

Course Syllabus

[Jump to Today](#)

Course Syllabus: SI 425 - Introduction to User Modeling

Instructor: Tanya Rosenblat, trosenbl@umich.edu

GSI: Yingzhi Liang, yingzhi@umich.edu

Meets: Mon and Wed 1:00 pm - 2:20 pm, Online on Zoom

(<https://umich.zoom.us/j/98423087362> (Links to an external site.) password SI425rocks)

Instructor Office Hours: Tue 1 pm - 2 pm

(<https://umich.zoom.us/j/99653379641> (Links to an external site.) password 609276)

GSI Office hours: Wed 3 pm - 4:30 pm

(<https://umich.zoom.us/j/93390429537> (Links to an external site.) password SI425rocks)

Course Overview:

This course provides an integrated overview of techniques to model user behavior from economic theory, behavioral economics and computer science. We start the class with a “micro perspective” on how individual consumers makes choices.

1. Basic concepts such as *consumer preferences* and the rational model of *consumer demand* provide us with a concise framework of how rational individuals with limited resources choose among a set of alternatives. Firms use pricing and other strategies to *price discriminate* between different customer segments. For many products, such as communication products, there are strong *network effects* which require us to look at consumer expectations of how other consumers behave.
2. We then delve into a number of topics where we augment the basic framework with insights from psychology and behavioral economics. *Behavioral economists* and *psychologists* have looked at deviations from the rational model in certain circumstances. For example, consumers sometimes are less likely to make purchases if products are added to the choice set (choice overload) or they select a more expensive alternative on a website if a seemingly inferior product is added to the choice set (context effects).
3. We discuss how consumers search for products and how firms advertise their products.
4. We discuss how firms can convince customers to pay for their services (Freemium Pricing/Pay for Service).

In the second part of the course, we adopt a “macro perspective” and try to infer preferences from the decisions of millions of consumers (which can inform firms, for example, on how to adequately price products). The spread of e-commerce has made

"big data" sets available to analysts. We introduce "big data" techniques from economics and machine learning (we will use R for some assignments).

1. Measuring the demand for products and in particular identifying the impact of prices on consumer choice is empirically challenging because prices are *endogenous*.
2. Machine learning techniques such as Lasso can condense high-dimensional choice data into a smaller set of relevant right-hand side variables in a regression analysis.
3. *Recommender systems* can learn from a consumer's previous choices as well as the choices of other consumers by applying *collaborative filtering*. Intuitively, if two consumers like movie A but not movie B and the first consumer also likes movie C then it can be useful to recommend movie C also to the second consumer. Recommender systems are widely used by Amazon and other online retailers.

The course has a midterm and a final and the assignments are a mixture between traditional problem sets and *case studies* on the challenges faced by particular companies and their customers. You will form groups to complete these case-study assignments and for every assignment one or two groups will be asked to present.

Learning Objectives: The course is intended to give students an integrated overview of techniques to model user behavior from economics, psychology and CS. The rational model of consumer choice is concise and provides a useful benchmark. Behavioral economics discusses under which conditions the rational model holds. Finally, students will learn about basic "big data" techniques to infer preferences from high-dimensional choice data.

Prerequisite: SI 301 (recommended, but not required) and at least one undergraduate statistics class at the level of Stats 250.

Course Format: This course is presented in a lecture/discussion format. This is a quantitative course which tries to present the basic concepts as intuitively as possible. The course is designed to be accessible to all students who enjoy combining conceptual thinking and practical understanding. The course combines analytical (lectures), experiential (exercises), interactive (discussion), peer (group assignments) and individual (textbook reading and papers) learning.

Readings: You are **required** to purchase the coursepack with the case studies from Harvard Business Publishing. Please use the following link to receive the educational discount:

<https://hbsp.harvard.edu/import/750669> (Links to an external site.) (Links to an external site.)

After you click this link you will be asked to register with Harvard Business Publishing.

Instructions on how to setup an account are here:

<https://help.hbsp.harvard.edu/hc/en-us/articles/360000171687-Students-How-to-register-to-purchase-course-materials-> (Links to an external site.)

<https://hbpacademichelpcenter.zendesk.com/hc/en-us/articles/360001262588-Students-Accessing-Course-Material-a-Coursepack-Assigned-to-You>

The following texts are optional and helpful for parts of the course:

[Principles of Economics](#) by Greg Mankiw

[Thinking, Fast and Slow](#) by Daniel Kahnemann

[Recommender Systems: An Introduction](#) by Dietmar Jannach, Markus Zanker, Alexander Felfernig and Gerhard Friedrich

[Mostly Harmless Econometrics](#) by Josh Angrist and Jorn-Steffen Pischke

[Trustworthy Online Controlled Experiments: A Practical Guide to A/B Testing \(Links to an external site.\)](#) by Ron Kohavi, Diane Tang, and Ya Xu

Assignments and Grading: There will be weekly problem sets, two exams and at least one group presentation.

Your final grade will consist of five weighted components:

Course Engagement (both synchronous and asynchronous)	15%
Assignments	20%
Group Presentation	15%
Exam 1 (Oct. 14)	25%
Exam 2	25%

Collaboration

- *UMSI strongly encourages collaboration while working on some assignments, such as homework problems and interpreting reading assignments as a general practice. Active learning is effective. Collaboration with other students in the course will be especially valuable in summarizing the reading materials and picking out the key concepts. You must, however, write your homework submission on your own, in your own words, before turning it in. If you worked with someone on the homework before writing it, you must list any and all collaborators on your written submission. Each course and each instructor may place restrictions on collaboration for any or all assignments. Read the instructions careful and request clarification about collaboration when in doubt. Collaboration is almost always forbidden for take-home and in class exams.*

Plagiarism

- *All written submissions must be your own, original work. Original work for narrative questions is not mere paraphrasing of someone else's completed answer: you must not share written answers with each other at all. At most, you should be working from notes you took while participating in a study session. Largely duplicate copies of the same assignment will receive an equal division of the total point score from the one piece of work.*

You may incorporate selected excerpts, statements or phrases from publications by other authors, but they must be clearly marked as quotations and must be attributed. If you build on the ideas of prior authors, you must cite their work. You may obtain copy editing assistance, and you may discuss your ideas with others, but all substantive writing and ideas must be your own, or be explicitly attributed to another. See the (Doctoral, MSI, BSI) student handbooks available on the UMSI intranet for the definition of plagiarism, resources to help you avoid it, and the consequences for intentional or unintentional plagiarism.

Accommodations for Students with Disabilities

If you think you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course, the assignments, the in-class activities, and the way we teach may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Office of Services for Students with Disabilities (SSD) to help us determine appropriate accommodations. SSD (734-763-3000; ssd.umich.edu/) ([Links to an external site.](#)) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. I will treat any information that you provide in as confidential a manner as possible.

Student Mental Health and Wellbeing:

The University of Michigan is committed to advancing the mental health and wellbeing of its students, while acknowledging that a variety of issues, such as strained relationships, increased anxiety, alcohol/drug problems, and depression, directly impacts students' academic performance.

If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact Counseling and Psychological Services (CAPS) at (734) 764-8312 and <https://caps.umich.edu/> ([Links to an external site.](#)) during and after hours, on weekends and holidays. You may also consult University Health Service (UHS) at (732) 764-8320 and <https://www.uhs.umich.edu/mentalhealthsvcs> ([Links to an external site.](#)), or for alcohol or drug concerns, see www.uhs.umich.edu/aodresources ([Links to an external site.](#)).

Since many students are remote during fall 2020, [CAPS COVID-19 Support](#) ([Links to an external site.](#)) features [SilverCloud](#) ([Links to an external site.](#)), an online, self-guided, interactive mental health resource that provides cognitive behavioral interventions.

For a more comprehensive listing of the broad range of mental health services available on campus, please visit: <http://umich.edu/~mhealth> (Links to an external site.) (Links to an external site.)

Tentative Schedule (This schedule will be updated throughout the semester, so please check it regularly for updates.)

Introduction

[Assignment 1 \(due 09/09\)](#)

Case Study: "Uber: Changing the Way the World Moves"

News: [What is the future for Uber and Lyft after the Pandemic \(Links to an external site.\)?](#)

[Lecture Recording \(Links to an external site.\)](#) (note that breakout room discussions are not recorded)

8/31 Notes from breakout rooms are available here:

Breakout Rooms Brainstorming Session Links:

[Group 1, \(Links to an external site.\)](#)[Group 2, \(Links to an external site.\)](#)[Group 3, \(Links to an external site.\)](#)[Group 4, \(Links to an external site.\)](#)[Group 5, \(Links to an external site.\)](#)[Group 6, \(Links to an external site.\)](#)[Group 7, \(Links to an external site.\)](#)[Group 8, \(Links to an external site.\)](#)[Group 9, \(Links to an external site.\)](#)[Group 10 \(Links to an external site.\)](#)

If you haven't done this before class, please fill out the wrap up [Google form \(Links to an external site.\)](#)

Basics: Consumer Demand, Price Discrimination and Network Effects

[Lecture 2 Recording \(Links to an external site.\)](#)

Weeks [Lecture Notes](#) 

1 and [Links for Lecture 2](#)

2

Consumer theory: preferences and budget constraints

9/2-

9/9 Examples of Substitutes and Complements

Supplementary readings (optional):

Popular Press Summary 1: "Computing the Social Value of Uber"

Popular Press Summary 2: "Uber's Pricing Formula Has Allowed Economists to Map Out a Real Demand Curve "

Research Paper: "Using Big Data to Estimate Consumer Surplus: the Case of Uber"

[Assignment 2 due Sep. 17](#)

Consumer Demand

Prices and price discrimination

Week
3

Supplementary Readings (optional):

9/14-
9/16

Research Summary:

<http://personalization.ccs.neu.edu/Projects/PriceDiscrimination/press.html>

Research Paper: Price Discrimination on e-commerce web sites

Assignment 3

Network effects

Week
4

Networks, Crowds, and Markets: Reasoning about a Highly Connected World, by David Easley and John Kleinberg, chapter 17

9/21-
9/23

Supplementary reading: Google Allo

Assignment 4

Case study presentation: Hubspot

Topics: Insights from Behavioral Economics and Psychology

Week

5 Anchors and context effects

9/28-
9/30

Assignment 5

Week
6

Attention and Nudges

Case Study Presentation: Tripadvisor

10/5-
10/7

[Practice Midterm Exam](#) 

10/12- Exam 1
14

Week
7 Nudge Hackathon Ideas

10/19- Price Dispersion and Consumer Search - part 1
10/21

Price Dispersion and Consumer Search - part 1

Week Price Dispersion and Consumer Search- part 2
8

Air France Case Study Introduction
10/26-
10/28 Case Study Presentation: Stickk (Thu)

Assignment 6

Measuring the Returns to Advertising

Week Case Study Presentation: Air France (Tue)
9 Case Study - the Big Skinny

11/2- Case Study - Star Digital
11/4 History and Future of Digital Advertising

Assignment 7

Week "Freemium and Monetization" Part 1 and Part 2
10 Case Study Presentation: Star Digital

11/9- Case Study Presentation: Big Skinny
11/11 Assignment 8

Freemium Pricing Examples and Practice Questions

Week Case Study Presentation: Dropbox
11 Case Study Presentation: NYT Paywall

11/16- Case Study Presentation: Facebook
11/18 Case Study Presentation: American Express
Assignment 9

Happy Thanksgiving!

Social Networks and Social Media

<https://vimeo.com/287751270>

Case Study Presentation: Google - Privacy (Tue)

Case Study Presentation: Gap - Bigdata (Tue)

Week 13 Case Study Presentation: United Breaks Guitars (Thu)

Regression and its interpretation

11/30-
12/2 Big Data Techniques

Recommender Systems

Exam Review

Assignment 10

Week 14 Exam 2
12/7

Course Summary:

Date	Details	
Thu Sep 26, 2019	Assignment Assignment 3	due by 10:30am
Thu Oct 3, 2019	Assignment Assignment 4	due by 10:30am

Date	Details	
Thu Oct 10, 2019	Assignment Assignment 5	due by 10:30am
Thu Oct 31, 2019	Assignment Assignment 6	due by 10:30am
Fri Nov 8, 2019	Assignment Assignment 7	due by 3pm
Fri Nov 15, 2019	Assignment Assignment 8	due by 3pm
Fri Nov 22, 2019	Assignment Assignment 9	due by 3pm
Thu Dec 12, 2019	Assignment Assignment 10	due by 11:59pm
Fri Dec 13, 2019	Assignment Case Study Presentation ppt slides	due by 11:59pm
Mon Aug 31, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
Wed Sep 2, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
	Calendar Event SI 425 Office Hours	3pm to 4:30pm
Wed Sep 9, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
	Assignment Assignment 1: You as a Data Scientist at Uber	due by 1pm
Mon Sep 14, 2020	Calendar Event SI 425 Office Hours	3pm to 4:30pm
	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
Wed Sep 16, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
	Calendar Event SI 425 Office Hours	3pm to 4:30pm

Date	Details	
Thu Sep 17, 2020	Assignment Assignment 2 - You as a Consumer Theorist	due by 11:59pm
Mon Sep 21, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
Wed Sep 23, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
	Calendar Event SI 425 Office Hours	3pm to 4:30pm
Mon Sep 28, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
Wed Sep 30, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
	Calendar Event SI 425 Office Hours	3pm to 4:30pm
Mon Oct 5, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
Wed Oct 7, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
	Calendar Event SI 425 Office Hours	3pm to 4:30pm
Mon Oct 12, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
Wed Oct 14, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
	Calendar Event SI 425 Office Hours	3pm to 4:30pm
Mon Oct 19, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
Wed Oct 21, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
	Calendar Event SI 425 Office Hours	3pm to 4:30pm
Mon Oct 26, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm

Date	Details	
Wed Oct 28, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
	Calendar Event SI 425 Office Hours	3pm to 4:30pm
Mon Nov 2, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
Wed Nov 4, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
	Calendar Event SI 425 Office Hours	3pm to 4:30pm
Mon Nov 9, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
Wed Nov 11, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
	Calendar Event SI 425 Office Hours	3pm to 4:30pm
Mon Nov 16, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
Wed Nov 18, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
	Calendar Event SI 425 Office Hours	3pm to 4:30pm
Mon Nov 30, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
Wed Dec 2, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
	Calendar Event SI 425 Office Hours	3pm to 4:30pm
Mon Dec 7, 2020	Calendar Event SI 425 FA 2020 - Lecture	12:50pm to 2:50pm
Wed Dec 9, 2020	Calendar Event SI 425 Office Hours	3pm to 4:30pm
	Assignment Attendance	

Date

Details

Assignment [Exam 1](#)

Assignment [Exam 2](#)
