.3 Duration