

Industrial Organization and Data Science

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Office Hours:	By appointment
Timing and Location:	Wednesdays 3:30-7:30pm, Savery 136
Course Duration:	March 30 th - June 1 st
Final Exam:	Thursday June 9 th , 6:30-8:20pm, Savery 136
Website:	TBD
Code of Honor:	The University of Washington Code of Honor applies in full to this course. https://econ.washington.edu/policy-academic-conduct

Course Objective

This course is designed to rigorously cover the theory of industrial organization and strategic behavior of firms. We will cover both theoretical and empirical topics and focus on applications in the technology sector. We will develop both theoretical and empirical tools that will serve students in being competitive for quantitatively focused jobs in both tech and other sectors or be competitive graduate students in continuing your education.

The course is structured to have both lecture and facilitated discussion. We anticipate lots of interaction and idea flows. It is going to be a fun, honest and stimulating classroom environment. This class should be thought of as a mechanism for your improvement as an economist, which increases your ability to think both critically and do interesting and important work that adds value to your endeavors.

Course Requirements & Grading

Homework	30%
Midterm	30%
Final	40%
Class Participation/Attendance	10% (+/-)

Homework assignments will be both theory and empirical with data sets being provided by the instructors. Homework assignments will have two main themes. The first will be to have students practice the mechanics of the concepts covered in class. The goal of this theme is to cement the comprehension of the material. The second theme of the homework assignments will be to foster creativity in thinking about the material. They will be graded on a full credit/partial credit/zero credit scale (e.g.: 100%, 50%, and 0%).

In some cases with empirical assignments, we may ask you to supplement the data sets on your own. We encourage you to use STATA, R, MATLAB or Python, but any code that we provide in solutions will be provided in R. The empirical assignments can span multiple weeks and steady progress is vital to not fall behind. These assignments will be similar to the types of problems you may face working with a firm like Microsoft, Amazon, Google, etc.

Exams will be of standard format: T/F, multiple choice, short answer, graphs and essays.

Since we are only meeting once a week, one can fall way behind by missing just one course. Accordingly, class attendance is mandatory, please email the instructors if you have a legitimate conflict so it does not hurt your participation score. Attendance combined with homework completion, and a thorough review of one's notes and homework assignments should adequately prepare a student for the exams. Note that there will be material on exams that is not covered in the book. **IMPORTANT:** If you will miss a midterm for a verifiable medical/legal/sports reason, notify us immediately to set up a make-up exam. Failure to do so will result in a zero grade for that exam. Unexcused absences for an exam will also result in a zero. If you have a condition that dictates special circumstances for exam taking, please notify us as early as possible.

Appropriate class participation is strongly encouraged. We reserve the right to raise or lower grades by 10% based upon exceptional or unacceptable interaction in classroom, email, or office settings. The grading for this course will be curved. Do not be alarmed if the highest grade on a midterm is 80%; that 80% will earn an A and grades will be assigned from there.

ADVICE: We strongly advise active engagement in the course. You will find that in economics, a deep understanding of key concepts facilitates high grades. Deep understanding of concepts is most easily attained with class attendance and participation. Coming to class and not paying attention is virtually worthless; given the once a week format of this course, we strongly encourage you to prepare for class to minimize work catching up later on.

Textbook & Readings

An Introduction to Statistical Learning w/ Applications in R. James, G., Daniela, W., Hastie, T., Tibshirani, R. Available free and legally from:

<http://www-bcf.usc.edu/~gareth/ISL/ISLR%20Sixth%20Printing.pdf>

Lectures on Pricing. McAfee, R. Preston. Available free and legally from:

<http://www.mcafee.cc/Classes/BEM116/PDF/LectureNotes.pdf>

Reinventing the Bazaar: A Natural History of Markets. John McMillan, 2003.

We will also assign reading from selected academic journal articles and other sources, which will be announced on a rolling basis.

Course Outline

NOTE: This outline is subject to change at the discretion of the instructors.

** means required reading.*

Date	Topic	Reading
March 30	Monopoly pricing <ol style="list-style-type: none"> Single good case and optimal price Elasticities and the Lerner formula Selling n goods Intro to value based pricing 	McAfee Ch. 1 & 2 McMillan Ch. 1-3
April 6	Value based pricing (price discrimination) <ol style="list-style-type: none"> Product versions Eligibility and direct Bundling Timing Two-part tariffs 	McAfee Ch. 3 Varian's notes on price discrimination Determinants of Store Level Price Elasticity Optional: Ch 2-5.3 in Hermalin's lecture notes
April 13	Empirical methods for practical pricing <ol style="list-style-type: none"> Conjoint methods Econometric methods A/B tests in business settings Train-test-treat experiments 	Hastie Ch. 1 and 3.1-3.3 Thirty Years of Conjoint Analysis Measuring Customer's Reaction to Price
April 20	Models of competition <ol style="list-style-type: none"> Cournot Bertrand Hotelling Entry and exit 	Lecture notes will be provided.
April 27	First third: midterm review Rest: Data science methods for pricing <ol style="list-style-type: none"> Prediction Classification Regression trees and segmenting 	Study for midterm
May 4	First half: midterm Second Half: Regression Trees	Hastie 4.3, 8.1 McMillian Ch. 4-7
May 11	Data science for pricing	Papers will be provided.

	<ul style="list-style-type: none"> a. Logit regression b. Lasso and Ridge c. Using these methods to guide strategy and decisions d. Case study: grocery prices 	<p>Hal Varian “Big Data: New Tricks for Econometrics”</p>
May 18	<p>Inferring causality</p> <ul style="list-style-type: none"> a. Field experiments b. Using prediction and ML c. Natural experiments 	<p>Hal Varian “Causal Inference in the Social Sciences”</p>
May 25	<p>Alternative pricing models & big picture of demand estimation</p> <ul style="list-style-type: none"> a. Theory of auctions b. Types of auctions c. Putting the pieces together for our supermarket data 	<p>Paul Klemperer “What Really Matters in Auction Design”</p>
June 1	<p>Assorted topics</p> <ul style="list-style-type: none"> a. Freemium b. Transfer pricing c. Legal considerations 	<p>Final exam study guide will be provided.</p>
June 9 Savery 136	<p>6:30pm-8:20pm Note this is a Thursday.</p>	<p>n/a</p>