Unit Outline*

ECON3372

Mathematics for Economists

Semester 1, 2011
Campus: Crawley

Unit Coordinator
Winthrop Professor Darrell Turkington

Business School
www.business.uwa.edu.au

* This Unit Outline should be read in conjunction with the Business School Unit Outline
Supplement available on the Current Students web site http://www.business.uwa.edu.au/students
UNIT DESCRIPTION

Aims of the course
This course follows on from ECON2272 Mathematics for Economists. It aims to provide the student with further mathematical tools that are useful in modern quantitative economics and econometrics.

The teaching format is similar to that of the previous unit. The mathematical technique will be taught first followed by its application in quantitative economics.

TEACHING AND LEARNING RESPONSIBILITIES

Teaching and learning evaluation
You may be asked to complete two evaluations during this unit. The Student Perception of Teaching (SPOT) and the Students’ Unit Reflective Feedback (SURF). The SPOT is optional and is an evaluation of the lecturer and the unit. The SURF is completed online and is a university wide survey and deals only with the unit. You will receive an email from the SURF office inviting you to complete the SURF when it is activated. We encourage you to complete the forms as your feedback is extremely important and can be used to make changes to the unit or lecturing style when appropriate.

Attendance
Participation in class, whether it be listening to a lecture or getting involved in other activities, is an important part of the learning process. It is therefore important that you attend classes. More formally, the University regulations state that ‘to complete a course or unit students shall attend prescribed classes, lectures, seminars and tutorials’.

CONTACT DETAILS

We strongly advise students to regularly access their student email accounts. Important information regarding the unit is often communicated by email and will not be automatically forwarded to private email addresses.

<table>
<thead>
<tr>
<th>Unit coordinator/lecturer</th>
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<tbody>
<tr>
<td>Name:          Darrell Turkington</td>
</tr>
<tr>
<td>Email:         <a href="mailto:darrell.turkington@uwa.edu.au">darrell.turkington@uwa.edu.au</a></td>
</tr>
<tr>
<td>Phone:         6488 2880</td>
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<tr>
<td>Consultation hours:  Wednesday 11am – 1pm</td>
</tr>
<tr>
<td>Friday 10am – 12 noon</td>
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<tr>
<td>Lecture times:    Please check: <a href="http://www.timetable.uwa.edu.au">http://www.timetable.uwa.edu.au</a></td>
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<tr>
<td>Lecture venue:    Please check</td>
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Tutor:

<table>
<thead>
<tr>
<th>Name:</th>
<th>Darrell Turkington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email:</td>
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Consultation hours:

Tutorial times: http://www.olcr.uwa.edu.au/

Tutorial venue:

**TEXTBOOK(S) AND RESOURCES**

**Unit website**

http://www.webct.uwa.edu.au

**Recommended/required text(s)**


Books that are useful for references but should not be purchased are:


A text that is now out of print remains useful for this course. It is:


All these books have been placed in Closed Reserve in the Business section of Reid Library.
UNIT STRUCTURE

Overview

1. **Convex Sets and n-Dimensional Geometry**
   Sets, \( E^n \), lines, line segments and hyperplanes, closed, open and, bounded sets, convex sets, separating and supporting hyperplanes, convex hulls, convex cones, convex functions.

   Chiang, 4th edition, chapters 11.4, 11.5
   Chiang, 3rd edition, chapter 19.3
   Simon and Blume, 12.3, 12.4, 12.5

2. **Linear Programming**
   General mathematical programming problem, application of n-dimensional geometry, extreme points and basic feasible solutions, simplex method, duality, standard economic problems, activity analysis.

   Chiang, 3rd edition, chapters 19, 20
   Lambert, pp133 – 139
   Wade Hands, pp 415 – 429
   Sydsaeter & Hammond, chapter 19

3. **Kuhn-Tucker Theory**
   Nonlinear programming compared with linear programming, effect of nonnegativity conditions, convex and quasi-convex functions, Kuhn-Tucker conditions, constraint qualification, sufficiency theorems, economic applications.

   Chiang, 4th edition, chapter 13
   Chiang, 3rd edition, chapter 21
   Lambert, pp115 – 133
   Simon & Blume, chapters 18, 19
   Wade Hands, pp 394 – 415
   Sydsaeter & Hammond, chapter 18

4. **Maximum Value Function and the Envelope Theorem**
   Properties of the maximum value function for the unconstrained and constrained problems, Envelope Theorem, Lagrangian multipliers as shadow prices.

   Simon & Blume, pp 448 – 457
   Lambert, chapter 6
   Birchenhall, C. and P. Grout, chapter 9
   Turkington, chapter 7

5. **Modern Micro Economics**
   i) **Theory of the Consumer**

      Binary relations, preference preorderings, indirect utility function, Hickesian and Marshallian demand functions, consistency properties, expenditure function, Shephard’s lemma, Roy’s identity, Slutsky’s equation, duality in consumption, consumer’s surplus and welfare measures.
ii) **Theory of the Firm**

Input requirement set, production function, neoclassical problems, cost function, conditional factor demand functions, Shephard’s lemma, duality between cost and production functions, profit functions.

Varian, H. chapters 1-8, 10
Birchenhall and Grout, chapters 10, 11, 14, 15
Turkington, chapter 7.5

6. **Game Theory**

i) **Zero-sum games**

Payoff matrix, saddle point, mixed strategies, linear programming and game theory.

ii) **Non-zero sum games**

Examples, dominated strategies, Nash equilibrium, economic examples, mixed strategies, existence of a Nash equilibrium.

iii) **Dynamic Games**

Backward induction, Stackelberg model, bargaining, 2-stage games, repeated games, dynamic games of complete but imperfect information.

Gibbons, R., chapters 1, 2
Intrilligator, chapter 6
Bierman, H., and L. Fernandez, chapters 4, 11, 13, 5, 23

**ASSESSMENT MECHANISM**

**The purpose of assessment**

There are a number of reasons for having assessable tasks as part of an academic program. The assessable tasks are designed to encourage you to explore and understand the subject more fully. The fact that we grade your work provides you an indication of how much you have achieved. Providing feedback on your work also serves as part of the learning process.

**Assessment mechanism summary**

The course consists of three lectures a week and one tutorial a week. Students will be required to hand in weekly assignments, (probably no more than ten in total) and sit a one hour mid semester exam and a two hour final exam. The weighting given to the course work and the final exam will be decided by majority vote in the first week of the course.

**Ratchet System**

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<thead>
<tr>
<th>Item</th>
<th>Weight</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>Assignment</td>
<td>30%</td>
<td>1 X 10 weeks</td>
</tr>
<tr>
<td>Mid Semester Test</td>
<td>20%</td>
<td>1 hour</td>
</tr>
<tr>
<td></td>
<td>50%</td>
<td><strong>Semester Mark</strong> (Total of Assignments and Mid Semester Test Results)</td>
</tr>
<tr>
<td>Final Exam</td>
<td>50%</td>
<td>2 hours</td>
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If final exam mark > semester mark final exam, 100% of grade.
If final exam mark < semester mark 50% semester mark, 50% final exam mark.

**Note 1:** Results may be subject to scaling and standardisation under faculty policy and are not necessarily the sum of the component parts.

**Note 2:** Your assessed work may also be used for quality assurance purposes, such as to assess the level of achievement of learning outcomes as required for accreditation and audit purposes. The findings may 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 the outcome will not affect your grade for the unit.

**Submission of assignments**
Assignment instructions will be handed out in class during the Monday lecture. (They will also be available on WebCT).

Completed assignments must be handed in during class the following Monday. Please remember to attach an Assignment Cover sheet to the front of your assignment. You can download the relevant Assignment Cover sheet from the Business School Current Students web page [http://www.business.uwa.edu.au/students/assessments](http://www.business.uwa.edu.au/students/assessments).

**Student Guild**
Phone: (+61 8) 6488 2295
Facsimile: (+61 8) 6488 1041
E-mail: enquiries@guild.uwa.edu.au
Website: [http://www.guild.uwa.edu.au](http://www.guild.uwa.edu.au)

**Charter of Student Rights and Responsibilities**
The Charter of Student Rights and Responsibilities outlines the fundamental rights and responsibilities of students who undertake their education at UWA (refer [http://handbooks.uwa.edu.au/undergraduate/poliproc/policies/StudentRights](http://handbooks.uwa.edu.au/undergraduate/poliproc/policies/StudentRights)).

**Appeals against academic assessment**
The University provides the opportunity for students to lodge an appeal against assessment results and/or progress status (refer [http://www.secretariat.uwa.edu.au/home/policies/appeals](http://www.secretariat.uwa.edu.au/home/policies/appeals)).