STAT2032
Financial Mathematics

Course Description
Compound interest functions; valuation of annuities certain; loans repayable by instalments; comparison of value and yield of cash flow transactions; valuation of fixed interest securities, with and without tax on interest and capital gains; duration and volatility of securities; introduction to concept of immunisation and matching; consumer credit contracts; introduction to stochastic interest rate models.

<table>
<thead>
<tr>
<th>Semester and Year</th>
<th>S1 2015</th>
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<tbody>
<tr>
<td>Mode of Delivery</td>
<td>On campus</td>
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<tr>
<td>Prerequisites</td>
<td>Completion of STAT1008 Quantitative Research Methods or STAT1003 Statistical Techniques</td>
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<tr>
<td>Course Convener</td>
<td>Dr Bronwyn Loong</td>
</tr>
<tr>
<td>Office Location:</td>
<td>CBE Building 26C Rm 4.23</td>
</tr>
<tr>
<td>Phone:</td>
<td>6125 7312</td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:bronwyn.loong@anu.edu.au">bronwyn.loong@anu.edu.au</a></td>
</tr>
<tr>
<td>Consultation hours:</td>
<td>Bridget Browne, Xi Lin, Xun Chun Tee</td>
</tr>
<tr>
<td>Student Administrators</td>
<td>Anna Pickering</td>
</tr>
<tr>
<td></td>
<td>Level 4, CBE Building 26C</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:anna.pickering@anu.edu.au">anna.pickering@anu.edu.au</a></td>
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COURSE OVERVIEW

Course Learning Outcomes
To achieve an understanding of and facility in:

2. Nominal and effective rates of interest and discount, and the force of interest.
5. Loan valuation and payments.
6. Capital budgeting including NPV, IRR and DPP. Measuring investment performance. TWRR and MWRR.
10. An introduction to stochastic interest rate models.

Research-Led Teaching
Where possible, topics covered will be related to current research problems.

Technology, Software, Equipment
The use of Microsoft Excel may assist in learning

Student Feedback
All CBE courses are evaluated using Student Experience of Learning and Teaching (SELT) surveys, administered by Planning and Statistical Services at the ANU. These surveys are offered online, and students will be notified via email to their ANU address when surveys are available in each course. Feedback is used for course development so please take the time to respond thoughtfully. Course feedback is anonymous and provides the Colleges, University Education Committee and Academic Board with opportunities to recognise excellent teaching and to improve courses across the university. For more information on student surveys at ANU and reports on feedback provided on ANU courses, visit http://unistats.anu.edu.au/surveys/selt/students/ and http://unistats.anu.edu.au/surveys/selt/results/learning/
## COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Summary of Activities</th>
<th>Assessment</th>
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<tbody>
<tr>
<td>1</td>
<td>Cashflow models. Simple and compound interest. Accumulated and present values.</td>
<td></td>
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<tr>
<td>2</td>
<td>Nominal and effective rates of interest and discount. Force of interest.</td>
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<tr>
<td>3</td>
<td>Introduction to annuities and their valuation.</td>
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<tr>
<td>4</td>
<td>Perpetuities. Continuous, increasing, decreasing and indexed annuities.</td>
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<tr>
<td>5</td>
<td>Equations of value. Introduction to linear interpolation and annuity tables. Dealing with inflation.</td>
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<tr>
<td>6</td>
<td>Loan valuation and payments. Capital budgeting including NPV, IRR and DPP.</td>
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<tr>
<td>7</td>
<td>Measuring investment performance. TWRR and MWRR.</td>
<td>Mid-semester exam</td>
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<tr>
<td>8</td>
<td>Valuation of fixed interest securities, with and without tax on interest and capital gains.</td>
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<tr>
<td>10</td>
<td>Arbitrage and valuation of forward contracts. Yield curve and term structure of interest rates. Calculating forward and spot rates.</td>
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<tr>
<td>11</td>
<td>Interest rate risk: duration, effective duration and convexity. Conditions for and determination of immunisation.</td>
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<tr>
<td>12</td>
<td>Introduction to stochastic interest rate models.</td>
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<tr>
<td>13</td>
<td>Revision – practice questions presented in class</td>
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## COURSE ASSESSMENT

### Assessment Summary

<table>
<thead>
<tr>
<th>Item</th>
<th>Title</th>
<th>Description</th>
<th>Value</th>
<th>Due Date</th>
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<tbody>
<tr>
<td>1</td>
<td>Mid-semester exam</td>
<td>Redeemable</td>
<td>25% (or 0%)</td>
<td>Week beginning Monday 30 March</td>
</tr>
<tr>
<td>2</td>
<td>Final Exam</td>
<td>Compulsory</td>
<td>75% (or 100%)</td>
<td>TBA</td>
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</table>
Assessment Task 1: Midsemester Exam
Details of task:
The mid-semester exam will be 1.5 hours long and will cover learning objectives LO1-LO6. Specific details regarding examination conditions and the time and location for this examination will be provided once confirmed. The mid-semester exam is redeemable, meaning that you will get the better of the two breakdowns 25+75 and 0+100. That is, if you do better in the final exam than in the mid-semester exam, your mid-semester exam will not count and your final exam will count 100%.

There will be no special examinations for the mid-semester exam. Instead the weighting will be moved to the final exam.

If you choose not to sit the mid-semester exam, your final exam will definitely count 100%.

Assessment Task 2: Final Exam
Details of task:
The final examination will be 3 hours long and will cover the entire syllabus. Specific details regarding examination conditions and the time and location for this examination will be provided once confirmed.

All examinations are closed-book. A formula sheet will be provided. You are also allowed to bring in a non-programmable calculator and a dictionary (these must not contain any material added by the student, and will be subject to random checks during the course of the examination).

Scaling
Your final mark for the course will be based on the raw marks allocated for each assignment or examination. However, your final mark may not be the same number as produced by that formula, as marks may be scaled. Any scaling applied will preserve the rank order of raw marks (i.e. if your raw mark exceeds that of another student, then your scaled mark will exceed or equal the scaled mark of that student), and may be either up or down.

READING LISTS

THERE IS NO PRESCRIBED TEXTBOOK FOR THE COURSE. Students will be provided with all materials they require to complete the course through lecture notes, tutorial questions, supplementary exercises and practice exams.

Some recommended books:

- “Mathematics of Investment and Credit” by Samuel A Broverman, published by Actex

If you are planning to pursue later year actuarial courses at ANU, at some stage during your degree you will need to obtain a copy of the book Formulae and Tables for Actuarial Examinations (2002). This is optional for STAT 2032. The book contains interest rate tables and a variety of other actuarial tables and formulae. It can be purchased through the University bookshop or ordered directly through ACTED Australia (website: www.acted.com.au).

Interest rate tables that you will need for STAT 2032 will be provided on the course website and as part of the formula sheet in the examinations.
COMMUNICATION

Email
If necessary, the lecturers and tutors for this course will contact students on their official ANU student email address. Information about your enrolment and fees from the Registrar and Student Services’ office will also be sent to this email address.

Announcements
Students are expected to check the Wattle site for announcements about this course, e.g. changes to timetables or notifications of cancellations. Notifications of emergency cancellations of lectures or tutorials will be posted on the door of the relevant room.

Course URLs
All course materials will be available on Wattle, the University's online learning environment. Log on to Wattle using your student number and your ISIS password. (https://wattle.anu.edu.au).

TUTORIAL AND/OR SEMINAR REGISTRATION
Enrolment in tutorials will be completed online using the CBE Electronic Teaching Assistant (ETA). To enrol, follow these instructions:

1. Go to http://eta.fec.anu.edu.au
2. You will see the Student Login page. To log into the system, enter your University ID (your student number) and password (your ISIS password) in the appropriate fields and hit the Login button.
3. Read any news items or announcements.
4. Select "Sign Up!" from the left-hand navigation bar.
5. Select your courses from the list. To select multiple courses, hold down the control key. On PCs, this is the Ctrl key; on Macs, it is the key. Hold this key down while selecting courses with the mouse. Once courses are selected, hit the SUBMIT button.
6. A confirmation of class enrolments will be displayed. In addition, an email confirmation of class enrolments will be sent to your student account.
7. For security purposes, please ensure that you click the LOGOUT link on the confirmation page, or close the browser window when you have finished your selections.
8. If you experience any difficulties, please contact the School Office (see page 1 for contact details).
9. Students will have until 5pm Wednesday 25 February to finalise their enrolment in tutorials. After this time, students will be unable to change their tutorial enrolment.
POLICIES

The University offers a number of support services for students. Information on these is available online from http://students.anu.edu.au/studentlife/

ANU has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University's academic standards, and implement them. You can find the University's education policies and an explanatory glossary at: http://policies.anu.edu.au/

Students are expected to have read the Student Academic Integrity Policy before the commencement of their course.

Other key policies include:

- Student Assessment (Coursework)
- Student Surveys and Evaluations

ACTUARIAL PROFESSION INFORMATION

Exemption from Actuarial Professional examination

The Australian National University is accredited by the Actuaries Institute to provide students with exemptions from the Part I professional examinations of the Institute. Exemptions are recommended subject to obtaining sufficiently high grades in designated courses. This course closely follows the syllabus of Subject CT1 of the IAAust.

To qualify for an exemption from the IAAust professional examination CT1, students are required to receive a mark of 60% or greater in this course. The standard required by the Institute of Actuaries of Australia for an exemption will be upheld and thus no quota applies to the percentage of students receiving each grade in this course.

University subscription to the Institute of Actuaries

The Institute of Actuaries of Australia (IAAust) allows students to become IAAust University Subscribers free of charge. Full time undergraduates studying at an Institute accredited university who are members of a university student actuarial society are eligible. To sign up, go to http://www.actuaries.asn.au/Membership/MembershipoftheInstitute/Subscriber.aspx

The University Subscriber offer is not a membership of the IAAust but a subscription to receive information on career opportunities, invitations to selected IAAust events and online publications. You might also consider joining the IAAust – there are advantages in doing so while a full-time student. For membership information, go to http://www.actuaries.asn.au/Membership/MembershipoftheInstitute.aspx