

ECON 2125

Optimisation for Economics and Financial Economics

The foundations of economic theory are based on mathematical models. Thus, a thorough understanding of the economic content of such models is not possible without a clear understanding of the mathematical concepts that underpin the modeling. Together with ECON2127 - Mathematics for Economists B, this course forms a two-semester sequence, which introduces students to a range of mathematical concepts and techniques that form the basis of advanced economic theory courses, such as the ones required of students enrolled in Honours, Masters and PhD programs. The introduced concepts and techniques will be derived from basic principles and assumptions as thoroughly as possible, and will be illustrated using standard applications from economics.

Due to the strong interdependence between the topics covered in the two courses, students are encouraged to take both courses as a sequence in the same year. Undergraduate students who are interested in pursuing an Honours or Post-graduate degree are also advised to take these courses as early as possible during their undergraduate studies.

Mode of Delivery	On campus
Prerequisites	ECON 1101, 1102 and EMET 1001 (for ECON 2125); EMET 7001 (for ECON 8013)
Incompatible Courses	The three course numbers of this course are not compatible with each other as they meet together
Co-taught Courses	
Course Convener:	Ruitian Lang
	Photo (optional)
Phone:	57325
Email:	ruitian.lang@anu.edu.au
Office hours for student consultation:	Tuesdays 1:30pm to 3:00pm
Research Interests	Dynamic games and mechanism design
Relevant administrator if any (optional)	Nicole Millar
Phone:	50384
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Lecturer(s)	Ruitian Lang
Phone(s):	57325
Email(s):	ruitian.lang@anu.edu
Office hours for student consultation:	Thursday 1:30pm to 3:00pm

COURSE OVERVIEW

Learning Outcomes

Upon a successful completion of this course, students should be able to:

1. Understand the mathematical methods that are most widely used in economics, both from a formal, abstract perspective, and an intuitive perspective.
2. Know how to read, understand, and construct mathematical proofs, and appreciate their role in the derivation of mathematical concepts and structures.
3. Apply mathematical methods and techniques that are formulated in abstract settings to concrete economic applications.

Assessment Summary

Assessment Task	Value	Due Date (Indicative)	Date for Return of Assessment	Linked Learning Outcomes (optional)
1. Assignment 1	5%	1st March	10th March	1 and 2
2. Assignment 2	5%	15th March	24th March	1 and 2
3. Optional Mid-semester Exam	30%	Week 6 or 7	TBA	1 and 2
4. Assignment 3	5%	26th April	5th May	all
5. Assignment 4	5%	10th May	20th May	all
6. Final exam	50%	Exam period	TBA	all

Note: The mid-semester exam is optional and redeemable. If your score in the mid-semester exam is lower than your score in the final exam or you choose not to take the mid-semester exam, then your mid-semester exam score will not count toward your course mark and your final exam will count 80%. Also, no deferred exam will be offered for the mid-semester exam.

Research-Led Teaching

Modern economic research involves either developing theoretical models or analyzing empirical data (or both). This course prepares students for the former research approach by introducing them to some major mathematical tools used in microeconomic research.

Feedback

Staff Feedback Students will receive online feedback on their homework through Turnitin. Exam books will be marked and can be viewed by the students.

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/](http://unistats.anu.edu.au/surveys/selt/students/) and
[http : //unistats.anu.edu.au/surveys/selt/results/learning/](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 Universitys academic standards, and implement them. You can find the Universitys education policies and an explanatory glossary at: [http : //policies.anu.edu.au/](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

Commonwealth supported students and domestic full-fee paying students generally must be able to complete the requirements of their program of study without the imposition of fees that are additional to the student contribution amount or tuition fees.

Provided that its payment is in accordance with the Act, a fee is of a kind that is into any one or more of the following categories:

- (a) It is a charge for a good or service that is not essential to the course of study.
- (b) It is a charge for an alternative form, or alternative forms, of access to a good or service that is an essential component of the course of study but is otherwise made readily available at no additional fee by the higher education provider.
- (c) It is a charge for an essential good or service that the student has the choice of acquiring from a supplier other than the higher education provider and is for:
 - (i) equipment or items which become the physical property of the student and are not consumed during the course of study; or
 - (ii) food, transport and accommodation costs associated with the provision of field trips that form part of the course of study.
- (d) It is a fine or a penalty provided it is imposed principally as a disincentive and not in order to raise revenue or cover administrative costs.

Additional course costs

None.

Examination material or equipment

One two-sided A4 student-prepared information sheet and a non-programmable calculator.

Recommended Resources

Simon, C. P., and L. Blume (1994). Mathematics for Economists. New York: W. W. Norton&Company, Inc.

COURSE SCHEDULE

Week/ Session	Summary of Activities	Assessment
1-3	Topics in linear algebra	Assignment 1
4-6	Multivariate calculus	Assignment 2
7	Unconstrained optimization	Mid-semester exam
8-9	Convexity	Assignment 3
10-12	Constrained optimization	Assignment 4
	Examination Period	

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.

Assessment Tasks

Participation

Participation is encouraged but will not be assessed.

Assessment Task 1: Assignments 1 to 4

Details of task: Students solve problems using theory covered in the course, and the problems are designed to develop their analytical skills. Students taking ECON 4413/8013 are expected to solve additional problems developing their ability to construct proofs.

Assessment Rubrics

Word limit (where applicable): None

Value: 5% each.

Presentation requirements: None.

Estimated return date: See course schedule.

Hurdle Assessment requirements (where applicable): None.

Individual Assessment in Group Tasks (where applicable): Each student must submit his/her own write-up.

Examinations

Details of task: Students solve problems within the given time frame. A lecturer-prepared formula sheet will be provided in the exam (in addition to the student's formula sheet), which contains both

- formulas that may be useful in answering the exam questions; and
- formulas that are not useful or not even intended for the students to understand.

Students are expected to tell between the two types of formulas if they intend to use the lecturer-prepared formula sheet. Some exam questions test students' ability to apply the theory in a creative way. Students taking ECON 4413/8013 are expected to answer more challenging exam questions than those taking ECON 2125.

Mid-semester exam is optional and redeemable. If a student does not take the mid-semester exam or his/her final exam score is higher than the mid-semester score, the final exam score will replace his/her mid-semester exam score (if any) in computing the final raw mark.

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.

Hard Copy Submission: Assignments must include the cover sheet available [here](#). Please keep a copy of tasks completed for your records.

Extensions and penalties

Extensions and late submission of assessment pieces are covered by the Student Assessment (Coursework) Policy and Procedure.

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.

If you accept late submission of assessment, please use the following text:

Late submission of assessment tasks without an extension are penalised at the rate of 5% of the possible marks available per working day or part thereof. Late submission of assessment tasks is not accepted after 10 working days after the due date, or on or after the date specified in the course outline for the return of the assessment item.

Late submission is not accepted for take-home examinations.

Returning assignments

Hard-copy homework will be returned during consultation hours.

Resubmission of assignments

Resubmission is not permitted after the due date of the assignments

Referencing requirements

Cite any sources you use beyond the recommended textbook.

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 licensors 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 students 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 licensors 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/)