Continuous Time Finance provides an introduction to the theory and practice of derivative pricing and hedging. The aim of this course is to provide students with the mathematical skills needed for the valuation of derivatives. Focus will be on the application of results rather than their mathematical derivation. These tools will be applied to derive the famous Black-Scholes formula, to price options on currencies, and to interest-rate derivatives.

**Mode of Delivery**

On campus

**Prerequisites**

FINM7041 and either STAT7004 or STAT7018

**Incompatible Courses**

FINM3003. Graduate students attend joint classes with undergraduates but are assessed separately.

**Course Convener:**

Fei Huang  
Phone: 6125 7390  
Email: Fei.Huang@anu.edu.au  
Office hours for student consultation: TBA

**Research Interests**

Actuarial Studies, Applied Statistics, Quantitative Finance

**Relevant administrator if any (optional)**

Anna Pickering  
Phone: 6125 9045  
Email: Anna.Pickering@anu.edu.au

**Lecturer(s)**

Fei Huang  
Phone(s): 6125 7390  
Email(s): Fei.Huang@anu.edu

**Office hours for student consultation:**

TBA

**Tutor(s) (optional)**

SEMESTER S1  
2018
COURSE OVERVIEW

Learning Outcomes
By the end of this course students are expected to have attained a sound working knowledge of both the arbitrage-free approach to pricing and the mathematical tools required: Brownian motion, Itô’s formula, martingales, stochastic differential equations, change of measure, and the martingale representation theorem.

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. Assignment 1</td>
<td>6%</td>
<td>Week 3</td>
<td>Week 4</td>
</tr>
<tr>
<td>2. Assignment 2</td>
<td>6%</td>
<td>Week 6</td>
<td>Week 7</td>
</tr>
<tr>
<td>3. Assignment 3</td>
<td>6%</td>
<td>Week 8</td>
<td>Week 9</td>
</tr>
<tr>
<td>4. Assignment 4</td>
<td>6%</td>
<td>Week 10</td>
<td>Week 11</td>
</tr>
<tr>
<td>5. Assignment 5</td>
<td>6%</td>
<td>Week 12</td>
<td>Week 13</td>
</tr>
<tr>
<td>6. Final Exam</td>
<td>70%</td>
<td>TBA</td>
<td></td>
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</tbody>
</table>

Research-Led Teaching
The course provides the up-to-date introduction to the derivatives pricing and hedging. The course convener has undertaken research in areas of actuarial sciences and quantitative finance. Lectures in the course will be informed where possible by practical examples.

Feedback

Staff Feedback
Students will be given feedback in the following forms in this course:
- Written comments,
- Verbal comments.

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
http://unistats.anu.edu.au/surveys/selt/students/ and
http://unistats.anu.edu.au/surveys/selt/results/learning/

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 Rule 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.

**Additional course costs**
None.

**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.

**Recommended Resources**
Prescribed Text

Additional references:
- Shreve, Stochastic Calculus for Finance I: The Binomial Asset Pricing Model
- Baxter and Rennie, Financial Calculus

**COURSE SCHEDULE**

<table>
<thead>
<tr>
<th>Week</th>
<th>Summary of Activities</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overview of the course. Revision of Fwd/Futures Pricing &amp; Valuation, basic probability concepts</td>
<td>Assignment 1 (out)</td>
</tr>
<tr>
<td>2</td>
<td>Options: Put-Call Parity, Option Price Bounds, Binomial Models</td>
<td>Assignment 2 (out)</td>
</tr>
<tr>
<td>3</td>
<td>Arbitrage-Free and Complete Markets. Risk-Neutral Pricing</td>
<td>Assignment 1(due)</td>
</tr>
<tr>
<td>4</td>
<td>Brownian Motion. Stochastic Calculus. Geometric Brownian Motion</td>
<td>Assignment 2 (due)</td>
</tr>
<tr>
<td>5</td>
<td>Continuous Time Market Theory. The Black-Scholes formula</td>
<td>Assignment 3 (out)</td>
</tr>
<tr>
<td>6</td>
<td>Exotic Options: Binaries, Lookbacks. Matching the Tree.</td>
<td>Assignment 3 (due)</td>
</tr>
<tr>
<td>7</td>
<td>The Greeks and Hedging Strategies</td>
<td>Assignment 4 (out)</td>
</tr>
<tr>
<td>8</td>
<td>Intrinsic and Time Values. Implied Volatility. Simulation</td>
<td>Assignment 4 (out)</td>
</tr>
<tr>
<td>9</td>
<td>Dividends, Currencies, Futures Options</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Interest Rate Derivatives (Standard)</td>
<td>Assignment 4 (due)</td>
</tr>
</tbody>
</table>
ASSESSMENT REQUIREMENTS
The ANU is using Turnitin to enhance student citation and referencing techniques, and to assess assignment submissions as a component of the University's approach to managing Academic Integrity. For additional information regarding Turnitin please visit the ANU Online website.

Students may choose not to submit assessment items through Turnitin. In this instance you will be required to submit, alongside the assessment item itself, copies of all references included in the assessment item.

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: Assignments
Details of task: 5 assignments are to be completed and handed in through the semester. Each one of these is worth 6% of your final mark. Any 4 out of the 5 assignments are compulsory and the other one is optional. If you fail to hand in one of these (the optional one) for any reason, the weight (6%) will be assigned to your final exam.

Assessment Task 2: Final Examination
Details of task: Final Examination is compulsory. Students will be permitted to bring in a non-programmable calculator and an unmarked paper-based dictionary. No written material or formula sheets may be taken into the final exam.

Examination(s)
Final Examination
The course has a final examination. This is centrally timetabled. Further details relating to the Exam will be provided on Wattle and in class closer to the scheduled date.

Assignment submission
Online Submission: Assignments are submitted using Turnitin in the course Wattle site. You will be required to electronically sign a declaration as part of the submission of your assignment. Please keep a copy of the assignment for your records.

Extensions and penalties
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**
Student work is to be returned via Turnitin.

**Resubmission of assignments**
Is not permitted.

**Referencing requirements**
None.

**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 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 licensor’s 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.

**Tutorial Seminar Registration**
Tutorial signup for this course will be done via the Wattle website. Detailed information about signup times will be provided on Wattle or during your first lecture.
When tutorials are available for enrolment, follow these steps:
1. Log on to Wattle, and go to the course site
2. Click on the link “Tutorial enrolment”
3. On the right of the screen, click on the tab “Become Member of…..” for the tutorial class you wish to enter
4. Confirm your choice
If you need to change your enrolment, you will be able to do so by clicking on the tab “Leave group....” and then re-enrol in another group. You will not be able to enrol in groups that have reached their maximum number. Please note that enrolment in ISIS must be finalised for you to have access to Wattle.

**SUPPORT FOR STUDENTS**
The University offers a number of support services for students. Information on these is available online from [http://students.anu.edu.au/studentlife/](http://students.anu.edu.au/studentlife/)