ACST8033
Investment and Asset Modelling

This course covers investment and asset modelling for the purpose of liability portfolio management in the financial services industry, with a specific focus on life insurers, general insurers and superannuation funds. The course will cover development of investment strategies with regard to liability characteristics and within regulatory constraints. The use of long term stochastic actuarial models of assets and liabilities in the context of designing and monitoring investment strategies will be covered, including model characteristics and limitations.

This subject, in conjunction with ACST4031/8040 and ACST4032/8041, provides the opportunity for exemption from the Part II academic requirements of the Actuaries Institute. Such exemption depends on the grades attained over all three subjects.

<table>
<thead>
<tr>
<th>Mode of Delivery</th>
<th>On campus</th>
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<tbody>
<tr>
<td>Prerequisites</td>
<td>STAT3038 or STAT6045</td>
</tr>
<tr>
<td>Incompatible Courses</td>
<td>Dr. Fei Huang</td>
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<tr>
<td>Course Convener:</td>
<td>Dr. Fei Huang</td>
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<td>6125 7390</td>
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<td><a href="mailto:fei.huang@anu.edu.au">fei.huang@anu.edu.au</a></td>
</tr>
<tr>
<td>Office hours for student consultation:</td>
<td>TBA</td>
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<tr>
<td>Research Interests</td>
<td>Stochastic Investment Modelling, Stochastic Mortality Modelling</td>
</tr>
<tr>
<td>Relevant administrator</td>
<td>Maria Lander</td>
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<td>Email:</td>
<td><a href="mailto:maria.lander@anu.edu.au">maria.lander@anu.edu.au</a></td>
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http://programsandcourses.anu.edu.au/course/ACST4033
COURSE OVERVIEW

Learning Outcomes
The learning objectives are based on the Part IIB syllabus which can be found in full at the end of the Course Outline. Upon successful completion of the requirements for this course, students will be able to:

- Demonstrate an understanding of the characteristics, returns and risk factors of the different types of investment
- Apply the methods used for the valuation of investments
- Develop an understanding of the major economic, financial and practical theories relevant to investment
- Understand the impact of the liabilities on investment objectives and constraints
- Describe the characteristics and limitations of the major stochastic investment models
- Derive relevant assumptions for each of these models
- Demonstrate the ability to build a relevant stochastic model
- Formulate an appropriate investment strategy for a given liability portfolio
- Discuss the practical implementation of investment strategy

Assessment Summary

<table>
<thead>
<tr>
<th>Assessment Task</th>
<th>Value</th>
<th>Due Date</th>
<th>Date for Return of Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mid-semester Exam (redeemable)</td>
<td>20%</td>
<td>Week 6</td>
<td>TBA</td>
</tr>
<tr>
<td>2. Assignment</td>
<td>10%</td>
<td>Week 10</td>
<td>23rd October</td>
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<tr>
<td>3. Final Exam</td>
<td>70%</td>
<td>TBA</td>
<td>TBA</td>
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Research-Led Teaching
This course covers the relevant parts of the Actuaries Institute Part II syllabus. It will be informed by practical examples and case studies of relevance to professional and research issues currently faced by the profession.

There will also be several guest speakers throughout the course. These speakers have many years of experience and professional practice.

Feedback
Staff Feedback
Students will be given feedback in the following forms in this course:

- Written comments
- Feedback to the whole class, to groups, and to individuals

Student Feedback
ANU is committed to the demonstration of educational excellence and regularly seeks feedback from students. One of the key formal ways students have to provide feedback is through Student Experience of Learning Support (SELS) surveys. The feedback given in these surveys is anonymous and provides the Colleges, University Education Committee and Academic Board with opportunities to recognise excellent teaching, and opportunities for improvement.

For more information on student surveys at ANU and reports on the feedback provided on ANU courses, go to
Policies
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 Academic Misconduct Rules 2014 before the commencement of their course.

Other key policies include:
• Student Assessment (Coursework)
• Student Surveys and Evaluations

Required Resources
All basic course materials will be available on Wattle. Students will be required to print these out themselves if they want a hard copy of them.

Examination material or equipment
Details about the material or equipment that is permitted in an examination room will be provided in class and on Wattle.

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>Investment Characteristics</td>
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<tr>
<td>2</td>
<td>Valuation</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Investment Theories</td>
<td>Online Quiz available</td>
</tr>
<tr>
<td>4</td>
<td>Investment Theories</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Investment Theories</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Stochastic Asset Modelling</td>
<td>Mid-semester Exam</td>
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<tr>
<td>7</td>
<td>Stochastic Asset Modelling</td>
<td></td>
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<tr>
<td>8</td>
<td>Stochastic Asset Modelling</td>
<td></td>
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<tr>
<td>9</td>
<td>Impact of Liabilities</td>
<td></td>
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<tr>
<td>10</td>
<td>Investment Strategy</td>
<td>Assignment due</td>
</tr>
<tr>
<td>11</td>
<td>Investment Strategy</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Investment Strategy / Review</td>
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<tr>
<td></td>
<td>Examination period</td>
<td>Final Exam (TBA)</td>
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ASSESSMENT REQUIREMENTS

As a further academic integrity control, students may be selected for a 15 minute individual oral examination of their written assessment submissions. Any student identified, either during the current semester or in retrospect, as having used ghost writing services will be investigated under the University’s Academic Misconduct Rule.

Assessment Tasks

Assessment Task 1: Mid-semester Exam (redeemable)
Details of task:
The mid-semester exam is redeemable and optional for this course. No deferred mid-semester examinations will be offered, instead the weighting will be moved to the final exam. The mid-semester exam will be closed book, and you will be permitted to bring in a calculator, and an English dictionary. Further details relating to the exam will be provided closer to the scheduled date.
Value: 20%
Date: Specific date to be advised.

Assessment Task 2: Assignment
Details of task:
The assignment is a group assignment and students are free to choose both the group size (up to three) and composition. The assignment can also be completed individually if preferred. The assignment question will be available on Wattle from 18th September and it will be due by 4pm on 9th October. Details will be provided in class and on Wattle.
Word limit (where applicable): 3000
Value: 10%
Presentation requirements: NA
Estimated return date: 23rd Oct
Individual Assessment in Group Tasks (where applicable): All group members will share the same grade.

Assessment Task 3: Final Exam
Details of task:
The final examination is compulsory and will be conducted in computer labs, that is, the student is allowed to use Microsoft Excel and R/RStudio to answer some questions, but the answers must be recorded in the script books provided. The Excel spreadsheets and R scripts will NOT be marked. The final exam will be open book, and you will be permitted to bring in a calculator, an English dictionary and any hardcopy materials (electronic devices are not allowed). Further details relating to the exam will be provided closer to the scheduled date.
Value: 70% or 90% depending on results of other redeemable assessment tasks.
Date: Specific date to be advised.

Examination(s)
The course includes formal examination through a mid-semester and final examination as described above.
Assignment submission

Hard Copy Submission: All assignments must be submitted to the School Office on level 4 of the CBE building and must include a cover sheet. Email and fax submissions are not acceptable. You must keep a copy of assessment materials submitted for your records. Assignments must include the cover sheet available on Wattle. Please keep a copy of tasks completed for your records.

Extensions and penalties

The Course Convener may grant extensions for assessment pieces that are not examinations or take-home examinations. If you need an extension, you must request it in writing on or before the due date. If you have documented and appropriate medical evidence that demonstrates you were not able to request an extension on or before the due date, you may be able to request it after the due date.

No submission of assessment tasks without an extension after the due date will be permitted. If an assessment task is not submitted by the due date, a mark of 0 will be awarded.

Returning assignments

Marked assessments will be returned as soon as they are marked, at the next available lecture time, or you will be able to collect them from the course convenor.

Resubmission of assignments

Students are not allowed to resubmit assignments.

Referencing requirements

All sources accompanying your work must be properly cited. Harvard referencing is most preferable (https://academicskills.anu.edu.au/resources/handouts/referencing-style-guides). Accepted academic practice can be found via the links on the Wattle sites, under the file named “ANU and College Policies, Program Information, Student Support Services and Assessment”. For a more interactive guide on what this is all about, please see http://library.acadiau.ca/tutorials/plagiarism/.

Recommended Reading List:

Investment Principles for Actuaries, by Fitzherbert R. (2004),

Recommended reading: Chapters 9,10,12,14

Recommended reading: Part 2: Investments
The above books are not compulsory but recommended and will be placed in the 2-hour reserve loan section in Chifley Library. Other relevant reading material will be distributed via Wattle during the semester.

**Scaling**
Your final mark for the course will be based on the raw marks allocated for each of your assessment items. 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 be the same as the scaled mark of that student), and may be either up or down.

**Privacy Notice**
The ANU has made a number of third party, online, databases available for students to use. Use of each online database is conditional on student end users first agreeing to the database licensor’s terms of service and/or privacy policy. Students should read these carefully.

In some cases student end users will be required to register an account with the database licensor and submit personal information, including their: first name; last name; ANU email address; and other information.

In cases where student end users are asked to submit ‘content’ to a database, such as an assignment or short answers, the database licensor may only use the student’s ‘content’ in accordance with the terms of service – including any (copyright) licence the student grants to the database licensor.

Any personal information or content a student submits may be stored by the licensor, potentially offshore, and will be used to process the database service in accordance with the licensors terms of service and/or privacy policy.

If any student chooses not to agree to the database licensor’s terms of service or privacy policy, the student will not be able to access and use the database. In these circumstances students should contact their lecturer to enquire about alternative arrangements that are available.

**University subscription to the Actuaries Institute**
The Actuaries Institute (IAAust) allows students to become IAAust University Subscribers free of charge. To sign up, go to

http://actuaries.asn.au/becoming-an-actuary/becoming-a-university-subscriber

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://actuaries.asn.au/becoming-an-actuary/becoming-a-member

**General information for actuarial students**
A generic Wattle site has been created for actuarial students called “Actuarial Students’ News and Information”. The purpose of this page is to provide actuarial students with up to
date news on the actuarial profession, requirements for qualification, job opportunities and
any other relevant information. To access it, login to Wattle and in the “Search Courses”
box at the top of the page search for “Actuarial”. Then find the link to the “Actuarial
Students’ News and Information” page and click on it, selecting “Yes” to enrol in the
course. You will remain enrolled in the site for the remainder of your degree at ANU.

**Exemption Standard**
The standard for exemptions from the Institute Part II is achievement of a weighted
Distinction grade average (70% or better) over the combination of each of the three units
ACST4031/8040, ACST4032/8041 and ACST4033/8033, with a minimum requirement of
60% in each unit.

The weights will be:

- ACST4031/8040: 33.3%
- ACST4032/8041: 33.3%
- ACST4033/8033: 33.3%

**SUPPORT FOR STUDENTS**
The University offers a number of support services for students. Information on these is
Part IIB – Investment and Asset Modeling Syllabus 2010

Unit 1: The Investment Process

Describe and critically evaluate the types of investments; their attributes in varying circumstances; valuation methods including assumptions and limitations; and the critical application of models from economics and finance to investment management.

Learning Objectives

1.1. Be able to describe and critically discuss the characteristics and behavior of different investment types under different economic conditions, understanding the relationship between risk and return and recognizing risk factors which includes issuer default, counterparty failure, systemic liquidity, the collapse of speculative bubbles, shocks to the economic system and cyclical/structural changes.

1.2. Develop an understanding of the methods used for valuation of the common forms of debt, equity, property and derivative securities. In particular students should be aware of:
   - the valuation methods and principles
   - data requirements and sources
   - the implicit assumptions and limitations of these models

1.3. Develop an understanding of the application and limitations of the major economic and financial theories relevant to investment, and be able to critically evaluate these theories including:
   - the efficient market hypothesis
   - the capital asset pricing model
   - multi-factor pricing models
   - theories from behavioral finance

Unit 2: Asset Modeling

Construct, critically evaluate and apply asset models of a stochastic nature that are appropriate to the management of liabilities. The outcome of such an exercise is usually an investment strategy for managing the liabilities.

Learning Objectives

2.1. Define appropriate investment objectives based on the liability profile of a fund
2.2. Specify appropriate investment constraints, based on the liability profile of a fund
2.3. Identify the characteristics of different types of asset models.
2.4. Critically evaluate the appropriateness of an asset model for a given context
2.5. Derive consistent asset assumptions for asset models, taking into account historical date, prevailing industry expectations, contemporary investment literature, and other practical considerations such as tax.
2.6. Apply asset assumptions, and the linkages contained within asset models, to real world situations.
2.7. Describe and critically evaluate different approaches to asset allocation.