

ECON5402

Mathematical Economics

Course Outline

Semester 2, 2017

Course-Specific Information

The Business School expects that you are familiar with the contents of this course outline. You must also be familiar with the Course Outlines Policies webpage which contains key information on:

- Program Learning Goals and Outcomes
- Academic Integrity and Plagiarism
- Student Responsibilities and Conduct
- Special Consideration
- Student Support and Resources

This webpage can be found on the Business School website:

<https://www.business.unsw.edu.au/degrees-courses/course-outlines/policies>

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1 STAFF CONTACT DETAILS

Lecturer-in-charge: Nadine Yamout

Location: Workstation 430D UNSW Business School

Email: n.yamout@unsw.edu.au

Consultation Times: Tuesday 11:00 to 14:00

Tutors:

Name of tutors will be posted on the Course Website.

1.1 Communications with staff

You should feel free to contact your lecturer(s) about any academic matter. However, I strongly encourage, for efficiency, all enquiries about the subject material be made at lectures or tutorials or during consultation time. Discussion of course subject material will not be entered into via lengthy emails.

Email correspondence on administrative matters (e.g. advising inability to attend tutorials) will be responded to within 48 hours, but not over weekends. Please note that the lecturer has no advance notice of the date and time of the exam [the subject of many emails].

2 COURSE DETAILS

2.1 Teaching Times and Locations

Lectures start in Week 1 (to Week 13), except Week 10 on Monday 2nd October, which is a public holiday thus has no lecture.

The Time and Location are: Monday 10:00am – 12:00pm, Macauley Theatre

Tutorials start in Week 2 (to Week 13), except Week 10 on Monday 2nd October, which does not have tutorials.

The Groups and Times are available at the [online UNSW timetable](#).

2.2 Units of Credit

The course is worth 6 units of credit. There is no parallel teaching in this course.

2.3 Summary of Course

Mathematical tools are an important part of theoretical economic analysis. This course gives students a working knowledge of static and dynamic optimization techniques applied in economics. Topics include classical optimization with and without constraints, comparative statics, non-linear programming and differential equations. Knowing these tools will equip students to solve complex economic models. All mathematical techniques are illustrated with mainstream theoretical applications such as consumer theory and the neoclassical theory of optimal growth.

2.4 Aims and Relationship to Other Courses

This course is offered as part of the economics stream in the B.Com and B.Econ degrees. A prerequisite for this course is ECON1202. It aims to build on basic theories and knowledge learnt in Quantitative Analysis courses.

This course is an introduction to mathematical economics. This course aims to:

- introduce students to the mathematical concepts and methods used by professional economists;
- equip students with the necessary knowledge to express economic ideas with formal mathematical concepts;
- develop students' ability to derive logical implications of formal economic models.

This course develops skills/knowledge that students need if they go on to graduate studies in Economics.

2.5 Student Learning Outcomes

The Course Learning Outcomes are what you should be able to DO by the end of this course if you participate fully in learning activities and successfully complete the assessment items.

The Learning Outcomes in this course also help you to achieve some of the overall Program Learning Goals and Outcomes for all undergraduate coursework students in the BUSINESS SCHOOL. Program Learning Goals are what we want you to BE or HAVE by the time you successfully complete your degree. You demonstrate this by achieving specific Program Learning Outcomes - what you are able to DO by the end of your degree.

For more information on Program Learning Goals and Outcomes, see the School's Course Outlines Policies webpage available at

<https://www.business.unsw.edu.au/degrees-courses/course-outlines/policies>.

The following table shows how your Course Learning Outcomes relate to the overall Program Learning Goals and Outcomes, and indicates where these are assessed:

Program Learning Goals and Outcomes		Course Learning Outcomes	Course Assessment Item
<i>This course helps you to achieve the following learning goals</i>		<i>On successful completion of the course, you should be able to:</i>	<i>This learning outcome will be assessed in the following items:</i>
1	Knowledge	Identify and demonstrate a knowledge and understanding of the mathematical concepts and methods used by professional economists.	<ul style="list-style-type: none"> • Assignment • Mid-session Exam • Final Exam
2	Critical thinking and problem solving	Demonstrate the facility to express economic ideas in the language of mathematics. Critically analyze and evaluate economic models by using formal mathematical methods.	<ul style="list-style-type: none"> • Assignment • Mid-session Exam • Final Exam
3a	Written communication	Construct written work which is logically and professionally presented.	<ul style="list-style-type: none"> • Final Exam
3b	Oral communication	Communicate successfully with group members in solving analytical problems. Such skills in analytical thinking and effective communication are Graduate Attributes that UNSW seeks to foster in its graduates.	<ul style="list-style-type: none"> • Not specifically assessed
4	Teamwork	Work collaboratively to complete a task.	<ul style="list-style-type: none"> • Not specifically assessed

5a.	Ethical, environmental and sustainability considerations	Identify and assess environmental and sustainability considerations in problems in economics and business.	<ul style="list-style-type: none"> Final Exam
5b.	Social and cultural awareness	Not applicable in this course.	

3 LEARNING AND TEACHING ACTIVITIES

3.1 Approach to Learning and Teaching in the Course

The philosophy underpinning this course and its Teaching and Learning Strategies are based on “Guidelines on Learning that Inform Teaching at UNSW. These guidelines may be viewed at: www.guidelinesonlearning.unsw.edu.au.

Specifically, the lectures, tutorials and assessment have been designed to appropriately challenge students and support the achievement of the desired learning outcomes. A climate of inquiry and dialogue is encouraged between students and teachers and among students (in and out of class). The lecturers and tutors aim to provide meaningful and timely feedback to students to improve learning outcome.

3.2 Learning Activities and Teaching Strategies

The examinable content of the course is defined by the references given in the Lecture and Tutorial Schedules, the content of Lectures, and the content of the Tutorial Program.

Lectures

The purpose of Lectures is to provide a logical structure for the topics that make up the course; to emphasize the important concepts and methods of each topic, and to provide relevant examples to which the concepts and methods are applied.

Tutorials

Tutorials are an integral part of the subject. Tutorial presentations/discussion questions/problem will build on the material discussed in class with the lecturer.

Out-of-Class Study

While students may have preferred individual learning strategies, it is important to note that most learning will be achieved outside of class time. Lectures can only provide a structure to assist your study, and tutorial time is limited.

An “ideal” strategy (on which the provision of the course materials is based) might include:

- Reading of the relevant chapter(s) of the text and any readings **before the lecture**. This will give you a general idea of the topic area.
- Attendance at lectures. Here the context of the topic in the course and the important elements of the topic are identified. The relevance of the topic should be explained.
- Attending tutorials and attempting the tutorial questions.

The assignments present the mathematical methods with statements and proofs of the main theorems and many examples and problems. The lectures will focus on aspects

that are more difficult to understand or apply with the aim of providing greater comprehension and facility. The readings and the lectures give you an opportunity to learn the concepts and methods, see some simple applications and begin the process of learning to use these models on your own.

You will be given assignments which are an essential part of the course. The assignments will be marked so you will be asked to submit your work. We will discuss the answers in class and you will be expected to participate in the discussion. Since the problems on the exams will be similar in character to the assigned problems, your serious effort on the assignments is a necessary condition for good performance on the exams.

4 ASSESSMENT

4.0 You must complete the “Working with Academic Integrity” module on your Moodle site, before you hand in any written work.

- You **MUST** complete the ‘Working with Academic Integrity’ module AND THE MODULE’S QUIZ, found on your course Moodle site, BEFORE YOU ARE ALLOWED TO SUBMIT ANY WRITTEN ASSESSMENT.
- If your submission is delayed because you did not complete the module and the quiz, you may be liable to late penalties as specified in your course outline.
- Failing to comply with the University rules of Academic integrity may result in serious consequences:
 - All cases of plagiarism (regardless of their severity) ARE recorded with the University Integrity Office University register.
 - Depending on the level of the plagiarism/misconduct, the penalties may include a FAIL grade for the assessment piece, a FAIL grade for the course, or being expelled for serious/repeat offences.

Any misconduct, including plagiarism, is recorded on your Conduct Record. If you have only one academic misconduct at the lowest level (level A) in your career, then the record is wiped clear when you graduate. Otherwise it remains there permanently. *Many professions, such as accounting and law, require access to the student’s Conduct Record.*

4.1 Formal Requirements

In order to pass this course, you must:

- achieve a composite mark of at least 50 out of 100; and
- make a satisfactory attempt at ALL assessment tasks. This means attendance at 80% of tutorials (8 out of 11) and a mark of at least 40% in all assessment items.

AND

- Achieve a satisfactory level of performance in the final exam. This means a minimum mark of 40 per cent. Any student having an overall mark of 50 or more but less than 40 per cent in the final examination will be given an UF grade (unsatisfactory fail).

4.2 Assessment Details

Assessment Task	Weighting	Length	Due Date
Assignment	20%	Multiple questions	Weekly
Mid-session Exam	30%	100 minutes	Week 6
Final Exam	50%	2 hours	University Exam Period

	100%		
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4.3 Tutorial Participation

No marks are awarded for tutorial attendance. However, a record of attendance at tutorials will be kept. **Students should note that 80% attendance is required by UNSW and Business School rules.** In certain circumstances, such as where a request for special consideration is made in relation to assessment items, tutorial attendance will be taken into account in determining your final assessment or whether special consideration is granted.

Attendance at 9 of 12 tutorials will be deemed as meeting the requirement. Students must sign on by 10 minutes from the start of tutorial to qualify as 'in attendance'. Signing on for another student will be treated as misconduct. If, owing to illness or other exceptional circumstances, you are unable to attend your usual tutorial, you may try to attend another tutorial in the same week. However, you are required to attend your usual tutorial class at least 9 times during the session. This allows for occasional absence due to minor illness and other reasons, hence special consideration applications will not reduce this requirement.

4.4 Midsession Exam

There will be a mid-session exam in Week 6. The exam will be 100 minutes in length and will cover materials covered in Weeks 1-4 (Chapters 3-8 inclusive).

There will be **NO supplementary exam** offered for the mid-session exam. You should make every effort to take the mid-session exam. Students who fail to attend the examination will need to apply for Special Consideration. For information on Special Consideration please refer to the Business School's [Course Outlines Policies webpage](#).

In cases of serious illness, students will need full and convincing documentation of that illness. Students who are found to be genuinely too ill to have attended the exam will have their mark in the remaining assessment tasks re-weighted to include the mark reserved for the missed test. In all other cases of non-attendance students will receive a grade of zero.

Applications for special consideration for the mid-session exam must be lodged online through myUNSW within 3 working days of the exam (log into myUNSW and go to My Student Profile tab > My Student Services channel > Online Services > Special Consideration). Then submit the originals or certified copies of your completed [Professional Authority form \(pdf - download here\)](#) and any [supporting documentation](#) to Student Central.

Employment obligations or holiday plans of any kind are not acceptable reasons for absence from any test/examination.

4.5 Assignments

The assignment topics are set out in Section 7.1 below. Each week you will be given an assignment testing the knowledge discussed during the lecture and consisting in a set of problems to be solved at home. Four of these ten assignments will be randomly chosen, marked in detail, and the marks will be recorded. During tutorials, we will discuss the answers to these problems in class and you will be expected to participate in the discussion.

4.5.1 Submission Procedure for Assignments

Students must submit a hard copy of their assignment. You will have one week to complete it. **The hard copy is to be submitted at the beginning of the tutorial.** Do not use plastic sheets or binders. Simply staple the pages together. Your name and ID should be on the cover page.

4.5.2 Late Submission of Assignment

If you fail to submit your assignment before the deadline you will be given a mark of zero. Any student, who for reasons of **serious illness cannot submit before the submission deadline**, will need **full and convincing documentation of that illness**, specifically a valid medical certificate which covers the period 4 days prior to the submission deadline. Employment obligations or holiday plans of any kind are not acceptable reasons for failing to submit an assignment.

4.6 Quality Assurance

The Business School is actively monitoring student learning and quality of the student experience in all its programs. A random selection of completed assessment tasks may be used for quality assurance, such as to determine the extent to which program learning goals are being achieved. The information is required for accreditation purposes, and aggregated findings will be used to inform changes aimed at improving the quality of Business School programs. All material used for such processes will be treated as confidential and will not be related to course grades.

4.7 Final Exam Format

The final exam will be held in the University examination period. As outlined in 3.2 above all material covered in the lectures and tutorial program is examinable. Further information on the content of the final exam will be provided towards the end of session.

The final exam will consist of problem solving questions. This exam will ask you to think creatively about how you could apply the mathematical concepts and methods you have learned during the entire course to particular problems.

4.8 Protocol for viewing final exam scripts

The UNSW Business School has set a protocol under which students may view their final exam script. Please check the protocol [here](#).

5 COURSE EVALUATION AND DEVELOPMENT

Each year feedback is sought from students and other stakeholders about the courses offered in the School and continual improvements are made based on this feedback. UNSW's myExperience Survey Tool is one of the ways in which student evaluative feedback is gathered. You are strongly encouraged to take part in the feedback process.

6 COURSE RESOURCES

The website for this course is on UNSW Moodle at: <http://moodle.telt.unsw.edu.au>

The Required Textbook for this course is:

- Alpha C. Chiang, Kevin Wainwright, **Fundamental Methods of Mathematical Economics**, McGraw-Hill Education, 4th ed. 2005 (Referred as C&W hereafter).

Students may also find the following textbook useful for some parts of the course:

- Simon, Carl P., Lawrence Blume, **Mathematics for Economists**, W. W. Norton, 1994.
- Klein, W. Michael, **Mathematical Methods for Economics**, Addison Wesley, 2002.

7 COURSE SCHEDULE

7.1 Lecture Schedule

Lectures start in Week 1 and finish in Week 13.

LECTURE SCHEDULE		
Week	Topic	Reference
Week 1 24 July	Equilibrium Analysis, Linear Models and Matrix Algebra	C & W Chapters 3 and 4
Week 2 31 July	Linear Models and Matrix Algebra (cont'd)	C & W Chapters 4 and 5
Week 3 7 August	Comparative Statics and Differentiation	C & W Chapters 6 and 7
Week 4 14 August	Differentiation and Comparative Statics of General Function Models	C & W Chapters 7 and 8
Week 5 21 August	Comparative Statics (cont'd) and Optimization	C & W Chapter 9
Week 6 28 August	Mid-Session Exam	
Week 7 4 September	Exponential and Logarithmic Functions	C & W Chapter 10
Week 8 11 September	Multi Variable Optimization	C & W Chapter 11
Week 9 18 September	Optimization with Equality Constraints	C & W Chapter 12
Mid-semester break: 23 September – 2 October inclusive (2 Oct = Labour Day Public Holiday)		
Week 10 2 October	No lecture. Public Holiday.	
Week 11 9 October	Further Topics in Optimization	C & W Chapter 13
Week 12 16 October	Economic Dynamics and First-Order Differential Equations	C & W Chapters 14 and 15
Week 13 23 October	Review	C & W Chapters 3-15

7.2 Tutorial Schedule

Tutorials start in Week 2 and finish in Week 13, except Week 10. Tutorials will generally follow the topics presented in the Lectures on a weekly basis.