



# ECON860

## Advanced Microeconomics

S1 Day 2017

*Dept of Economics*

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#### Disclaimer

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## General Information

Unit convenor and teaching staff

Unit Convenor

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E4A-407 (phone 98508465)

Tue 2-5:30pm; Wed 2-5:30pm; Fri 2-5pm

Credit points

4

Prerequisites

ECON632

Corequisites

Co-badged status

Unit description

Topics covered in the unit include: introduction to the Arrow-Debreu model; consumer theory; producer theory; existence of equilibrium; uniqueness of equilibrium; stability of equilibrium; optimality of equilibrium; comparative statics in multi-market economies; applications; empirical testing; temporary equilibrium; and other extensions.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

On successful completion of this unit, you will be able to:

Appreciate current and seminal research papers and scholarship in a variety of areas of advanced microeconomics.

Develop critical skills in evaluating microeconomic theories.

Develop the ability to identify research opportunities and open question in advanced microeconomics.

Possess a high level of oral and written communication skills specific to the needs of their discipline

Be intellectually stimulated and intellectually stimulate others.

## General Assessment Information

Your final grade will be determined based on your performance in each component of your assessments.

**Note:** It is necessary to pass the exam to pass the course.

Each of these assessments are related to the learning outcomes.

Marks for individual Tutorials and the Essay will be based on the Tutorials and Essays submitted by students. The individual seminar reviews will be marked out of 10 as follows:

Mark Range	Achievement Descriptor
18 – 20	Excellent – Outstanding
> 18 – 14	Very Good – Good
> 14 – 10	Average
> 10 – 0	Below acceptable standard

A mark in the Excellent – Outstanding range will be awarded for work that:

- Succinctly, correctly and insightfully answers the questions asked in the Tutorials.
- For the Essay, where there might not be an obviously correct answer, thoughtful, insightful and thoroughly research student responses will be given marks in this range.

Submissions in the other mark ranges usually:

- Contain errors of fact and/or interpretation;.
- Contain unsubstantiated criticisms or expressions of opinion – rather than solid research based conclusions.
- Lack of clarity and/or coherence.
- Lack of references (in text body, in list of references).

Your final combined mark for the Tutorials (20%) and Essay (20%) will be an equally weighted in determining your final grade.

The final assessment in ECON860 is a Final Exam. A Sample Exam is available on the iLearn webpage.

### Classes and Requirements

You must:

- Attend all seminar classes and seminars during Session 1, 2017.
- Arrive at each class having read the prescribed readings for the topic under discussion.
- Complete other weekly assignments as specified.
- Complete the essay and submit it by the due date.
- Complete the final Examination.

If documented illness or misadventure causes students difficulty in meeting assessment deadlines they can avail themselves of the Disruption to Studies (DTS) process. If an application for DTS is approved some alternative assessment task will be arranged. This may involve an oral assessment task.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Best ten (10) Tutorials</u>	20%	No	Weekly
<u>One Essay</u>	20%	No	by 6pm on ECON860 Exam day
<u>Final Examination</u>	60%	No	University Exam Period

### Best ten (10) Tutorials

Due: **Weekly**

Weighting: **20%**

Learning and teaching in ECON860 is supported by weekly Tutorials. Each Tutorial has roughly the following structure: An open question about what you have learned so far in the course; A series of terms that you need to define; Some problems/calculation questions; and material to read and/or listen to and summarize.

On successful completion you will be able to:

- Appreciate current and seminal research papers and scholarship in a variety of areas of advanced microeconomics.
- Develop critical skills in evaluating microeconomic theories.
- Possess a high level of oral and written communication skills specific to the needs of their discipline
- Be intellectually stimulated and intellectually stimulate others.

## One Essay

Due: **by 6pm on ECON860 Exam day**

Weighting: **20%**

### Essay Topic: “The Microeconomics of Terrorism”

*Preamble:* The phenomenon of ‘terrorism’ is (rightly or wrongly), the focus of a great deal of public discussion and public policy. This essay is an opportunity for you to get to know something of the contribution that (micro)economics can make to our understanding of and policy response to terrorism.

**(a) (10 Marks) Literature Review.** Give an account of the various approaches taken in the economics literature to understanding the phenomenon of terrorism.

*Starting reference for this part:*

Fernanda Llusa and José Tavares (2011), “The economics of terrorism: A (simple) taxonomy of the literature”, *Defence and Peace Economics*, Vol.22(2), pp.105–123.

**(b) (10 Marks) Microeconomics Contribution.** Explain and critique the particular contribution to understanding terrorism – and the appropriate policy responses – provided by microeconomics.

*Starting reference for this part:*

C. Anderton and J. Carter (2006), “Applying intermediate microeconomics to terrorism” *The Journal of Economic Education*, Vol.37(4), p.442–459.

John A. Sautter (2010), “Variance, Violence, and Democracy: A Basic Microeconomic Model of Terrorism”, *Journal of Strategic Security*, Vol.3(1), pp. 39–50.

Jean-Paul Azam (2005), “Suicide-bombing as inter-generational investment”, *Public Choice*, Vol.122(1–2), pp.177–198.

### Submission Details

Submit the essay to my room which is E4A-407 by the due time/date, which is:

**by 6pm on the day of the Final Adv. Micro. Exam for ECON860 students.**

You must also submit a copy of your essay via Turnitin.

**Since you have the entire semester to do this essay, there will be NO extensions granted other than in exceptional circumstances after approved formal Disruption to Studies applications. Also, start work early on this one. Such a strategy will have many educational and mark accumulations payoffs for you.**

The total value of the Essay is 20.

### No Word Limit

**There is no word limit** (upper or lower). Just answer the questions asked to the best of your ability and when you have done the best you think you can, stop.

If that takes a lot (or just a few) pages, then so be it. What I’m looking for here is the *quality* and

*comprehensiveness* of your thought, analysis and research – not some arbitrary number of words on a series of pages.

On successful completion you will be able to:

- Appreciate current and seminal research papers and scholarship in a variety of areas of advanced microeconomics.
- Develop critical skills in evaluating microeconomic theories.
- Develop the ability to identify research opportunities and open question in advanced microeconomics.
- Possess a high level of oral and written communication skills specific to the needs of their discipline
- Be intellectually stimulated and intellectually stimulate others.

## Final Examination

Due: **University Exam Period**

Weighting: **60%**

There *will be* a Final Examination in ECON860 and it will consist of **one** (1) three-hour (3 hr) final papers.

Details of the structure and content of the examination will be supplied nearer the time. Sample papers are available on the course web site.

On successful completion you will be able to:

- Appreciate current and seminal research papers and scholarship in a variety of areas of advanced microeconomics.
- Develop critical skills in evaluating microeconomic theories.
- Possess a high level of oral and written communication skills specific to the needs of their discipline

## Delivery and Resources

**Lecture Time and Location:** Tuesday 9am–1pm at Room C5A-310.

Please note the time and location are subject to change and students are advised to check <https://timetables.mq.edu.au>

### Lecture 1 Introduction, motivation and the Arrow-Debreu model

#### 1.1 The Field of Microeconomics

See *Journal of Economic Literature* 'Classification System' for Articles and is available at [http://www.aeaweb.org/journal/jel\\_class\\_system.php](http://www.aeaweb.org/journal/jel_class_system.php)

This standard classification may give you some idea of the scope of the subject.

## 1.2 The Framework of Microeconomics

A. Mas-Colell, M. Whinston and J. Green (1995), *Microeconomic Theory*, Oxford, pp. 3–4.

Very brief introduction to and overview of the nature and structure of Microeconomics.

D. Kreps (1990), *A Course in Microeconomic Theory*, Harvester-Wheatsheaf, Ch. 1.

Introduces the “Actors, behaviour, institutions and outcomes” picture, which can be a very useful organising device.

M. Blad and H. Keiding (1990), *Microeconomics: Institutions, Equilibrium and Optimality*, Ch. 1.

Gives an overview of Microeconomics with particular emphasis on the environment in which agents are imagined to be operating and introduces some of the available equilibrium concepts by which their behaviour might be modelled.

Frank Hahn (2003), “Macro foundations of micro-economics” *Economic Theory* 21, 227–232

No this is not typo – he actually called the paper this. It is worth reading for the elegance of expression alone – but also for the context it gives to the study we are about to undertake.

## 1.3 Methodology and Scientific Method

E. Silberberg (1978), *The Structure of Economics*, pp. 120.

Introduces the idea that Microeconomics exploits the information contained in the maximisation hypothesis to make predictions about the comparative statics of economic agents, (‘the Samuelson program’).

A. Jehle (1992), *Advanced Microeconomics*, pp. 1–3.

Useful summary of basic scientific method.

C.W.J. Granger (1992), “Fellows Opinion: Evaluating Economic Theory”, *Journal of Econometrics*, pp 3-5.

Presents an interesting perspective on ‘testing the theory’.

## 1.4 The Framework of the Arrow-Debreu Model

Mas-Colell, Whinston and Green (1995), pp. 511-513.

Very brief introduction to the A-D model and the field of general equilibrium theory.

J. Geanakoplos (2008), “Arrow-Debreu model of general equilibrium”, (in) *NPDE2*.

A very useful guide to the Arrow-Debreu model. At this stage it is probably easiest for you to read just the first three pages and glance at the rest. You might like to retain the article as a map of where we are going.

## Lecture 2 Arrow-Debreu Consumers I (Choice Theory)

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 5–9, 17–22, 40–50.

This introduces the basic notions of “commodity”, “preference relation”, “budget set” and

“utility function”.

L. W. McKenzie (2002), pp. 13–15.

This section presents a nice discussion of the classic Sonnenschein theorem on choice without transitivity. Such discussions are hard to find outside the research literature and this one in particular would repay careful study.

C. Blackorby (2008), “Lexicographic orderings”, (in) *NPDE2*.

Nice discussion of an interesting (and widespread?) class of preferences.

### **Lecture 3 Arrow-Debreu Consumers II (Demand Theory)**

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 50–56, 23–28.

This section presents some of the basic results which make up neo-classical or Arrow-Debreu consumer demand theory.

L. W. McKenzie (2002), pp. 15–22.

Gives a very nice, compact treatment of demand theory via what we have called the ‘primal’ approach. Includes a neat derivation of the Slutsky equation. See also pp. 36–38 for a discussion of the remarkable Mitushin-Polterovich theorem.

M. Blad and H. Keiding (1990), Ch. 2.

Defines the notion of a “consumer”; writes down neoclassical choice theory and derives the comparative statics of neoclassical consumers acting in an Arrow-Debreu environment.

### **Lecture 4 Arrow-Debreu Consumers III (Duality and Revealed Preference Theory)**

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 28–36, (optional pp. 91–92).

Presents information about the Slutsky matrix and also introduces the Weak Axiom of Revealed Preference (and optionally the Strong Axiom of Revealed Preference).

L. W. McKenzie (2002), pp. 22–25.

Gives a thorough and uncluttered account of the revealed preference approach.

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 56–63 and 67–75 (pp. 64–67 optional).

This introduces the “Duality” approach to consumer theory. There are in a sense no new results here, but there are number of new techniques which are now pervasive in economic analysis.

L. W. McKenzie (2002), pp. 1–13.

Discusses the dual approach to consumer demand. Note there are some notational differences between the approach of McKenzie and that of Mas-Colell *et. al.*, Varian and co.

V. Bohm and H. Halket (2008), “Demand theory”, (in) *NPDE2*.

Compliment to Mas-Colell, Whinston and Green and gives a very complete (reference level) account of consumer choice and demand theory.



E. Silberberg (2008), "Hicksian and Marshallian Demand Curves", (in) *NPDE2*.

A nice account of Arrow-Debreu consumer theory.

### **Lecture 5 Arrow-Debreu Producers**

Mas-Colell, M. Whinston and J. Green (1995), pp. 127–154.

An account of Arrow-Debreu producer theory from the "Primal" and "Dual" points of view.

M. Blad and H. Keiding (1990), Ch. 3.

Presents the theory of production in an Arrow-Debreu environment from the set theoretic, production function and dual points of view. Notice the attention given to the question of the existence of profit maximising decisions.

G. Debreu (1959), *Theory of Value*, Ch. 3.

Classic and fairly easy to follow treatment of firm behaviour in an Arrow-Debreu environment written by the second part of the famous team.

D. W. Jorgensen (2008), "Production functions", (in) *NPDE2*.

A nice presentation of producer theory from the 'primal' point of view.

W. E. Diewert (2008), "Cost Functions" (in) *NPDE2*.

Surveys producer theory with particular emphasis on the duality between production, cost and profit functions. Also contains some interesting material on 'empirical testing' that we will return to later in the course.

### **Lecture 6 Existence of Market Equilibrium**

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 578–589 (optionally pp. 632–641).

Introduction to the basic existence question for market or Walrasian equilibrium.

H. Varian (1992), *Microeconomic Analysis*, (3rd. Edition) pp. 313–323.

Gives an account of an approach to the existence question, originally due to Arrow and Hahn (1971), which exploits the properties of the excess demand map in an Arrow-Debreu economy to achieve an existence result. Note that Varian's approach appears to be for the exchange case, but as we will see in the lectures, it easily generalises to the production case.

M. Allingham (1987), "Excess Demand and Supply", *NPDE1* (2), pp. 201–222.

Also comes at the existence problem from the "excess demand end".

M. Blad and H. Keiding (1990), pp. 156–162.

Existence from the "primitives" point of view.

G. Debreu (2008), "Existence of General Equilibrium", *NPDE2*.

A nice account of the existence problem which allows you to get a feel for what has to be assumed about the primitives of the economy if an existence argument is to go through.

W. D. A. Bryant (1997), “Conditions for the existence of market equilibrium” *Journal of Economic Education*, 28(3), pp. 230–254.

This is a critical survey of the available sufficient conditions for the existence of market equilibrium, in particular the conditions which appear in the ‘third level’ proofs of the equilibrium existence theorem. The paper also discusses an apparently little known necessary condition due to Arrow and Debreu (1954) as well as providing an introduction to the recent and emerging literature on necessary and sufficient conditions for the existence of market equilibrium.

L. W. McKenzie (2002), pp. 189–214.

Has an extensive discussion of issues associated with the existence of competitive equilibrium. Also discusses in detail some of the issues discussed in Bryant (1997).

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 598–606 (optionally Chapter 4.)

A fundamental result which tells us something about the “aggregate” implications of Arrow-Debreu Microeconomics and also conditions the search for conditions which yield Uniqueness, Stability and Comparative Static properties of market equilibrium.

M. Blad and H. Keiding (1990), pp.173–176.

Nice treatment of the classic Sonnenschein-Mantel-Debreu theorem, which apart from being interesting in its own right, underpins a lot of the work to be discussed in the sections to follow.

L. W. McKenzie (2002), pp. 25–33.

Contains a discussion of the properties of market demand functions that is slightly more accessible than that presented in Mas-Colell, Whinston and Green (1995).

W. D. A. Bryant (2010), Ch 2 and 3.

Presents more detail on sufficient, necessary and necessary and sufficient conditions for the existence of equilibrium. Recommended reading only if you are having trouble sleeping!

### **Lecture 7 Uniqueness and Stability of Market Equilibrium**

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 589–615.

Presents a thorough analysis of the conditions needed for uniqueness (and local uniqueness) and does so from a number of “angles”. Also gives a thorough account of the remarkable ‘Sonnenschein-Mantel-Debreu Theorem’.

M. Blad and H. Keiding (1990), pp. 162–166.

Gives a nice introduction to the “conditions on excess demand functions” approach to the uniqueness question.

H. Varian (1992), pp. 394–397.

Presents a reasonably accessible summary of the modern “index analysis” approach to the uniqueness question.

L. W. McKenzie (2002), pp. 229–235.

Provides a unified view of some relatively recent work on the uniqueness of equilibrium.

W. D. A. Bryant (2010), Ch 7.

Gives an overview of the uniqueness problem, particularly in a production context – and suggests a potentially new approach to getting uniqueness conditions via contraction mappings.

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 620–626.

Interesting account of price and quantity adjustment processes.

M. Blad and H. Keiding (1990), pp. 169–173.

Are there forces at work in the economy that will take the prevailing price vector to equilibrium, supposing that one exists? This is the “stability question” for market equilibrium and in these pages Blad and Keiding present an introduction to the field of answers to this question.

H. Varian (1992), pp. 398–402.

Gives an account parallel to that in Blad and Keiding for the first few pages, but then introduces the important ‘Non-Tatonnement’ adjustment processes.

F. H. Hahn (2008), “Auctioneer”, (in) *NPDE2*.

Interesting discussion of the stability problem. Also, if you get interested in this problem, then a place where you might start a serious study is Hahn (1982), both for details about known results and for ‘attitude’.

D.G. Saari and C.T. Simon (1978), “Effective price mechanisms”, *Econometrica*, pp. 1097–1125.

This is an extremely important paper in the Stability literature. A summary of the main conclusion will be presented in lectures.

L. W. McKenzie (2002), pp. 45–96.

Provides a unified treatment of numerous important issues in stability analysis.

W. D. A. Bryant (2010), Ch 8.

Provides a discussion of the stability properties of some tatonnement, non-tatonnement and ‘agent driven’ adjustment processes, in a GE context.

## **Lecture 8 Comparative Statics of Market Equilibrium**

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 616–620.

What happens to (equilibrium) prices and quantities if the economy is “shocked” (‘morally outraged’) by a variation in the parameters which define it, in particular, tastes, endowments and technologies? This is a fundamental applied issue and also one of considerable theoretical and “methodological” significance.

M. Blad and H. Keiding (1990), pp. 166–168.

If we are serious about the “Samuelson-program” and also if we want to make bread and butter predictions about the effects on prices and quantities traded of various parameter changes, then we need to be able to extract from our multi-market models, so called

comparative static predictions. Blad and Keiding give an introduction to the circumstances in which this might be possible.

J. Nachbar (2010), "Comparative Statics" *NPDE2*.

Excellent survey of what is involved in obtaining comparative static results in disaggregated systems.

L. W. McKenzie (2002), pp. 133–153.

Ties up a number of the issues associated with comparative statics in GE systems as well as providing an introduction to some of the emerging modern techniques for tackling this task.

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 652–673.

When does price taking behaviour make sense and what precisely is meant by the term “competitive”? A fundamental result due to Aumann answered these questions and that answer and the associated extensions is presented here.

W. D. A. Bryant (2010), Ch 10.

Discusses the major approaches to, and results for, comparative statics in a GE context.

### **Lecture 9 Optimality of Market Equilibrium and the Welfare Theorems**

A. Mas-Colell, M Whinston and J. Green (1995), (background: pp. 515–525; see also the course notes.)

Provides the geometric intuition for what is going on with the Welfare Theorems.

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 545–566.

Extensive account of the First and Second Fundamental Theorems of Welfare Economics.

M. Blad and H. Keiding (1990), Ch. 4.

Market or Walrasian equilibrium might be an interesting solution concept for certain abstract games and even a way of understanding market prices, trades and sometimes a vehicle for obtaining comparative static predictions. Possibly even more interesting is the fact that under certain conditions Walrasian equilibrium decentralises a Pareto optimal allocation. This chapter deals with the optimality of equilibrium.

G. Debreu (1959), Ch. 6.

Classic treatment of the first and second fundamental theorems of Welfare Economics. Note in particular the hypotheses *and* conclusions of these theorems.

L. W. McKenzie (2002), pp. 165–171.

Gives a very nice account of the Welfare theorems and their context.

W. D. A Bryant (1994), "Misinterpretations of the Second Fundamental Theorem of Welfare Economics", *Journal of Economic Education*, 25(1), pp. 75–80.

The informal and semi-formal literature which interprets the SFTWE often claims more than the theorem does. “Support” is not analogous in English to “achieve”. This distinction matters when policy design is considered.

L. Kaplow (2008), “Pareto principle”, (in) *NPDE2*.

An interesting and insightful discussion of the optimality principle that has come to dominate thinking about welfare economics, at least at the undergraduate level.

W. D. A. Bryant (2010), Ch 9.

Discusses both the First and Second welfare theorems. Explores some circumstances where they hold and also some circumstances where they fail.

### **Lecture 10 Some Applications of the Arrow-Debreu Model**

This LECTURE aims to show that far from being an arcane piece of theory, Arrow-Debreu microeconomics informs a great deal of economic analysis – both ‘pure’ and ‘applied’.

**Application 1:** The first application involves a relatively careful analysis of **The Gains from Trade Proposition**.

M. Kemp (1987), “Gains from Trade”, *NPDE1* (2), pp. 453–454.

There are numerous applications of Arrow-Debreu model. Here Kemp shows how the model underpins standard “gains from trade” arguments.

M. Kemp and K. Shimomura (1997), “Trade gains: A unified exposition based on duality”, *The Japanese Economic Review*, Volume 48, No. 2, pp. 121–131.

This paper provides an in depth look at the propositions which constitute the gains from trade proposition in international trade.

Newbery, D. and J. Stiglitz (1984), “Pareto inferior trade”, *The Review of Economic Studies*, 51(1), pp.1–12.

Shy, O. (1988), “A general equilibrium model of Pareto inferior trade”, *Journal of International Economics*, 25(1/2), pp. 143–154.

Shy, O. (1989), “External effects and Pareto inferior trade”, *Southern Economic Journal*, 56(1), pp. 56–63.

Willmann, Gerald (2004), “Pareto gains from trade: a dynamic counterexample” *Economics Letters* Volume 83, Issue 2, Pages 199-204.

Grandmont, J. M. and D. McFadden (1972), “A technical note on the classical gains from trade”, *Journal of International Economics*, 2, pp. 109–125.

Grinols E. (1991), “Increasing returns and the gains from trade”, *International Economic Review*, 32(4), pp. 973 – 984.

Kemp, Murray C. and Koji Shimomura (2002), “Recent Challenges to the Classical Gains-from-Trade Proposition”, *German Economic Review*, November 2002, Vol.3(4), pp. 485–489.

Fachini G. and G. Willmann (2001), “Pareto gains from trade”, *Economia et Politica*, 18(2), pp.

207–215.

Calvo-Pardo, Hector (2009), “Are the Antiglobalists Right? Gains-from-Trade without a Walrasian Auctioneer”, *Economic Theory*, Vol.38(3), pp. 561–592.

**Application 2:** The second application involves studying the fascinating subject of **Piecemeal reform**. This approach to economic policy formulation turns out to be widely applicable to task of finding welfare-improving policies. This LECTURE provides a discussion of the foundations of the approach in Arrow-Debreu microeconomics, along with some applications.

Debreu, G. (1951), “The coefficient of resource utilization”, *Econometrica*, 19, 273–292.

Dixit, A. (1975), “Welfare effects of price changes”, *Journal of Public Economics*, 4, pp. 103–125.

Dixit, A. (1979), “Price changes and optimum taxation in a many-consumer economy”, *Journal of Public Economics*, 11, pp. 143–157.

Dixit, Avinash (1987), “On Pareto-Improving Redistributions of Aggregate Economic Gains”, *Journal of Economic Theory*, February 1987, Vol. 41(1), pp. 133–153.

Rader, T. (1976), “The Welfare Loss from Price Distortions”, *Econometrica*, 44, pp. 1253–1257.

Guesnerie, R. (1977), “On the direction of tax reform”, *Journal of Public Economics*, 7, pp. 179–202.

A. Woodland (1982), *International Trade and Resource Allocation*, pp. 341–344.

Presents an introduction to the tax and tariff reform literature which uses the Arrow-Debreu model as its laboratory.

A. Turenne-Red and A. Woodland (1991), “Tariff Reform in a Small Open Multi-Household Economy with Domestic Distortions and Nontraded Goods”, *International Economic Review*, pp. 937–957.

Advanced contribution to the Arrow-Debreu tariff reform literature, which relaxes some of the assumptions previously made in the literature.

Quiggin, John (1998), “Micro Gains from Micro Reform”, *Economic Analysis and Policy*, March 1998, Vol. 28(1), pp. 1–16

Ju, Jiandong and Kala Krishna (2000), “Necessary conditions for welfare improving reforms” *Economics Letters* Vol. 67(2), pp. 121–237

Serra, Pablo (1988), “The excess utility functions and the welfare adjustment process”, *Economics Letters*, Vol. 26(1), pp. 1–5

Yun, Kwan Koo (2010), “Efficient, Pareto-improving processes”, *Journal of Mathematical Economics*, Vol. 46(3), pp. 326–331

Carvajal, Andrés and H.M. Polemarchakis (2008), “Identification of Pareto-improving policies: Information as the real invisible hand” *Journal of Mathematical Economics* Vol. 44(2), pp. 167–179

Acocella, N. and G. Di Bartolomeo (2006), “Tinbergen and Theil meet Nash: Controllability in



policy games” *Economics Letters* Vol. 90(2), pp. 213–218.

Turunen-Red, Arja H. (1990), “On the Hatta Normality Condition and Tax Reforms”, *Journal of Public Economics*, Vol. 43(2), pp. 253–262

Nakanishi, Noritsugu (1993), “Welfare Analysis of Tariff Change with and without International Transfers” *Journal of International Economics*, November 1993, Vol. 35(3-4), pp. 377–387.

Konishi, H. (1995), “Pareto-improving commodity tax reform under a smooth non-linear income tax”, *Journal of Public Economic*, 56, 413–446.

Mandler, Michael (1999), “Simple Pareto-Improving Policies”, *Journal of Economic Theory*, Vol. 84(1), pp. 120–133.

**Application 3:** In LECTURE 8 on Comparative Statics, we developed a general expression for the variation in prices associated with particular changes in the parameters that define the economy. One such parameter is the size, composition and distribution of endowments among consumers in the economy. It is of some interest to study what happens when agents are *transferred* between agents. Our third application of Arrow-Debreu microeconomics therefore considers **endowment transfers, endowment manipulation and The Transfer Problem and the transfer paradox**. Academic interest in the transfer problem, grew out of a debate between Ohlin and Keynes about the likely effects of post WW1 German reparations. Here we outline the classic transfer problem and explore the various ‘manipulation *via* endowments’ results that have appeared in the literature.

M. Rao (1992), “On the transfer and advantageous reallocation paradoxes” *Social Choice and Welfare*, pp. 131–139.

Presents a nice account of the so-called ‘Transfer Paradox’, which although it appears to be a highly academic question, actually has historical antecedents in the debates (between Keynes and Ohlin among others) about the appropriate size of post WW1 German reparations. Can be applied in many contemporary situations also.

Kemp, Murray C. and Koji Shimomura (2002), “A Theory of Voluntary Unrequited International Transfers”, *Japanese Economic Review*, Vol. 53(3), pp. 290–300

Safra, Z. (1987), “Strategic reallocation of resources”, *NPDE1*, Vol 4., pp. 516–518.

Donsimoni, M. P. and H. Polemarchakis(1994), “Redistribution and welfare”, *Journal of Mathematical Economics*, 23, 235–242.

Galor, O. and H. Polemarchakis (1987), “Intertemporal equilibrium and the transfer paradox”, *Review of Economic Studies*, 54, pp. 147–156.

Dixit, A. (1995), “The multi-country transfer problem”, in *International Trade, Volume 1: Welfare and Trade Policy*, (ed.) J. P. Neary, Edward Elgar, Aldershot.

Goenka, Aditya and Stefano Matta (2008), “Manipulation of endowments and sunspot equilibria” *Economic Theory* 36, pp. 267–282.

Hens, Thorsten and Beate Pilgrim (2004), “Sunspot Equilibria and the Transfer Paradox”, *Economic Theory*, Vol. 24, No. 3, pp. 583–602.

Lane, Philip R. and Gian Maria Milesi-Ferretti (2004), "The transfer problem revisited: net foreign assets and real exchange rates", *Review of Economics & Statistics*, Vol. 86 Issue 4, p841-857.

Brock, P. (2008), "Transfer problem", in *New Palgrave Dictionary of Economics*, 2<sup>nd</sup> Edition, S. Durlauf and L. Blume (eds.), Palgrave Macmillan, London.

Yano, M. and J. Nugent (1999), "Aid, nontraded goods and the transfer paradox in small countries", *American Economic Review*, 89, pp. 431 – 49.

**Application 5:** Thanks to a result known as Sperner's Lemma, is a close relative of Brouwer's Fixed Point Theorem, it is possible to compute Arrow-Debreu prices (and quantities). Our sixth application will explore and explain some of what is involved in the **computation of equilibrium prices and quantities**.

Scarf, H. E. (2008), "Computation of general equilibria", in *The New Palgrave Dictionary of Economics*, 2nd Edition (eds.), S. Durlauf and L. Blume, Palgrave MacMillan, London.

Richter, Marcel K. and Kam-Chau Wong (1999), "Non-computability of Competitive Equilibrium", *Economic Theory*, v. 14, iss. 1, pp. 1-27.

Brocker, Johannes (1998), "Operational Spatial Computable General Equilibrium Modeling", *Annals of Regional Science*, v. 32, iss. 3, pp. 367-87

Caucutt, Elizabeth M. (2001), "Peer Group Effects in Applied General Equilibrium", *Economic Theory*, Vol. 17, No. 1, pp. 25-51

Deng, Xiaotie and Ye Du (2008), "The computation of approximate competitive equilibrium is PPAD-hard", *Information Processing Letters*, Vol. 108 Issue 6, p369-373.

Kubler, F. (2008), "Computation of general equilibrium (new developments)", (in) *New Palgrave Dictionary of Economics*, 2nd Edition (eds.), S. Durlauf and L. Blume, Palgrave MacMillan, London.

Chia N. and J. Whalley (1997), "A numerical example showing globally welfare worsening liberalisation of international trade in banking services", *Journal of Policy Modeling*, 19(2), pp. 119 – 127.

### **Lecture 11 Testing Arrow-Debreu Theory**

F. Kleibergen (2008), "Testing", (in) *NPDE2*.

Interesting discussion of the testing in an economics context.

### **(Testing Arrow-Debreu Consumer Theory)**

A. Deaton (1984), "Demand Analysis", *Handbook of Econometrics*, Vol. 3, Ch. 30.

Presents a summary of the outcome of testing Neoclassical consumer demand theory and some background material on how to conduct such tests.

J. Sabelhaus (1990), "Testing Neoclassical Consumer Theory with Aggregate and Household Data", *Applied Economics*, pp. 1471-1479.

Presents a test of Neoclassical consumer demand theory using the AID demand system



and draws attention to the contrast between results for aggregate and individual data.

R. Cooper and K. McLaren (1992), "An empirically oriented demand system with improved regularity properties", *Canadian Journal of Economics*, pp.652- 68.

An important development in the methodology of testing A-D consumer theory is presented here along with an interesting empirical application.

M. Familiari (1995), "A household-based non-parametric test of Demand Theory", *Review of Economics and Statistics*, pp. 372-382.

A non-parametric test of consumer theory.

A. P. Barten (2003) "The empirical content of consumer theory", Journal of Agricultural and Applied Economics, Supplement 2003, v. 35, pp. 7-17

Falsification of nontrivial empirical statements, of a statistical nature or not, is basically destructive. No wonder that it is rarely practiced. Rather than then abandoning a rejected null hypothesis, one tries to salvage it by looking for reasons why the rejection of an otherwise credible, plausible hypothesis occurs. One then attempts to modify the set-up in such a manner that formal rejection is avoided. Testing, in general, but specifically of nonnested hypotheses, can be seen as a kind of model selection. These issues are illustrated with examples from applied demand analysis: the testing of the homogeneity condition and of *Slutsky symmetry* and the choice of functional form for demand systems.

W. D. A. Bryant (2010), pp. 356 – 76.

Provides a survey of tests of consumer theory.

### **(Testing Arrow-Debreu Producer Theory)**

K. Conrad and R. Unger (1987), "Expost Tests for Short - and Long-Run Optimisation", *Journal of Econometrics*, pp. 339-1479.

Tests Neoclassical producer theory by exploiting consequences of various dual equivalence's.

J. Pencaval and B. Craig (1994), "Empirical Performance of Orthodox Models of the Firm: Conventional Firms and Worker Co-operatives." *Journal of Political Economy*, pp. 718-744.

Cleverly does (at least) two things: (i) See's how well the standard price taking, profit maximising model of the firm performs as far as predicting how firms will react to changes in their economic environment and (ii) check to see how different this behaviour is from that which one observes in firms which have objectives other than straight profit maximisation. Also claims to be doing this work without appeal to restrictive assumptions about returns to scale.

Barnett, William A. (2002), "Tastes and technology: Curvature is not enough for regularity", *Journal of Econometrics*, May 2002, v. 108, iss. 1, pp. 199-202

An interesting discussion of some basic issues in the econometrics of testing producer (and consumer) theory.

W. D. A. Bryant (2010), pp. 377 – 86

Provides a survey of tests of producer theory.

### **(Testing The Market Clearing Hypothesis)**

G. Rudebusch (1989), "An Empirical Disequilibrium Model of Labor, Consumption and Investment", *International Economic Review*, pp. 633-654.

Tests the Walrasian-equilibrium hypothesis using a disaggregated model of the US economy and aggregate data.

Mishra, D. and D. Talman (2006), "Overdemand and underdemand in economies with invisible goods and unit demands", *Tilburg University, Center for Economic Research*, Discussion Paper No. 84.

Considers the possibility of disequilibrium on markets due to various sorts of indivisibilities. Also presents some informal evidence in this direction.

W. D. A. Bryant (2010), pp. 386 – 401.

Presents some empirical evidence derived from tests of market clearing.

### **Lecture 12 Arrow – Debreu and Uncertainty**

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 167-207.

Detailed introduction to the theory of individual behaviour under uncertainty, including a review of some of the modern developments in the field.

D. Kreps (1990), Ch. 3.

There are many ways to model the choice, by an individual, of an action when there is an uncertain connection between any particular action and the resulting outcomes. Kreps provides an introduction and useful discussion of one of the most heavily investigated models of choice under uncertainty, that due to von Neumann and Morgenstern.

P. P. Wakker (2008), "Uncertainty", (in) *NPDE2*.

Provides a very nice treatment of choice under uncertainty.

Bryant, W.D.A (2014), The Microeconomics of Choice under Risk and Uncertainty: Where Are We?, *Vikalpa* 39(1), Jan – March 2014, pp. 21–40.

Discusses various approaches to modelling choice under risk and uncertainty – include some very recent developments.

### **Lecture 13 Arrow – Debreu and Uncertainty (cont'd)**

G. Debreu (1959), Ch.7.

Provides a classic treatment of the results obtainable about an economy in which there is a complete set of contingent markets.

A. Mas-Colell, M. Whinston and J. Green (1995), pp. 167–207.

Detailed introduction to the theory of individual behaviour under uncertainty, including a review of some of the modern developments in the field.

## Summary and Revision

F. Hahn (1982), "Reflections on the Invisible Hand", *Lloyds Bank Review*, pp. 1-21.

A delightful summary of much of what we have seen, presented with flair and great "attitude".

W. D. A. Bryant (2010), Ch 12.

An attempts a reflection on some of what GET has to teach us.

## Unit Schedule

Teaching Week	Lecture	Other things happening
1	<b>Lecture 1:</b> Microeconomics and the Arrow–Debreu model.	
2	<b>Lecture 2:</b> Arrow–Debreu Consumers I (Choice).	Tute 1 due
3	<b>Lecture 3:</b> Arrow–Debreu Consumers II (Demand).	Tute 2 due
4	<b>Lecture 4:</b> Arrow–Debreu Consumers III (Duality and Revealed Preference).	Tute 3 due
5	<b>Lecture 5:</b> Arrow–Debreu Producers.	Tute 4 due
6	<b>Lecture 6:</b> The Existence of equilibrium.	Tute 5 due
7	<b>Lecture 7:</b> Uniqueness and Stability of equilibrium.	Tute 6 due
8	<b>Lecture 8:</b> Comparative Statics of equilibrium.	Tute 7 due
9	<b>Lecture 9:</b> Optimality and the Welfare Theorems.	Tute 8 due
10	<b>Lecture 10:</b> Some applications of Arrow–Debreu general equilibrium theory.	Tute 9 due
11	<b>Lecture 11:</b> Testing Arrow–Debreu consumer, producer and equilibrium theory.	Tute 10 due
12	<b>Lecture 12:</b> Arrow–Debreu and Uncertainty	Tute 11 due
13	<b>Lecture 13:</b> Arrow–Debreu and Uncertainty (cont'd) + Revision.	Tute 12 due

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

Assessment Policy [http://mq.edu.au/policy/docs/assessment/policy\\_2016.html](http://mq.edu.au/policy/docs/assessment/policy_2016.html)

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public [http://www.mq.edu.au/policy/docs/complaint\\_management/procedure.html](http://www.mq.edu.au/policy/docs/complaint_management/procedure.html)

Disruption to Studies Policy (in effect until Dec 4th, 2017): [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html)

Special Consideration Policy (in effect from Dec 4th, 2017): <https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration>

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: [https://students.mq.edu.au/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](http://ask.mq.edu.au).

## Academic Honesty

The nature of scholarly endeavour, dependent as it is on the work of others, binds all members of the University community to abide by the principles of academic honesty. Its fundamental principle is that all staff and students act with integrity in the creation, development, application and use of ideas and information. This means that:

- all academic work claimed as original is the work of the author making the claim
- all academic collaborations are acknowledged
- academic work is not falsified in any way
- when the ideas of others are used, these ideas are acknowledged appropriately.

Further information on the academic honesty can be found in the Macquarie University Academic Honesty Policy at: [http://www.mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://www.mq.edu.au/policy/docs/academic_honesty/policy.html)

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

## Student Enquiries

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

### IT Conditions of Use

Access to all student computing facilities within the Faculty of Business and Economics is restricted to authorised coursework for approved units. Student ID cards must be displayed in the locations provided at all times.

Students are expected to act responsibly when using University IT facilities. The following regulations apply to the use of computing facilities and online services:

- Accessing inappropriate web sites or downloading inappropriate material is not permitted. Material that is not related to coursework for approved units is deemed inappropriate.
- Downloading copyright material without permission from the copyright owner is illegal, and strictly prohibited. Students detected undertaking such activities will face disciplinary action, which may result in criminal proceedings.

Non-compliance with these conditions may result in disciplinary action without further notice. Students must use their Macquarie University email addresses to communicate with staff as it is University policy that the University issued email account is used for official University communication.

## Graduate Capabilities

### PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

### Learning outcomes

- Appreciate current and seminal research papers and scholarship in a variety of areas of advanced microeconomics.

- Develop the ability to identify research opportunities and open question in advanced microeconomics.
- Possess a high level of oral and written communication skills specific to the needs of their discipline
- Be intellectually stimulated and intellectually stimulate others.

### **Assessment tasks**

- Best ten (10) Tutorials
- One Essay
- Final Examination

## **PG - Critical, Analytical and Integrative Thinking**

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

### **Learning outcomes**

- Develop critical skills in evaluating microeconomic theories.
- Possess a high level of oral and written communication skills specific to the needs of their discipline
- Be intellectually stimulated and intellectually stimulate others.

### **Assessment tasks**

- Best ten (10) Tutorials
- One Essay
- Final Examination

## **PG - Research and Problem Solving Capability**

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

### **Learning outcomes**

- Appreciate current and seminal research papers and scholarship in a variety of areas of

advanced microeconomics.

- Develop critical skills in evaluating microeconomic theories.
- Develop the ability to identify research opportunities and open question in advanced microeconomics.
- Be intellectually stimulated and intellectually stimulate others.

## Assessment tasks

- Best ten (10) Tutorials
- One Essay
- Final Examination

## About This Unit

Microeconomics pictures the economy as a collection of agents making supply and demand decisions in order to further their own interests. The collective outcomes of these decisions determine the properties and behaviour of the economy.

Consequently, this course provides an account of: (i) the microeconomics of agents **in** the economy; and (ii) the microeconomics of the economy **as a whole** that follows from what the agents in the economy are up to. This is done using, as an over-arching framework and point of reference, possibly the most fundamental model in economics, namely the Arrow and Debreu model.

The course also considers various tests of microeconomic theory – something curiously lacking in most textbooks – along with illustrative applications of microeconomic theory to international trade and finance. Some extensions and generalizations of Arrow-Debreu microeconomics are also presented. The ultimate aim of the course is to fire student interest, enquiry, and learning in microeconomics, by providing an integrated, accessible, rigorous, carefully motivated, relevant and empirically referenced account of advanced microeconomics.

One of the complaints that students sometimes make about their experience in microeconomics courses is that microeconomics ‘appears to be a disjointed collection of topics’ and that it lacks ‘a unifying context and narrative’. From the title page on, this course makes an implicit claim that the presentation and student experience of microeconomics needn’t be like that. This is so because there exists a deep, unifying and beautiful context for the field of microeconomics in the form of the Arrow-Debreu model of general equilibrium.

John Geanakoplos (2008) has recently remarked that: “[i]t is not easy to separate the significance and influence of the Arrow-Debreu model of general equilibrium from that of mathematical economics itself”. In fact it is reasonable to argue that the Arrow-Debreu model – along with its extensions and generalizations – forms the bulk of theoretical economics. Geanakoplos, John. “Arrow-Debreu model of general equilibrium.” *The New Palgrave Dictionary of Economics*. Second Edition. Eds. Steven N. Durlauf and Lawrence E. Blume. Palgrave Macmillan, 2008.

The Arrow-Debreu model pictures the economy as a collection of economic agents (traditionally



identified as ‘consumers’ and ‘producers’), who make supply and demand decisions in an environment of complete markets, with the aim of furthering their own interests. Locating the economic agents in an Arrow-Debreu context leads naturally to a detailed discussion of consumer and producer behaviour in such a decision making environment. It also sets the scene for various extensions and generalizations of Arrow-Debreu consumer and producer theory that are treated later in the book. As well it provides an early glimpse at ‘the ultimate purpose’ of consumer and producer theory, which is to help us to better understand the behaviour of the economy as a whole.

With the Arrow-Debreu context for our work in place, outlining the field of microeconomics, and the institutional features of the Arrow-Debreu model becomes the natural subject matter for LECTURE 1.

Developing the microeconomic theory of consumers and producers in a complete market Arrow-Debreu economy follows as the subject matter of LECTURES 2, 3, 4 and 5.

LECTURES 6, 7, 8 and 9 develop the properties of the economy that flow from the underlying microeconomics of the agents in it.

LECTURE 10 considers some applications of Arrow-Debreu microeconomics. One of the surprising things discovered by readers in the applications section is that a great deal of what passes for ‘standard economics’ (e.g. the gains from international trade proposition, some basic results in finance), are highly conditional, and in fact conditional on the world looking a lot like the Arrow-Debreu model of the economy.

LECTURE 11 is motivated by the observation that economics not only has a duty to formulate theories about economic phenomena, but it also has a duty to test those theories. Curiously, at least to me, this step in the ‘scientific method’ is (with one partial exception), never embraced in graduate (or undergraduate) microeconomics texts. The partial exception is Chapter 12 in H. R. Varian, *Microeconomic Analysis* where a brief outline of some the **methods** for evaluating and testing Arrow-Debreu consumer and producer theory (but not of other aspects of Arrow-Debreu microeconomics, such as the market clearing hypothesis), is given. However, even in that very good book, and in the context of his discussion of ‘microeconometrics, Varian (1992, Ch12) fails to give students any indication of the **outcomes** of such tests as have been conducted and reported in the literature. This is a major omission from all currently available graduate texts in microeconomics.

LECTURES 12 and 13 provide a treatment of the microeconomics of uncertainty, both at the individual economic agent level and at the level of the economy as a whole.

The entire presentation of microeconomics given here is made in the context of and with reference to the Arrow-Debreu model. Hopefully this will give you as students the sense that far from being a ‘disjointed series of topics’, advanced microeconomics is in fact a coherent collection of mutually supporting ideas. Using the Arrow-Debreu model as the explicit framework for our presentation of microeconomics also has a pedagogic advantage because students will generally experience fewer feelings of being lost in any particular argument, because the big picture context of the model can always be referred to in order to see where any particular argument is ultimately heading.



## Research and Practice

- This unit may use research by Macquarie University researchers
- This unit may use research from external sources. This unit gives you opportunities to learn how to critique current research at the frontiers of advanced microeconomics as a prelude to possibly conducting your own research

## Technology Used and Required

Students require computer technology sufficient to regularly access the ECON860 iLearn webpage and the Departmental Research Seminar Series webpages via the internet.

Course material is available on the learning management system (iLearn)

The web page for this unit can be found at: <http://ilearn.mq.edu.au/course/view.php?id=12066>

## Textbook and References

The **textbook** for the course is:

Mas-Colell, A., M. D. Whinston and J. R. Green (1995), *Microeconomic Theory*. Oxford University Press, Oxford and New York.

**Reference** will also be made from time to time to the following works:

Balasko, Y. (2011), *General Equilibrium Theory of Value*, Princeton University Press, Princeton.

Blad, M. C. and H. Keiding (1990), *Microeconomics: Institutions, Equilibrium and Optimality*. North-Holland, Amsterdam.

Bryant, W. D. A. (2010), *General Equilibrium: Theory and Evidence*, World Scientific and Imperial College Press, Singapore, London and New Jersey. Two reviews of this book may be found at the end of this Course Outline.

Cornes, R. (1992), *Duality and Modern Economics*. Cambridge University Press, Cambridge.

Durlauf, S. N. and L. E. Blume (2008) eds., *The New Palgrave Dictionary of Economics*, (2<sup>nd</sup> Edition) London: Palgrave-Macmillan. This is abbreviated throughout this reading list as *NPDE2*.

Jehle, G. A. and P. J. Reny (2010), *Advanced Microeconomic Theory*, FT Press.

Kreps, D. M. (1990), *A Course in Microeconomic Theory*. Harvester-Wheatsheaf, N.Y.

Luenberger, D. G. (1995), *Microeconomic Theory*, McGraw-Hill, New York.

McKenzie, L. W. (2002), *Classical General Equilibrium Theory*, MIT Press, Cambridge Mass.

Varian, H. R. (1992), *Microeconomic Analysis*. Norton, N.Y. (3rd Edition).