

ECON 3030: Intermediate Microeconomic Theory

Cornell University, Fall 2022

Lectures: Mon/Wed, 1pm-2:15pm, Goldwin Smith G76-Lewis

Instructor

Douglas McKee (douglas.mckee@cornell.edu)

Office Hours: See Canvas

Teaching Assistants

Julien Neves (jmn252@cornell.edu)

Section 212: Friday, 9:05am-9:55am

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Section 211: Friday, 2:40pm-3:30pm

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Section 214: Friday, 1:30pm-2:20pm

Section 215: Friday, 2:40pm-3:30pm

Office Hours: See Canvas

Course Description

Everyone entering this class should be familiar with the concepts of preferences, maximization, technology, markets, and strategic interaction from previous coursework. Here, we will use the tools of calculus, constrained optimization, and game theory to put a formal mathematical foundation under these ideas. This will let us model more complex markets and relax assumptions (such as linearity) that are commonly made in introductory classes. Substantive topics will include consumer preferences and utility; demand relationships among goods; labor supply; uncertainty and risk; production and costs; welfare; behavior of firms; monopoly; price discrimination; public goods and externalities; asymmetric information; signaling; moral hazard and adverse selection.

This course will motivate the analysis of economic concepts using case studies and empirical facts. For most of the class we will assume actors behave as if they maximize an objective function. Depending on whether actors are firms, people, or governments, such functions may represent the level of profits, happiness or social welfare. The academic objective of this course is to elaborate students' skills in using theoretical tools to formulate and solve economic problems. The broader goal is for students to gain a deep understanding of the economic aspects of individuals' and firms' decisions.

The prerequisites for this course are introductory economics (ECON 1110/1120) and familiarity with single variable calculus (MATH 1110). Some experience with partial derivatives (e.g., MATH 1120) is helpful but not required.

Course Structure

Readings and Quizzes

Readings for this course are divided into *Required* and *Reference*.

1. *Required* readings build upon what you learned in previous classes. Concepts and methods are introduced during class, and the reading fills in some of the mathematical detail and common extensions.
2. *Reference* materials contain expanded information related the topic discussed. I don't expect everyone to read every page of the reference material, but you will almost certainly find it useful when working through the problem sets and studying for exams.

Many of the readings for this course are about mathematical techniques and the “big picture” ideas that underlie them. They are not bed-time reading. Take your time doing the reading each week, and make sure you understand what is being presented.

The primary textbook for this course is *Microeconomics: Theory and Applications with Calculus*, by Jeffrey Perloff (Pearson, 2019). The book is clearly written and combines mathematical rigor with lots of real world examples of theory in action. Be careful not to accidentally use Perloff's much less mathematically-oriented book titled simply *Microeconomics* that is now in its 8th edition.

There are several other excellent intermediate micro textbooks on the market, and you may want to look at one or two during the semester to get a different perspective on the material:

- Varian's *Intermediate Microeconomics: A Modern Approach* comes in a version with and without calculus.
- Nechyba's *Microeconomics: An Intuitive Approach with Calculus* covers each topic informally and then again formally (with calculus)
- Nicholson and Snyder's *Microeconomic Theory: Basic Principles and Extensions* is an excellent resource if you are looking for more mathematical rigor than is found in Perloff.

At the end of most course modules, you'll take a short online quiz that covers that module's lecture material and reading. The questions won't be difficult, but they will ensure you understand the core ideas and are doing the reading carefully.

Class Time

Class time will be highly interactive, and each class will contain multiple group work activities. While you work, the teaching assistants and I will circulate between the groups providing feedback and guidance.

The activities will be of four distinct types:

1. **Application:** After a short lecture on a topic, you will work through problems similar to those you might find on an exam.
2. **Case Study:** You will discuss how a theoretical model might be applied to a real-world situation. We'll focus on evaluating assumptions of the model and making predictions using the model.
3. **Invention:** You will attempt to derive something from a model or extend a model *before* a lecture on the topic. Studies have shown that students who do invention activities before learning a new method understand the method much more deeply than students that simply get a lecture on the method. They retain the knowledge longer and are able to apply the concepts more broadly. And with the right attitude, invention activities are a lot of fun.
4. **Sense-making:** You will move beyond black box thinking and interpret the meaning of the component parts of an expression or equation. This will often involve graphical visualization, and it is critical to deep understanding of the economic models you'll learn in the class.

Please keep in mind that all of these activities are difficult and **struggle is expected!** You'll learn a lot more working through hard problems than easy ones.

During almost every class, you will use the **Poll Everywhere** system to answer questions and give me feedback on what you are learning and what you are not. This keeps you engaged, and lets us know when we need to provide more direction and when we are ready to move on. You can answer questions in any web browser or use the Poll Everywhere app on your phone. And because Cornell has a university-wide license to this software, it's completely free to you.

Grades

Your grade for the class will be composed of four parts:

1. Problem Sets (20%)

There will be 6 problem sets during the semester. You must submit your problem sets as pdf's through the course web site by the due date. Your grade on each problem set will be based primarily on your answers to two randomly selected questions, but I will also expect you to submit answers to all the questions. Complete solution sets will be posted in the evening after the problem sets are due, and it is your responsibility to read these solutions and make sure you understand them. Your lowest grade on a problem set will be dropped. **Late problem sets will not be accepted.**

2. Quizzes (5%)

At the end of most weeks, you will take an online quiz on that week's material. Your grade will be your average score during the semester. Your lowest quiz will be dropped, and there will be no excuses for missing quizzes.

3. Class Participation (5%)

As you know from above, I believe there are major returns to attending class and participating in the activities. I also think it's easier to stay focused when the lecture is live. To further incentivize attendance and participation, 5% of your grade is based on a participation score equal to the fraction of classes where you clicked in for at least half of the Poll Everywhere opportunities. You can miss up to 5 classes and still get credit for participating in those classes, but again, this policy means there will be no excuses for missing additional classes.

If you cannot come to class for whatever reason, there is an additional way to earn the same participation credit: Within 24 hours of the end of class, you can watch the recorded lecture and submit answers to the questions I pose to students during the class. Along with your (mostly multiple choice) answers, you'll have to include explanations for your answers. You will get a lot more out of this exercise if you pause the recorded lecture as the questions come up and try to answer them right then.

4. First Prelim Exam (20%)

Date: Thursday, September 22, 7:30pm

5. Second Prelim Exam (20%)

Date: Thursday, October 27, 7:30pm

6. Final Exam (30%)

Date: TBD

The final exam will be given during finals period. The schedule will be posted at [here](#) some time in early in the semester.

Exams are closed book, but you may bring one double-sided page of notes to the first prelim,

two pages to the second prelim, and three pages to the final exam. You may use calculators during the exams.

We will also be doing *two stage exams* for the prelims in this class. You will first take the exam individually and hand in your test. Then you will take the exam in small groups, where each group works together and passes in one exam with their consensus answers. If your individual score is higher than your group's score, your grade on the exam will be your individual score. If your group's score is higher, your grade on the exam will be a weighted average of your individual score (90%) and your group's score (10%).

The main reason we conduct a second stage of the exam is to allow you to learn more during the exam. Traditional exams tend to be summative rather than formative, and two stage exams represent an opportunity to redress this imbalance. The process of discussing your answers with your teammates is a significant learning opportunity and supports the kind of collaborative learning that we encourage.

Final grades for the class will be determined by computing a weighted score based on the weights listed above. The weighted scores are assigned letter grades based on the following cut-offs:

Range	Letter
94–100	A
90–93	A-
87–89	B+
83–86	B
77–82	B-
71–76	C
65–70	C-
50–64	D
0–49	F

I expect this breakdown to result in about 45% of the class getting A-'s or A's, and reserve the right to make the cutoff's more generous if the exams are unexpectedly difficult. Rest assured that the cutoffs will not be made less generous under any circumstances. I will give A+'s to students who earn A's and show extraordinary mastery of the material by the end of the semester.

Excuses

Because one problem set is dropped, I do not consider excuses for missed problem sets. The only exception is prolonged/severe illness, which must be handled through the advising deans as per case (1) below.

With respect to exams, the [Faculty Handbook](#) lists four types of situations in which faculty are encouraged to make accommodations for missed work. However, the determination as to whether a particular case warrants accommodation is ultimately the decision of the faculty member. Here is how the four cases are handled in this course:

1. Illness, or family or personal emergency: Any situations that fall under this category must be first brought up with the advising dean in the student's college. The advising dean will then contact me directly, and I will make a determination based on the particular case. Do not email me directly about these issues.
2. Employment interviews. The student must provide me evidence of the interview and establish that (s)he has no control over the timing of the interview.
3. Religious observances. While I do my best not to schedule exams during religious holidays, please contact me at least two weeks in advance if an exam date/time conflicts with a religious holiday.
4. Athletics and Extracurricular Activities. Students in varsity athletics or recognized extracurricular activities must provide the standard permission slip from the staff responsible for the activity at least two weeks before the exam.

Final Exam Conflicts

There are two situations that I will consider for exam conflicts. First is a direct conflict where ECON 3030 and another class appear on the registrar's exam schedule at the same time. Second is more than 2 exams in 24 hours. This is defined as 3 or more exams having a start time within 24 hours, as indicated on the registrar's exam schedule. If Exam 1 is on Monday at 2pm, Exam 2 is on Monday at 7pm, and Exam 3 is on Tuesday at 2pm, this is not more than 2 exams in 24 hours. If you have a conflict, you need to email me at least 2 weeks before the final exam, listing out the other classes involved and scheduled exam times. The date and time of the makeup is determined by me.

Grading FAQ

- **Are the tests cumulative?** The tests **are** cumulative. About 15% of the second prelim is on earlier material and up to half the final exam is on material covered on the first two prelims. In addition, you will need to use concepts from the earlier parts of the course in order to understand the later topics.
- **Is there extra work I can do to improve my grade?** No.
- **I didn't do as well as I had hoped early in the course. In determining my final grade, can you put more weight on the latter part of the course?** No.
- **I have X exams/assignments due within Y of each other. Can I reschedule the exam/hand in the homework late?** No. All of the exam dates are listed above giving you plenty of time to plan ahead. As noted above, the only exception is more than 2 finals in 24 hours.

Exam Regrades

While we take care to grade exams as fairly and consistently as possible, on rare occasions there may be grading mistakes. If you feel that your test has been graded incorrectly, you must

submit it to the professor (not the TA), along with an explanation of the issue in writing. You must do this within 2 weeks of the exam being returned (not the date you pick it up) for it to be regraded. The entire exam will be regraded, and as a result it is possible for your grade to go down as well as up.

Academic Integrity

With online instruction, we will need to rely more than ever on students abiding by the Cornell University Code of Academic Integrity and Cornell University Campus Code of Conduct. You can find the full text of these policies at the following links:

- [Cornell University Code of Academic Integrity](#)
- [Cornell University Code of Campus Conduct](#)

You are encouraged to study together and to discuss concepts covered in lecture with other students. You are also encouraged to discuss problem sets with your fellow students. Zoom can be used for both purposes, and I suggest you use it to set up small-group meetings with your classmates.

Any work submitted by a student in this course for academic credit must be the student's own work. You are encouraged to study together and to discuss concepts covered in lecture with other students. You can give “consulting” help to or receive “consulting” help from other students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an email, an electronic file, or a hard copy. Students are permitted to share their notes with other students who are also registered in the course this semester.

Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Code can also be extended to include failure of the course and University disciplinary action.

When it comes time to take exams, you will need to complete these entirely on your own—**There should be no communicating with other students once you start an exam.**

Please remember that academic integrity also applies to the proper use of course materials. Online instruction will require even more course materials being posted to Canvas. In light of this, please keep in mind:

- Canvas is a restricted-access site. All materials posted to Canvas are prepared solely for students registered in this course during this semester.
- Students are not authorized to buy or sell or generally distribute course materials (i.e., course materials should not be shared with anyone not currently registered in the class). In particular, students are prohibited from buying and selling course materials through internet sites such as Chegg, CourseHero, and Slader.

- If you buy or otherwise access course materials through such a vendor, you face a charge of “Unauthorized Assistance,” thereby violating the Code of Academic Integrity. Please note that Cornell faculty are able to trace posts from internet sites, including identifying the individuals who provide the original posts and those who read or download the posts.
- If you sell course materials without my authorization—including “derivative” materials such as your own class notes or other materials you prepare that are based on course materials—you are subject to a charge of “Academic Misconduct.” You may also be participating in copyright infringement, as course materials are intellectual property that belong to the author and are not a student’s property to sell.
- Please note that this prohibition applies to the videos that contain lecture material and section material—these should not be bought or sold or shared in any way with someone not enrolled in the class.

Note: The use of any materials prepared in a previous semester for this course, other than materials redistributed this semester, is strictly prohibited. As above, this includes “derivative” materials that former students might have prepared based on their course materials.

Note to Students with Disabilities

If you have a disability-related need for reasonable academic adjustments in this course, please give Professor McKee an accommodation letter from Student Disability Services. We expect you to give two weeks notice of the need for accommodations. If you need immediate accommodations, please arrange to meet with Professor McKee within the first two class meetings.

Active Learning Initiative

Econ 3030 is participating in Cornell’s Active Learning Initiative, a program designed to infuse our large lecture courses with activities that increase student participation during class. We expect no risks to you for participating in the study. Later this term, we will ask you to complete a short survey. Otherwise, you’ll just do the work of the course, as assigned by your instructor. If you have any questions, you can talk to Doug McKee (douglas.mckee@cornell.edu) or Carolyn Aslan (crc1@cornell.edu) in the Center for Teaching Excellence.

Acknowledgements

Much of this class is derived from the intermediate microeconomics classes that Larry Samuelson and Eva Chalioti taught recently at Yale. I'm extremely grateful to them for sharing their syllabi, lecture slides, assignments, handouts, exams, and advice. In addition, Gregory Besharov and Max Troshkin have generously shared materials that they have used in teaching this course in the past. All of these have provided a fantastic starting point. That said, I take full responsibility for any mistakes that I may have added to the material.

Please do not redistribute any of these materials without my permission.

Schedule

PART I: INDIVIDUAL CHOICE

Module 1: The Big Picture

Lecture: August 22

- Topics:
- Course overview
 - Preferences and utility functions
 - Budget constraints
 - Optimization

Module 2: Optimal Choice

Lecture: August 24 and 29

- Topics:
- Single variable optimization
 - Multi-variable optimization
 - Lagrangians
 - Budget Constraints
 - Preference Relations
 - Utility Functions
 - Indifference curves and utility

Module 3: Demand

Lecture: August 31 and September 7

Due: Problem Set 1 on September 7, 1pm

- Topics:
- Homogeneous functions
 - Cobb-Douglas utility functions
 - Constant elasticity of substitution (CES)
 - Deriving demand functions
 - Price elasticity of demand
 - Income elasticity of demand

Module 4: Expenditures, Income Effects, and Substitution Effects

Lecture: September 12

- Topics:
- Expenditure minimization
 - Substitution effects
 - Income effects
 - Slutsky equation
 - Marshallian (ordinary) demand vs. Hicksian (compensated) demand

Module 5: Consumer Welfare and Taxes

Lecture: September 14

- Topics:
- Consumer surplus
 - Compensating variation
 - Taxes

Module 6: Review

Lecture: September 19

Due: Problem Set 2 on September 19, 1:00pm

Thursday, September 22, 7:30pm FIRST PRELIM EXAM

Part II: FIRMS

Module 7: Firms

Lecture: September 26 and 28

- Topics:
- Production functions
 - Marginal product
 - Marginal rate of technical substitution (MRTS)
 - Returns to scale
 - Profit maximization vs cost minimization
 - Fixed vs variable costs

Part III: COMPETITIVE MARKETS

Module 8: Partial Equilibrium

Lecture: October 3 and 5

Due: Problem Set 3 on October 5, 1pm

- Topics:
- Perfect Competition
 - Short run vs long run
 - Aggregate supply

Module 9: General Equilibrium

Lecture: October 12 and 17

- Topics:
- Economic efficiency
 - Edgeworth Box
 - Walras' Law
 - Contract curve
 - First and second welfare theorems

Module 10: Review

Due: Problem Set 4 on October 19, 1pm

Lecture: October 24

Thursday, October 27, evening SECOND PRELIM EXAM

PART IV: MARKET FAILURE

Module 11: Monopoly and Oligopoly

Lecture: October 19 and 31

- Topics:
- Market power
 - Markets with one firm vs few firms
 - Price discrimination

Module 12: Imperfect Competition and Externalities

Lecture: November 2 and 7

Due: Problem Set 5 on November 2, 1pm

- Topics:
- Cournot competition vs Bertrand competition
 - Differentiated products
 - Positive and negative externalities
 - Policy responses to externalities
 - Excludability and rivalry
 - Public goods

Module 13: Uncertainty and Insurance

Lecture: November 9 and 14

- Topics:
- Risk and probabilities
 - Expected utility
 - Risk aversion
 - Choice under uncertainty
 - Cost benefit analysis under uncertainty
 - Insurance markets
 - Risk pooling

Module 14: Game Theory

Lecture: November 16 and 21

Due: Problem Set 6 on November 21, 1pm

- Topics:
- Basic Concepts
 - Nash Equilibrium
 - Mixed Strategies

Module 15: Information

Lecture: November 28 and 30

Read: NS Chapter 8 (Section on Signaling) and Chapter 18

- Topics:
- Signaling
 - Adverse Selection
 - Moral Hazard

Module 16: Review

Lecture: December 5