



Australian
National
University

RESEARCH SCHOOL OF ECONOMICS

Econ 2141: Strategic Thinking: An Introduction to Game Theory

Semester I 2018

Martin Richardson

Course description

In many - perhaps most - economic, political, legal and social interactions, there is potential for strategic behaviour, a term, “intended to focus on the interdependence of the adversaries' decisions and on their expectations about each other's behaviour.” (Schelling, 1960, The Strategy of Conflict).

Recognising and understanding such behaviour is an essential part of any analyst's toolkit and this course is designed to enable just such recognition and understanding. Game theory has successfully been applied in a diverse range of fields, such as economics, political science, military analysis, law, biology and computer science.

The aim of this course is to provide an introduction to strategic thinking and analysis through the basic techniques of game theory and to illustrate the range of its applications in almost all fields of social interaction. While the level of the course will be introductory, and mathematical prerequisites are minimal, the presentation of the material will rely on precise logical arguments. This course should be of interest to students from any part of the University.

Mode of Delivery	On campus
Prerequisites	Any 24 units
Course Convener	Prof. Martin Richardson
Phone:	+61 2 612 53582
Email:	Martin.Richardson@anu.edu.au
Office hours for student consultation:	Thursdays 10-12 and other times by appointment
Research Interests	Intr'l Econ, Applied Microeconomics
RSE Student Office Contact	Nicole Millar
Phone:	02 612 50384
Email:	enquiries.rse@anu.edu.au
RSE Students Webpage	https://www.rse.anu.edu.au/students/
Tutor(s)	TBA

<http://programsandcourses.anu.edu.au/course/ECON2141>

Lecturer

[Prof. Martin Richardson](#)

Research School of Economics, College of Business & Economics,
H.W. Arndt Building (#25A), The Australian National University, Canberra ACT 2601.



I have been at the ANU since 2003. I got my PhD in Economics at Princeton University and have taught at Georgetown University in Washington DC and the University of Otago in New Zealand as well as at the ANU. I have published in international trade and applied micro and have been an academic visitor at the University of Toronto, the Université de Montréal, the University of Copenhagen Business School, University College Dublin and the University of Tübingen, amongst others. I have been a Lay Member of the NZ High Court since 2000.

Mode of instruction

The course runs through Semester 1 201: February 19th to May 25th. Students are expected to attend all lectures, tutorials and exams throughout this period – do not make alternative commitments that will prevent your attendance at these times. In particular, **the mid-semester tests are set for Tuesdays March 20th (Week 5) and May 1st (Week 9)** and there are no substitutes or supplementary tests for them. The primary mode of instruction will be through lectures, augmented by tutorials, readings and web-based problems.

Lectures

All in LAW T (Law School)

Tuesdays: 2:00pm-3:00pm

Thursdays: 2:00pm-3:00pm

Tutorials

All students attend a one hour tutorial starting in the second week. Enrolment in tutorials will be completed online through Wattle.

The first tutorial will take place during the second week of class. Tutorial exercises are designed to apply and reinforce the principles taught in lectures. Foundation tutorial questions for the following week will be available on Wattle (but not the other questions – you must attend the tutorial to get those.) I emphasise that you must attempt the foundation tutorial problems before attending the tutorial in order to make sense of the regular problems that will be discussed in the tutorial. **N.B. None of the tutorial materials will be made available online.** The final exam questions will include tutorial style problems. You will only learn problem solving skills (necessary to pass the final exam) through practice, NOT by simply writing down answers from tutorials. You learn by doing and practicing.

Course evolution

ECON2141 v8.2018 changelog:

- In late January 2018 ANU announced that it would no longer purchase PollEverywhere, the software it had previously encouraged lecturers to adopt for in-class real-time polling. That leaves the free version, which caps the number of responses permitted per poll. More details in class.
- 2017: a system of “class representatives” for feedback introduced.
- 2017: the ANU’s ongoing Cookie-Cutter Standardisation Education™ (CCSE) strategy meant the removal of the previous 5% assessment for in-class exercises and online questions as required elements. Move to two mid-semester tests instead.
- 2015: tutorials are restructured to mimic Best Practice™ at Australia’s 2nd best University: more details in class.
- 2015: the ANU CCSE diktat on late assignments led to the removal of written assignments in ECON2141.
- 2012: all lectures are recorded, subject to the whims of the IT.

Syllabus¹

1. What is game theory?
2. Simultaneous move games and pure strategies
3. Simultaneous move games and mixed strategies
4. Nash equilibrium explored
5. Sequential move games
6. Extensive form games, subgame perfection, backward induction
7. Information issues – Bayesian games
8. Repeated games and folk theorems
9. More applications
 - a. Strategic commitment
 - b. Pricing strategies
 - c. The dynamics of pricing rivalry
 - d. Entry and exit

Texts

No textbook is formally required but the following would be useful (in this order)

Watson, J. (2008), Strategy: an introduction to game theory 3e. Norton. ISBN 978-0-393-91838-0.

Osborne, M. (2009), An introduction to game theory Intn’l Ed. Oxford UP. ISBN 978-0-195-32248-4.

Dixit, A. and S. Skeath (1999), Games of strategy. 2e. Norton.

Besanko, D., D. Dranove, M. Shanley and S. Schaefer, (2007), Economics of strategy 4e. Wiley.

Any more recent editions of these books will do. Students will be supplied with a set of selected readings and copies of (most of) the lecture slides as we proceed.

¹ Note that no warranty, implied or express, is given concerning the coverage of this course and the lecturer issues no undertaking to cover all or any of the following material, so this is tentative only! In particular, the scheduling of topics is subject to on-the-spot revision as the class progresses.

Contacts

Role	Office address	Email	Phone	Office Hours
Course Convenor and Lecturer: Martin Richardson	2013, HW Arndt Bldg.	Martin.Richardson@anu.edu.au	6125-3582	Thurs 10-12, other times by appointment
Tutors: TBA	Arndt 1002	xxx@anu.edu.au	-	TBA
TBA	Arndt 1002	xxx@anu.edu.au		TBA
Finn Wijnberg , RSE School Administrator	1014, HW Arndt Bldg.	Finola.Wijnberg@anu.edu.au	6125-0195	09:00–17:00
Nicole Millar , RSE Course Administrator	1013, HW Arndt Bldg.	Nicole.Millar@anu.edu.au	6125-0384	09:00–17:00

Assessment

Assessment is based on the final exam, 2 mid-semester tests and *participation in online questions*.

- Final exam 65-100%,
- Optional online questions 5% – redeemable against final,
- Optional mid-semester tests 30%: 2@15% each – redeemable against final.

N.B.: Regardless of these weights, a disastrous failure on the final is grounds for failing the course.

Note that failure to do the final or mid-semesters means you get zero for that component of the assessment. The mid-semester tests, however, are, like the optional online questions, redeemable: if you do better on the final it will count for up to 100% of your course grade rather than the default 65%.

No deferred or supplementary mid-semester tests will be offered. Students who do not attend a mid-semester test will be awarded a mark of zero for it. “Any student who would normally qualify for a deferred mid semester exam will instead have their grade reweighted, and ... students have an opportunity to ask clarifying questions about this practice”. Any further details regarding exams will be announced in lectures and posted on Wattle.

Assessment Task	Value	Due Date	Date for Return of Assessment
1. Midterm 1	15% (redeemable)	March 20 th	March 26 th
2. Midterm 2	15% (redeemable)	May 1 st	May 7 th
3. Online games	5% (redeemable)	Occasional	–
4. Final exam	65%-100%	TBA	

Extensions Policy: The online questions must all be answered by 5:00pm Friday on the week in which they are assigned. No extensions beyond this will be given for ANY reason.

Technology, Software, Equipment

I plan to use Wattle extensively and as my main means of getting material to you: <https://wattle.anu.edu.au/>. Please ensure that you have access and that you check it regularly.

Prior to a number of lectures you will be asked to participate in some “on-line experiments” which will help you to focus on games and decision problems which we will discuss later in class. Participation is optional, but recommended. Once you complete a set, it will be recorded. I will have access to the information about which sets you have completed. There are no “right” and “wrong” answers to the posted problems and each set will take only a few minutes to complete. Please respond to the problems as naturally as possible. I will have the aggregated statistics of the class’ responses and we will use these in class discussion. To get the 5% assessment allocated for this component of the course you must do *all* of the assigned question sets from week two onwards (probably 4 or 5 weeks all up.) You will get somewhere between 0% and 5% in this element, depending on what share of the total number of assigned question sets you answer.

In order to participate in these experiments you will first need to register. Please do so immediately, before the first class meets:

- Please log into <http://gametheory.tau.ac.il/student/?c=2816>. (You’ll need cookies enabled on your browser to log in.)
- Our Course Number is 2816.
- The initial class password is 4415 but you will have to select a new password after login.

Please remember the login name and the personal password you select. (You will be able to retrieve the password if you lost it). After registration you will be automatically directed to the first problem set, an exercise set that I have posted for you to practice but which does not count for assessment purposes. Please respond to all problems. Only after you have completed the set will you receive confirmation (with a red tick) and your participation will be recorded. In case you are interrupted before you finish the set you will be able to login again and resume the set from the point at which you stopped.

Finally, we will be using some in-class surveys run through PollEverywhere. To participate in these you will need, ideally, some form of internet access while in class: a smartphone, tablet or laptop. More instructions will be provided in class.

Learning Outcomes

In order to satisfy the requirements of this course, students will need to acquire a thorough understanding of the concepts introduced during the semester, and will need to demonstrate that they can apply the corresponding tools and ideas to unfamiliar problems. Note that just memorising the steps used to solve examples discussed in lectures and assigned tutorial problems will not lead to a clear

understanding of these concepts, and will not prepare students to tackle the problems they will be required to solve in the exams.

On satisfying the requirements for this course, students should have the knowledge and skills to:

- Understand how game theorists think and approach a strategic problem.
- Understand the tools taught in class and be able to recognise their application to the analysis of real world fact situations.
- Recognise the strategic issues in a problem and understand how a game theorist might decide on the appropriate tools to analyse it.

Workload

Students taking this course are **expected to commit at least 10 hours a week – on average – to completing the work**, comprising:

- 2 hours a week of lectures
- 1 hour a week of tutorial
- 7+ hours a week: reading, writing and tutorial preparation

Some weeks will demand less time than this; some more.

Scaling

Your final mark for the course will be based on the **raw** marks allocated for each assignment or examination. 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**.

Research-Led Teaching

The lecturer is a user of game theory in his own research, albeit as a tool of analysis rather than the subject of the analysis itself. Consequently, students will be exposed to the practical use of game theory and strategic thinking in current economics research – explicitly in one of the applications covered in s.9 of the course, time permitting.

Feedback

It is hoped that the lectures will involve a lot of discussion, questions and answers. We will provide a verbal review of each tutorial exercise and review of the mid-semester exams (in tutorial time) and thus feedback to the class as a whole. All online and in-class questions will be discussed directly in class.

The Wattle site contains a forum for ongoing (anonymised) discussion and feedback and there will also be a small, optional survey mid-way through the course. I will be appointing a couple of student class representatives and they will be an important source of (anonymised) feedback too – more details in class.

General Information for all Students

Policies, Procedures and Rules

ANU has more educational policies, procedures and guidelines than you would believe, covering every contingency conceivable by the febrile imagination of the University's Legal Office. But of course these are, "designed to ensure that staff and students are aware of the University's academic standards, and implement them." You can find the University's education policies and an explanatory glossary at: <http://policies.anu.edu.au/>

Students are apparently expected to have read the [Academic Misconduct Rule 2015](#) before the commencement of their course. Enjoy!

Other key policies include:

- Student Assessment (Coursework)
- Student Surveys and Evaluations

CBE Student Office

<https://www.cbe.anu.edu.au/students/>

The CBE Student Office provides assistance with program and course selection, enrolment, change of program, variation to enrolment, status and other general matters. It is located on Level 2 of CBE Building 26c, contact details:

- T: (61) 02 6125 3807
- E: info.cbe@anu.edu.au

Main Administrative Dates

<http://timetable.anu.edu.au/>

The main administrative dates regarding teaching sessions, course census dates, examination period, graduation and enrolment variations (i.e. add and drop courses) are available from the ANU Timetable.

ANU Student Support

Academic Skills and Learning Centre

<http://www.anu.edu.au/students/contacts/academic-skills-learning-centre>

The Academic Skills and Learning Centre offers services to students regarding a range of academic issues including essay writing, note-taking, referencing, reading, examination preparation, and plagiarism.

ANU College

<http://www.anucollege.edu.au/>

ANU College offers the following introductory and extended programs:

- maths bridging courses; and
- English language support for students from non-English-speaking backgrounds.

ANU Students

<http://students.anu.edu.au/>

The Students pages on the ANU Website provide links to most of the information you need to know on matters such as enrolment and administrative procedures.

See also Study@ANU (<https://studyat.anu.edu.au/>) and the ANU Rules and Policies (<http://about.anu.edu.au/governance-structure/legislation/rules> and https://policies.anu.edu.au/ppl/document_list/index.htm?audience_id=Students).

Information for Enrolled Students

<https://www.rse.anu.edu.au/students/>

Students are expected to be familiar with the ANU College of Business & Economics and university-wide policies and procedures on the following:

- [Code of Practice for Teaching and Learning](#)
- Assessment Arrangements for Students from Language Backgrounds Other Than English
- Academic Progress Rules and Procedures
- Special examinations/consideration
- Supplementary examinations
- Review of assessment procedures

Special Examinations

<http://cbe.anu.edu.au/cbe/current-students/undergraduate-graduate-coursework/examinations-and-assessment/special-examinations/>

You must contact the College Office for guidance on the procedure for special examinations for final examination. Do not approach your lecturer for this information.

Special examinations are **not** automatically granted. If approved, successful candidates are required to contact the relevant School Office to obtain details of the special exam. If you do not sit the examination, or your application for a special examination is declined, then you will fail the course as incomplete.

It is not grounds for a further special examination if students are not contactable and miss the scheduled examination date.

Special Consideration

<http://www.anu.edu.au/students/program-administration/assessments-exams/special-assessment-consideration>

If illness or other disruptive events have affected your preparation for, or performance during, an examination, you can bring this to the attention of the examiners by making a request for special consideration using the [special consideration eForm, via ISIS](#).

Special Arrangements

If you have a disability or disorder (permanent or temporary) which makes undertaking a formal sit-down examination difficult, then **you are responsible for requesting special arrangements to be made for your examination**. In the past these arrangements have included the use of special equipment, additional time, writing breaks, a scribe (someone to write for you), etc.

Please contact the Examinations and Graduations Office early in the semester and **at least 10 days prior to the examination period**. Failure to make appropriate arrangements for an examination may result in a subsequent application for a special examination/special consideration being declined.

Disabilities

If you have an ongoing medical condition you are advised to register with the Disability Services Centre. The ANU Access and Inclusion website is at <http://www.anu.edu.au/students/contacts/access-inclusion>.

Supplementary Examinations

<http://www.anu.edu.au/students/program-administration/assessments-exams/supplementary-assessment>

In some circumstances you may be offered a supplementary examination. If you have qualified for a supplementary examination, your grade will be recorded as a PX on your Notification of Results. ***You must notify the School Office, in writing (email is satisfactory), within 7 days of the official publication date of exam results to indicate your acceptance or otherwise to sit the supplementary examination.***

If you pass the supplementary examination you will receive the grade of 50PS (pass at supplementary examination) and a mark of 50. If you are unsuccessful, or you decide not to sit the supplementary examination, your grade will be recorded as N (fail) and your original mark will stand.

Supplementary examinations will be held early in the next semester on dates to be advised. For information regarding the timing and venues for supplementary examinations please refer to the school website in week 2 or later of the current semester: <http://rse.anu.edu.au/>.

Travel plans should be made accordingly as travel plans are not an acceptable reason to miss a supplementary examination.

Results and Examinations

In accordance with the University Assessment Grades/Codes, CBE applies the following scale when awarding grades:

Final Pass Grades

HD – High Distinction 80–100

D – Distinction 70–79

CR – Credit 60–69

P – Pass 50–59

PS – Pass at supplementary examination 50

Final Fail Grades

N – Fail 00–49

NCN – Not Completed/Fail

WN – Withdrawn with failure

Interim Codes (used when a result for a course has not yet been finalised)

DA – Deferred assessment

PX – Offered supplementary assessment

RP – Result pending

WA – Withheld for administrative reasons

Results Notification

To access results students should check their ISIS accounts on the advertised date for release of examination results. After publication, students enquiring about

results must provide an ANU student card as proof of identification to the Examinations, Graduations, Prizes and Timetabling Office (Building 12). For privacy reasons students should not make enquiries regarding the results of other students.

Examination Timetable – Final Examination Period

<http://timetable.anu.edu.au/>

Details of the final examination timetable will be available on the ANU Timetabling website. The onus is upon students to acquire their own scheduling details.

Examination Timetable – Mid-Semester Examinations

When a mid-semester exam is scheduled, timetable information will be posted by the relevant School.

Misconduct and Plagiarism

We're against them. See <http://www.anu.edu.au/students/program-administration/assessments-exams/academic-honesty-plagiarism>

In relation to an examination, misconduct on the part of a student includes:

- cheating;
- plagiarism (including the reproducing in, or submitting for assessment for, any examination, by way of copying, paraphrasing or summarising, without acknowledgement and with the intention to deceive, any work of another person as the student's own work, with or without the knowledge or consent of that other person);
- submitting for an examination any work previously submitted for examination (except with the approval of the prescribed authority);
- failing to comply with the University's instructions to students at, or in relation to, an examination;
- acting, or assisting another person to act dishonestly, in or in connection with an examination; and/or
- taking a prohibited document into an examination venue.

The administrative procedures regarding misconduct are incorporated in the ANU Discipline Rules.

The College regards plagiarism as any appropriation of the ideas or expressions of another without relevant and appropriate acknowledgment. This includes un-attributed appropriation of text or content and may extend to improper referencing. Plagiarism will not be tolerated in any course and all discovered instances would be pursued to the full extent allowable under the rules. Where students have doubts as to how to deal with or acknowledge source materials in course assignments they should consult the lecturer or tutor. The penalties and administrative procedures regarding plagiarism are incorporated in the ANU Policy on Academic Honesty. On-line material discussing plagiarism and referencing styles is available from the following page:

<http://www.anu.edu.au/students/learning-development/academic-integrity>.

Privacy Notice

The ANU has made a number of third party, online databases available for students to use. Use of each online database is conditional on student end

users first agreeing to the database licensor's terms of service and/or privacy policy. Students should read these carefully.

In some cases student end users will be required to register an account with the database licensor and submit personal information, including their: first name; last name; ANU email address; and other information.

In cases where student end users are asked to submit 'content' to a database, such as an assignment or short answers, the database licensor may only use the student's 'content' in accordance with the terms of service – including any (copyright) licence the student grants to the database licensor.

Any personal information or content a student submits may be stored by the licensor, potentially offshore, and will be used to process the database service in accordance with the licensors terms of service and/or privacy policy.

If any student chooses not to agree to the database licensor's terms of service or privacy policy, the student will not be able to access and use the database. In these circumstances students should contact their lecturer to enquire about alternative arrangements that are available.

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/>

Other Information

Building Access Hours

Both CBE and HW ARNDT are:

TEACHING PERIOD: Mon – Fri 07.45 to 21.15 and
Sat, Sun and Public Holidays are not accessible by students.

NON -TEACHING PERIOD: Mon – Fri 08.00 to 18.00 and
Sat, Sun and Public Holidays are not accessible by students.

RSE has a **Frequently Asked Questions** page where you can find relevant policies and information on a broad range of topics, the onus is on the student to familiarise themselves with this page and the information available:

<https://www.rse.anu.edu.au/students/students/frequently-asked-questions/>.