Syllabus, Eco 701 (Advanced microeconomic theory)

TH 2:00-3:15, B&E room 214

Course description: This is a second-semester PhD-level course in microeconomics. The first-semester course discussed consumer and producer theory; this course will discuss game theory and information economics.

The intended audience for this course is students who wish to one day be competent economists. This includes UK econ PhD students, undergraduates with sufficient mathematical background who are interested in grad school in the future, and interested students in related fields. This is **not** a "survey" course which will provide a broad introduction to microeconomics; it is a narrowly-focused course which will provide technical training for future economists. As such, it will be most useful in concert with future economics course, which will focus much more on developing intuition and research potential.

This course will largely stand alone from Eco 601. Your mathematical background is more important than any particular prerequisite. Students will be assumed to be comfortable with complicated algebra, basic calculus including constrained optimization, and basic probability. If you find the relevant chapters of the course's required textbook unduly difficult, you should not take this course.

Contact info: My name is Jeremy Sandford, and I am an assistant professor in the economics department at UK. Please call me Jeremy. My email address is jeremy.sandford@uky.edu. My website is jasandford.com. It has a detailed schedule, which I will update after each class, and information on homeworks and exams.

Office meetings: I will have one regular office hour for this course, from 1-2 on Wednesdays. I will also be in my office throughout the week, and so, particularly on non-teaching days (MWF) I am available to meet with you as needed to discuss homeworks, lectures, problems understanding readings, etc. I view office meetings as an important part of the course, and expect them to be used efficiently and often.

Homework: There will be approximately 10 graded homework assignments. The grade will be based both on correctness of a subset of assigned problems as well as my subjective assessment of the effort you put into the homework.

You will spend most of your time for this course on the homeworks. They will be hard. You should work in study groups to compare answers and try to reach more correct answers together. You should come talk to me about the problems after this process has played out.

You are also free to copy assignments from classmates and/or the Mas-Collel answer key and turn them in as your work. However, if you do this, it is vanishingly unlikely that you will do well on exams, earn a passing grade in the course, or pass prelims.

Exams: The midterm exam is on Friday March 4 from 1pm-4pm. The final exam is Friday May 6th from 8am-10am. It is not possible to take either exam at a different time, short of debilitating extenuating circumstances discussed as far in advance as possible with me. The most likely outcome of missing an exam for such a reason would be receiving a grade of incomplete this semester, and having a chance to take next

year's corresponding Eco 701 exam for this semester's credit. If you will not be available for either of these exam times, please do not take this course.

Course materials: The required book is "Microeconomic Theory," by Andreu Mas-Collel, Michael Whinston, and Jerry Green. This is not always an easy book to read; nonetheless, by the time you take the prelim, you need to be intimately familiar with the 6 or so chapters covered in this class.

It may sometimes be useful to get a different perspective; undergraduate books on game theory may be able to fill in some blanks on the big picture. The book "Games of Strategy," by Dixit, Skeath, and Riley is the best I know of. There are also good advanced undergrad books such as "An Introduction to Game Theory" by Osborne and "Game Theory for Applied Economists," by Gibbons.

Though Mas-Collel has no real competitors as a first-year graduate economics textbook, there are other graduate-level general microeconomics books; their sections on game theory may be useful to you as supplemental reading. "Advanced Microeconomic Theory" by Jehle and Reny is particularly good. "Microeconomic Analisys," by Varian, was used as commonly as the Mas-Collel text is now 20 years ago, and is still a good reference. It's treatment of the topics in this course, however, is somewhat meager.

Grading: Course grades will be determined by a weighting of homework assignments (10%), one midterm (40%), and one final exam (50%).

Econ, finance, and ag econ PhD students will receive course grades as follows:

- **A:** Your performance in this course suggests you have a reasonably good chance of passing my portion of the microeconomics prelim exam
- **B:** Your performance suggests that it may be possible to pass my portion of the microeconomics prelim exam with a lot of hard work and improvement between the end of the course and the exam
- **C:** Your performance in this course suggests you are unlikely to pass the prelim exam without a heroic effort
- **F:** Your performance suggests that you are not serious about becoming a competent economist

Other students (undergrads, masters students, interested students from other departments) will be graded on a different scale, roughly A for "would be an excellent grad student to have at UK" B for "strong effort, and good results given constraints" and C for "didn't work out well".

While this university does not give plus/minus grades, nor grades such as "AB" or "BC," I will use such grades, and will also report them to other graduate faculty as needed, though they will not appear on your university transcript.

Time commitment: We will be covering 6 chapters of a difficult and technical book, and you will completing about 10 homeworks, in addition to studying for the exams and prelims. As such, this will be a time-intensive course. A student who gets an excellent course grade/prelim result will have spent at least 10 hours/week working on this course outside of class, and most likely considerably more.

Contingencies: Should the university cancel any of our class meeting because of inclement weather, they will be made up, most likely on the following Friday afternoon.

Academic dishonesty: I will pursue the maximum penalty for any cheating on exams.

Topics Covered

Topic	Subtopics	reading
Games	Normal form games	MWG 7, 6B
	Extensive form games	
	Expected utility	
Solution concepts for normal form games	Dominance	MWG 8A-8D
	Iterated strict dominance	
	Rationalizability	
	Nash equilibrium	
	The minmax theorem	
Refinements of Nash equilibrium	Subgame perfect equilibrium	MWG 8F, 9A-9C
	Perfect Bayesian equilibrium	
	Sequential equilibrium	
Bayesian games	Asymmetric information	MWG 8E, 9D
	Bayesian games	
	Signaling games	
Repeated games	Repeated prisoner's dilemma	TBD
	One-shot deviation principle	
	Folk theorems	
Oligopoly models	Static Cournot, Stackelberg, and Bertrand models	MWG 12
	Repeated interaction in oligopolies	
	Entry and strategic considerations	
Applied models of asymmetric information	Adverse selection	MWG 13
	Signalling and screening	
Principal-agent problems	Basic principal-agent model	MWG 14
	Mechanism design	

Each topic will take from 1-5 class meetings. This list is preliminary. It is quite likely that we will not cover every topic listed above, and that we will cover topics which are not listed. I will maintain an updated schedule on my website, jasandford.com, which will list the actual topic on each class day, as well as any additional readings that may be required.