

EC 121: Intermediate Microeconomics

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1 Course Description

This course provides a rigorous treatment of microeconomic theory and serves as a bridge to graduate-level courses in general equilibrium theory. The course is organized into four parts.

(1) The first part develops consumer choice theory, examining how individuals make consumption decisions based on preferences, budget constraints, and utility maximization, and studies how changes in market conditions affect consumer demand.

(2) The second part develops tools for welfare analysis, including compensating and equivalent variation, to evaluate the welfare impact of price changes.

(3) The third part covers the theory of the firm, analyzing production functions, cost minimization, and profit maximization.

(4) Building on these foundations, the final part covers partial equilibrium analysis, studying equilibrium conditions in individual markets and the effects of changes in supply and demand on prices and quantities. The course examines how government intervention, such as taxation, affects the welfare of consumers and firms, and introduces market failure due to monopoly. Through a combination of theoretical models and applications, the course develops the analytical skills needed for advanced work in economics.

Ec 150 (Mathematical Methods for Economics) is useful preparation but is not required.

2 Grading

- **Homework (30%):** There will be at most 8 homework assignments. Homework must be submitted on time; late submissions will receive zero points. Homework will be evaluated in class. To receive credit for a homework assignment, students must be present for the in-class evaluation and be prepared to explain their solutions and answer questions about their work. A student who is absent from the in-class evaluation without a formally excused absence will receive zero points for that homework assignment. In the case of an absence formally excused through CASS or the Dean's Office, an alternative evaluation will be arranged.
- **Final exam (70%) on Dec. 2:** The final exam will be held in class, will be 90 minutes long, and will be closed book.

Eligibility for an A requires attendance at all class meetings. Students may miss one class meeting for any reason without affecting their eligibility for an A. Any additional absences must be formally excused through CASS or the Dean's Office. A student who does not satisfy this attendance requirement may receive at most an A-. Attendance for purposes of this requirement will be recorded beginning October 5.

The one permitted absence under this attendance policy does not excuse a student from an in-class homework evaluation.

Homework scores are averaged across all assigned homework sets. The number of homework assignments does not affect the relative weight of homework in the final course grade.

2.1 Details

Let H denote the average percentage score across all homework assignments and let F denote the percentage score on the final examination. The numerical course score is

$$S = 0.30H + 0.70F.$$

Letter grades will be assigned according to the following scale:

Grade	Course Score
A	$S \geq 90$
$A-$	$87 \leq S < 90$
$B+$	$83 \leq S < 87$
B	$80 \leq S < 83$
$B-$	$77 \leq S < 80$
$C+$	$73 \leq S < 77$
C	$70 \leq S < 73$
$C-$	$67 \leq S < 70$
$D+$	$63 \leq S < 67$
D	$60 \leq S < 63$
F	$S < 60.$

3 Textbooks

The main material will be covered in lecture notes. However, the following books are useful references:

- Andreu Mas-Colell, Michael D. Whinston, and Jerry R. Green, *Microeconomic Theory*.
- Michihiro Kandori, *Mighty Microeconomics—A Guide to Thinking Like an Economist*, Cambridge University Press.

4 Office hour

Wednesday after class until 3:00

5 Class Schedule (19 Classes and 1 Final Exam (in class))

The number of classes and homework assignments listed below are estimates and may change during the term.

5.1 Consumer's Behavior: Where Does the Demand Function Come From?

(5 classes, 2 homeworks) We study how consumers make decisions to maximize utility given their budget constraints. Topics include:

- Preferences and utility functions
- Marginal rate of substitution
- Demand functions, income and substitution effects
- Slutsky equation
- Integrability: when can we recover the utility function from the demand function?

5.2 Consumer Welfare: How Do We Measure Consumer Well-Being?

(5 classes, 2 homeworks)

- Compensating and equivalent variation
- Approximation by area variation

5.3 Firm's Behavior: Where Does the Supply Function Come From?

(3 classes, 2 homeworks) We study how firms make production decisions to maximize profit given input prices and technology constraints. Topics include:

- Profit maximization
- Cost minimization

5.4 Partial Equilibrium Analysis: How Are Market Demand and Price Determined?

(4 classes, 2 homeworks) This section focuses on market equilibrium in a single market, where the behavior of agents is considered in isolation from other markets. Topics include:

- Supply and demand equilibrium
- Market efficiency
- Effects of tax

6 Homework Policy

All homework must be written in L^AT_EX. Handwritten submissions will not be accepted.

6.1 Use of AI

For this course, generative AI tools are prohibited for problem solving. This includes (i) asking an AI tool for a solution or solution outline, (ii) using AI to produce intermediate steps (e.g., proof sketches, algebraic manipulations, equilibrium computations), (iii) using AI to write or debug code that is part of a graded solution, and (iv) paraphrasing or editing AI-generated solutions into your own words. The purpose of problem sets is to develop independent analytical skill; therefore, all problem-solving work must be your own. Permitted uses are limited to non-content assistance such as formatting and basic proofreading. If you are uncertain whether a specific use is allowed, assume it is not.

6.2 Collaboration Policy

You are encouraged to work on problems with others and to seek additional help if you find that useful, but the write-up must be your own. You may not consult any prepared solutions for the problems, whether from this year or from previous years. You may consult outside reference materials, other students, or the instructor, but you must cite any use of material from outside references. All solutions that are handed in should be written up individually

and should reflect your own understanding of the subject matter at the time of writing. As a guideline, you should be able to reproduce any solution you hand in without help from anyone else.

6.3 Students with Documented Disabilities

Students who may need an academic accommodation based on the impact of a disability must initiate the request with Caltech Accessibility Services for Students (CASS). Professional staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty dated in the current quarter in which the request is being made. Students should contact CASS as soon as possible, since timely notice is needed to coordinate accommodations: <http://cass.caltech.edu/>. Undergraduate students should contact Dr. Lesley Nye, Associate Dean of Undergraduate Students (administrative contact: Beth Larranaga), and graduate students should contact Dr. Kate McAnulty, Associate Dean of Graduate Studies (administrative contact: Jacob Dalton).