

**Faculty of Liberal Arts and Professional Studies**  
**Department of Economics**  
**Econ 6100: Topics in Microeconomic Theory**  
**Winter 2024**

**Class information:**

- Time and location: Winter 2024, Friday 11:30-2:30 pm, VC 106
- Course Webpage: <https://eclass.yorku.ca/course>
- Prerequisite: Economics 5100 3.0

**Course Description**

This course serves as a graduate-level introduction to game theory and its applications, specifically tailored for first-year Economics Ph.D. students. Throughout the curriculum, we will delve into core concepts of game theory, encompassing static and dynamic games of complete information, games of incomplete information, repeated games, and more.

The latter part of the course will extend beyond theoretical foundations to explore applied topics, including bargaining, information economics, and mechanism design. To maximize your understanding and engagement with the material, a robust background in mathematics is required. Proficiency in advanced calculus, probability theory, basic measure theory, and various methods of mathematical proof will be beneficial for navigating the course content.

**Instructor:** Yishu Zeng

- E-mail address: [zengyish@yorku.ca](mailto:zengyish@yorku.ca)
- Office Hour: By appointment

Note: Please kindly indicate “Econ 6100” in the subject of your email.

**Textbooks and Course Material**

The required textbook is:

Microeconomic Theory; Andreu Mas-Colell, Michael D. Whinston, and Jerry R. Green;

Oxford University Press, 1995 (**MWG**). MWG is aimed squarely at first-year Ph.D. students and is nearly universally used at top graduate programs.

You are also encouraged to read other excellent textbooks listed below:

- **Suggested, less advanced:** Strategy: An Introduction to Game Theory, 3rd. Edition; Joel Watson; W. W. Norton, 2013 (**Watson**). Watson is aimed at advanced undergraduates. I highly recommend it for intuition and examples; nonetheless it is quite precise. It is also more modern in its approach than the textbooks from the 1990s. I use Watson for my undergraduate game theory course. The chapter numbers I list are for the 3rd. edition. The older editions are also good, but the chapter numbers will vary a bit. When first approaching a new topic, if you have time you might consider reading Watson first, then moving onto MWG.
- **Suggested, more advanced:** A Course in Game Theory; Martin Osborne and Ariel Rubinstein; MIT Press, 1994 (**OR**). OR provides a more formal treatment of game theory than MWG, and covers certain topics in significantly more depth. It is aimed at second-year Ph.D. students. This textbook is available as a free PDF download at <http://www.economics.utoronto.ca/osborne/cgt/index.html>.
- **Further reading, more advanced:** Game Theory; Drew Fudenberg & Jean Tirole; MIT Press, 1998 (**FT**). FT is at a similar level to OR, and is from the same time period, but it provides a lot more depth in terms of examples, motivation, and advanced topics. It is considered the standard textbook for second-year Ph.D. courses.

### **Practice Problems and In-Class Quizzes**

With our class spanning a duration of 3 hours, the final hour of each class will be dedicated to practical application through problem-solving sessions. During this time, I will provide you with a set of practice problems, and together we will work through them.

Additionally, you can expect five to six in-class quizzes, spaced approximately every two weeks. These quizzes are open-book. Your final quiz score will be determined by averaging the three highest scores achieved throughout the duration of the course. We will review the solutions to each quiz in the subsequent problem-solving session.

**Submission & Expectations:** Each quiz will have a duration of 30 minutes, and I kindly request that you upload your work electronically on eClass upon completion.

Please be aware that the quizzes will be graded by experienced senior Ph.D. students. It is your responsibility to ensure the readability of your submissions. Please give rigorous

and complete answers. Explain all required steps of your argument, and do not leave out calculations even if the math in your opinion is trivial. This expectation also applies to your write-up solution for all the exams.

### **Exams and Grades**

The in-class quizzes will contribute to 20% of your final grade. Additionally, there will be a midterm exam and a final exam, each accounting for 40% of your final grade. Specifically, the midterm will cover materials from the first half of the class, while the final exam will focus on content from the second half.

It is important to note that all exams are closed-book, but you are allowed to bring a one-page, A4 size, double-sided handwritten cheat sheet. Grades will be assigned based on the weighted average credit (P%) you achieve in the class.

**Midterm: Mar 1st, 2024 (In Class)**

**Final: TBA**

### **Tentative Course Outline**

I listed all the topics that will be covered in this course. The order of going through all the topics in this list may not be followed strictly.

- Static Games
  - Games in Normal Form
  - Strictly and Weakly Dominated Strategies
  - Iterated Deletion of Dominated Strategies and Rationalizability
  - Nash equilibrium
  - Games of Incomplete Information
  - Bayesian Nash Equilibrium
- Dynamic Games with Complete Information
  - Games in Extensive Form
  - Subgame perfect equilibrium
  - Repeated Games
    - \* One-shot deviation principle

- \* Folk theorem
  - Noncooperative Bargaining
- Dynamic Games with Incomplete Information
  - Sequential rationality, perfect Bayesian equilibria, and sequential equilibria
  - Signaling games and equilibrium refinements
  - Applications: cheap talk, reputation, bargaining, social learning, etc.
- Information Economics
  - Signaling and screening
  - Moral hazard: The principal-agent problem
- Mechanism Design
  - The revelation principle
  - Quasilinear utilities and VCG mechanisms
  - Dominant Strategy Mechanisms
  - Bayesian Incentive Compatible Mechanisms
  - Optimal auction design
  - Bilateral trading and the Myerson–Satterthwaite impossibility theorem

### **Important Policy**

All students are expected to actively participate in all classes, including solving practice problems, participating in in-class quizzes, and taking all exams. In exceptional situations, such as illness, you may be permitted to be absent from some quizzes or the midterm. In these situations, the following policy will be implemented without exceptions:

- If you have to miss a quiz, no make-up will be allowed, as the quizzes are held only once every two weeks and we consider only the highest three quiz scores.
- In the event that you must miss the midterm, the weight will automatically be transferred to the final exam. Given that the materials are not cumulative, the final exam is generally expected to be more challenging than the midterm. By requesting the transfer, you implicitly acknowledge and understand this associated risk.