

# ECONOMICS 445

## INDUSTRIAL ORGANIZATION

### SPRING 2023

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Instructor: Ishan Phadke

Email: [iphadke@live.unc.edu](mailto:iphadke@live.unc.edu)

Office: Gardner Hall 416

Office Hours: ECON Aid Center: Tuesdays 11am-12:15pm and Friday 1:30pm-3pm, or by appointment

Class Location and Time: Mon & Wed 1:25-2:40pm - Gardner 210

Midterm Exams: Midterm 1: Feb 20th; Midterm 2: Mar 27th

Final Exam: TBD

#### **Course Overview:**

Prerequisites: ECON 400 and 410; a grade of C or better in ECON 400 and 410 is required.

In this class we will study the causes and consequences of firms' strategic behavior, focusing on situations in which the assumptions behind perfect competition do not hold. Our main analytical tools will be microeconomic theory and game theory. We will supplement our theoretical work with empirical evidence from academic research and popular media.

The topics we will study include: pricing, product design, imperfect competition, collusion and cartels, firm-to-firm supply relationships, and mergers. Within each topic we will consider the impact of firms' actions on consumer welfare. We will also consider the motivation for and impact of US antitrust law on these settings. Economics is more a way of thinking rather than a collection of facts, and industrial organization (IO) is no exception. Our main objective is to develop the ability to use economic models to understand a broad range of problems. These models, when constructed well, can be both simple and powerful. Your ability to construct, analyze, and interpret models is best developed through practice, and our class meetings, assignments, and exams will focus on providing this practice.

I will require you to use basic calculus during this course. If you remember what a derivative is and how to obtain one, you will not have any problems with the math that we use here.

#### **Readings:**

There is no required textbook for this class. Your notes from class together with lecture slides will be sufficient to keep up with the course. However, if you would like to have an external reference, previous versions of this class used ***Introduction to Industrial Organization by Luis Cabral (2nd edition)***.

We will often supplement class notes with readings collected from popular media (newspapers, magazines, etc.). When assigned, these readings are mandatory. They will be accompanied by short online quizzes (to be completed before class) that will test your understanding of readings. I will use Sakai to distribute notes, readings, homework assignments, etc. **I will use Gradescope to collect answers to all assignments (other than exams). Please verify that you can log on to the course pages on both these websites.**

I also encourage you to keep up with current economics-related events. Good popular press sources for economic content include the Economist, and the Wall Street Journal, but you can find plenty of economic content on virtually any newspaper. There are also many online news sources and podcasts that are worthwhile: Planet Money, Freakonomics, FiveThirtyEight, and more. While not all of these resources focus on IO, they provide great opportunities to think about the economic forces common to IO and other microeconomics areas.

## Grading

Your grade will be based on three exams and homework assignments using the following breakdown:

Midterm 1	17.5%
Midterm 2	17.5%
Final Exam	35%
Problem Sets (~6x)	20%
Writing (~9x)	10%

- Exams will be closed books and notes, and cumulative: all material that has been covered in class up to that point is fair game.
- I will not reschedule exams other than for University Approved Absences (also refer to the Attendance policy section)
  - The University Approved Absence process has been streamlined for students who test positive and must isolate due to COVID-19. Any student who tests positive at Campus Health or who reports a positive test to Campus Health will be instructed to isolate. Since this inhibits in-person attendance and can lead to incomplete coursework, students should submit a request to the University Approved Absence Office. Tests conducted at Campus Health will automatically generate a UAA form.
- In the case of a student with a University Approved Absence justification missing one of the two midterms, the final grade will be based on a reweight using only one midterm and the final exam (to use this exception as a way to increase your final grade is **not** a good strategy).
- I will post problem sets on Sakai at least one week before they are due. You must upload your solution to Gradescope by the due date. Collaboration (in groups of at most four students) is encouraged, as long as you include everyone's names on your submission and

each person turns in their own work.

- Problem sets and writing grades are graded on a mix of completion and correctness. You will receive 75% credit for simply turning in an honestly attempted, complete problem set. The remaining 25% is based on correctness of a particular subset of question/submission for the particular assignment.
- I will post solutions for each problem set on Sakai at the same time the assignment is due. As a consequence, **no late work will be accepted**. However, you will be allowed to drop your lowest problem set and writing score (so you have the option not to turn in one).

All course grades will be stored and displayed on Sakai. It is your responsibility to insure that the grades on this course page are accurate. Re-grade requests must be provided within one week of receiving your score, and accompanied by a **brief written** explanation of why you think you deserve a higher score. When you submit an assignment for a re-grade, everything will be re-scored and your grade may go up or down.

Grades will be curved so that course grades have a similar distribution to previous 445 classes. The following table shows UNC's standard grading policy and any curve administered would only be to benefit students.

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Percent	93-	90-	87-	83-	80-	77-	72-	70-	67-	60-	<60
Range	100	92.99	89.99	86.99	82.99	79.99	76.99	72.99	69.99	66.99	

## **Policies and Expectations:**

### **Classroom Etiquette**

I expect you to arrive on time and prepared for the day's class. My goal is to maintain a classroom environment that provides a good learning environment for everyone. You may use a tablet to take notes. If you need to use a laptop, I ask that you sit near the back of the class.

### **Attendance policy**

Engagement in the course (demonstrated through attention, comments, questions, active listening, and participation in in-class activities) is expected and part of the learning experience. While I understand that students may not be able to attend every class, students must understand that an absence from class may result in missed information which could affect your grade.

### **Email policy**

I will do my best to answer all emails within 24 hours. If I do not get back to you, feel free to send a reminder. It will also be helpful to put ECON 445 in the subject line as well.

**Mask Use:** UNC-Chapel Hill is committed to the well-being of our community – not just physically, but emotionally. I will abide by any policies UNC has in place during the semester. If you feel more comfortable wearing a mask, you are free to do so. There are many reasons why a person may decide to continue to wear a mask, and we respect that choice.

### **Honor code**

I expect all students to follow the guidelines of the UNC Honor Code. In particular, students are expected to refrain from “lying, cheating, or stealing” in the academic context. You can read more about the honor code at [studentconduct.unc.edu](http://studentconduct.unc.edu). In any course, including mine, what constitutes cheating can change from one activity to another. For example, collaboration may be encouraged for an assignment but qualify as cheating during an exam. Please see my guidelines for each activity, and if you are unsure, please ask me to clarify. Note that these sites provide names of students who have used their materials, and they routinely cooperate with institutions around academic integrity issues. Please don’t get caught up with honor code issues just because it appears to be simple and untraceable. It is not!

### **Accessibility Resources and Services**

The University of North Carolina at Chapel Hill facilitates the implementation of reasonable accommodations, including resources and services, for students with disabilities, chronic medical conditions, a temporary disability or pregnancy complications resulting in barriers to fully accessing University courses, programs and activities.

Accommodations are determined through the Office of Accessibility Resources and Service (ARS) for individuals with documented qualifying disabilities in accordance with applicable state and federal laws. See the ARS Website for contact information: <https://ars.unc.edu> or email [ars@unc.edu](mailto:ars@unc.edu).

### **Counseling and Psychological Services**

If you or anyone you know is struggling with mental health, I encourage you to seek counseling. CAPS is strongly committed to addressing the mental health needs of a diverse student body through timely access to consultation and connection to clinically appropriate services, whether for short or long-term needs. Go to their website: <https://caps.unc.edu/> or visit their facilities on the third floor of the Campus Health Services building for a walk-in evaluation to learn more. (source: Student Safety and Wellness Proposal for EPC, Sep 2018). As a prize for reading to the end of the syllabus I will add 1 point to the overall course score of the first five students who email me the title of their favorite book or movie. If you are outside the first 5 students, you can still get .5 points by doing so.

### **Title IX Resources**

Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Reports can be made online to the EOC at <https://eoc.unc.edu/report-an-incident/>. Please contact the University’s Title IX Coordinator

(Elizabeth Hall, interim titleixcoordinator@unc.edu), Report and Response Coordinators in the Equal Opportunity and Compliance Office (reportandresponse@unc.edu), Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators (gvsc@unc.edu; confidential) to discuss your specific needs. Additional resources are available at <https://safe.unc.edu>.

## Course Outline

Below is a tentative schedule for the semester. Exact dates for topics and assignments may change. If that's the case I will try to give as much advance notice as possible.

Date	Topic	Assignments	Readings (Cabral)
<b>PART 1: INTRODUCTION AND CONCEPTUAL FOUNDATIONS</b>			
Jan 9th	Course objectives and introduction		
Jan 11 <sup>th</sup>	Demand, production, and cost functions		2, 3
Jan 16 <sup>th</sup>	<b>MLK DAY – No Classes</b>		
Jan 18 <sup>th</sup>	Perfect competition & Monopoly		4.1-4.4, 5.3-5.5
<b>PART 2: PRICE DISCRIMINATION</b>			
Jan 23 <sup>rd</sup>	Price Discrimination I: 3DPD (linear)		6.1-6.4
Jan 25 <sup>th</sup>	Price Discrimination II: 1DPD (nonlinear)		6.1-6.4
Jan 30 <sup>th</sup>	Bundling & Price Discrimination IIIa: 2DPD (nonlinear)	<b>PS1 due</b>	6.1-6.4
Feb 1 <sup>st</sup>	Price Discrimination IIIb: 2DPD (nonlinear)		6.1-6.4
<b>PART 3: STATIC OLIGOPOLY THEORY</b>			
Feb 6 <sup>th</sup>	Game Theory I: Simultaneous-move Games		7.1-7.3
Feb 8 <sup>th</sup>	Game Theory II: Sequential games		7.1-7.3
Feb 13 <sup>th</sup>	<b>Wellness Day – No Class</b>		
Feb 15 <sup>th</sup>	Midterm 1 - Review Day	<b>PS2 due</b>	
Feb 20 <sup>th</sup>	<b>MIDTERM I</b>		
Feb 22 <sup>nd</sup>	Competition w/ homog. products I: Basic Cournot		8.2-8.3
Feb 27 <sup>th</sup>	Competition w/ homog. products II: Cournot variations		8.2-8.3
Mar 1 <sup>st</sup>	Competition w/ homog. products III: Stackelberg		8.2-8.3
Mar 6 <sup>th</sup>	Competition with homogeneous products IV: Bertrand	<b>PS3 due</b>	8.2-8.3
<b>PART 4: DYNAMIC OLIGOPOLY THEORY</b>			
Mar 8 <sup>th</sup>	Competition w/ diff. products I: Hotelling I		14.1-14.2
Mar 13 <sup>th</sup>	<b>*** SPRING BREAK ***</b>		
Mar 15 <sup>th</sup>	<b>*** SPRING BREAK ***</b>		
Mar 20 <sup>th</sup>	Competition w/ diff. products I: Hotelling II		14.1-14.2
Mar 22 <sup>nd</sup>	Midterm II – Review Day	<b>PS4 due</b>	
Mar 27 <sup>th</sup>	<b>*** MIDTERM II ***</b>		
Mar 29 <sup>th</sup>	Market Structure and Outcomes		10
Apr 3 <sup>rd</sup>	Game Theory III: Repeated Games		7.3
Apr 5 <sup>th</sup>	Collusion I		9
Apr 10 <sup>th</sup>	Horizontal Mergers	<b>PS5 due</b>	11
Apr 12 <sup>th</sup>	Vertical Relationships		13.1-13.2
Apr 17 <sup>th</sup>	<b>[Extra – Collusion/Mergers]</b>		
Apr 19 <sup>th</sup>	<b>[Extra – Auctions]</b>		

Apr 24 <sup>th</sup>	[Extra – Platforms/TBD]
Apr 26 <sup>th</sup>	Review
May (TBD)	<b>FINAL EXAM</b>

**PS6 due**

### **Syllabus changes**

I reserve the right to make changes to the syllabus, including assignment due dates and test dates. These changes will be announced as early as possible.