

INTRODUCTION TO ECONOMICS OF THE ENVIRONMENT



ABOUT ME

LESSON FORMAT

CANVAS MODULES

- Each lesson has a module
- All relevant materials in module
- Multiple videos per lesson

LESSON OBJECTIVES

01

Course Goals

02

Review of the
syllabus

03

Final thoughts

WHAT IS ENVIRONMENTAL ECONOMICS?



ENVIRONMENTAL ECONOMICS

Economics is the study of decision-making in the presence of scarce resources and the consequences of those decisions.

Environmental economics is the study of environmental issues through an economic science framework.

This framework allows us to understand what drives environmental issues as well as how to prescribe policy.

ENVIRONMENT IS IMPORTANT. DID YOU KNOW?

We rely on the resources provided by the environment

- Water, land, oil

A polluted environment can cause both physical and economic harm

- Cardiovascular, respiratory harm
- Decreased agricultural yields

People have value for environmental services

- Parks, fishing, hiking

PG&E Reaches \$13.5 Billion Deal With Wildfire Victims

The agreement could help tens of thousands of residents rebuild while helping to resolve the utility's bankruptcy.



Power lines near Paradise, Calif., during the Camp Fire, which was ignited last year by Pacific Gas & Electric equipment. Jim Wilson/The New York Times

By Ivan Penn, Lauren Hepler and Peter Eavis

ENVIRONMENTAL ISSUES ARE HUMAN DRIVEN

Ten Years After Deepwater Horizon, U.S. Is Still Vulnerable to Catastrophic Spills

Members of the bipartisan commission created to investigate the spill say Congress and the Trump administration have failed to take safety seriously.



The Deepwater Horizon platform on April 23, 2010. Carol Herbert/Associated Press

By Lisa Friedman

THE DIFFICULTY OF TRADEOFFS

What would happen if we banned use of plastics?



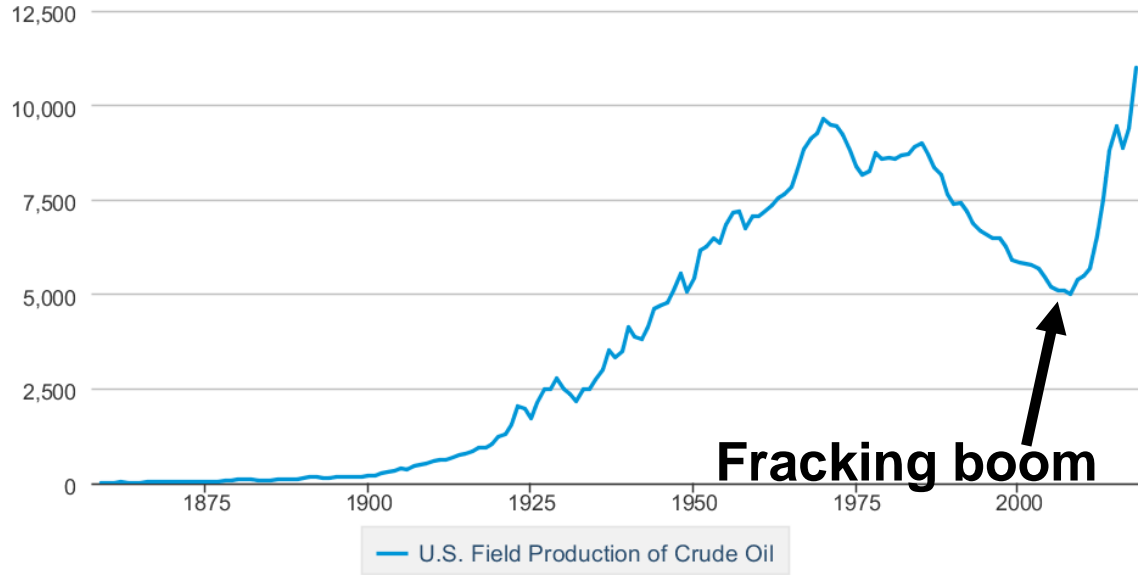
The equivalent of five grocery bags of plastic trash for every foot of coastline spills into the oceans annually. Here, on a remote island in the Caribbean Sea, discarded bottles, wrappers, and straws wash ashore and cover the beach.

PHOTOGRAPH BY ETHAN DANIELS, ALAMY

WHAT ABOUT FRACKING?

U.S. Field Production of Crude Oil

Thousand Barrels per Day

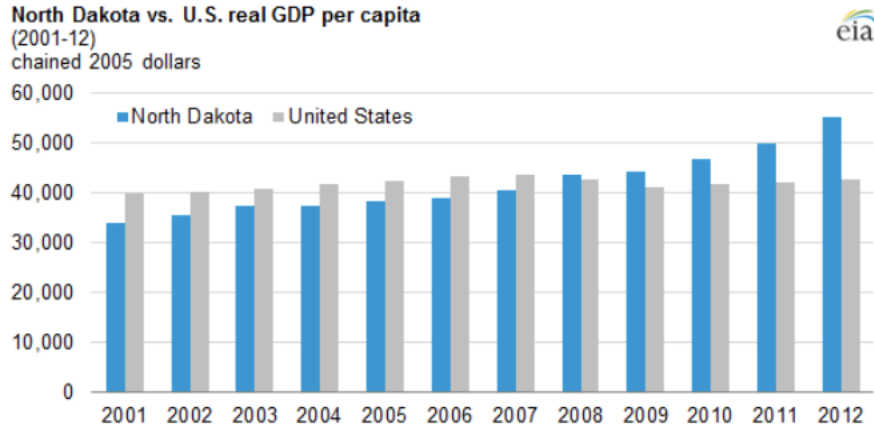
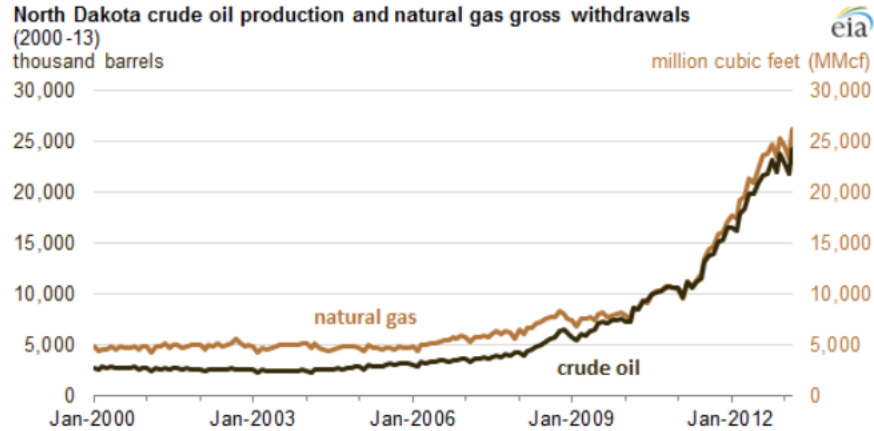


Fracking boom

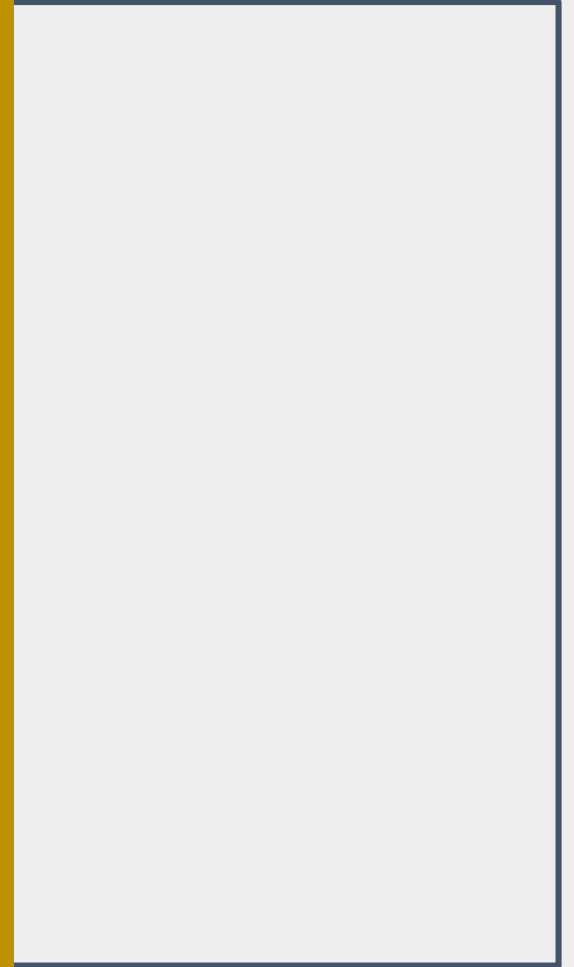


Source: U.S. Energy Information Administration

WHAT ABOUT FRACKING?



**HOW DO WE APPROACH
THESE ISSUES FROM AN
ECONOMIC PERSPECTIVE?**



ENVIRONMENTAL ECONOMICS

Many think economists are only concerned with money and growth with no regard for factors like the environment.

Also think environmentalists are concerned with the environment with no regard for money.

But neither of these are true

ECONOMIC FRAMEWORK

In economics, decisions follow incentives.

In environmental economics we need to understand incentives to

- Know what drives environmental issues
- Prescribe effective policy

01

COURSE GOALS

THREE PARTS OF THE COURSE:

**HOW DO WE
DETERMINE OPTIMAL
ENVIRONMENTAL
QUALITY?**

**HOW DO WE
DESIGN POLICY
INTERVENTIONS**

APPLICATIONS

SHANGHAI

1987



2013



<https://www.theatlantic.com/photo/2013/08/26-years-of-growth-shanghai-then-and-now/100569/>

PROBLEM

Should we ignore environmental impacts and focus on economic growth?

Should we save the environment at all costs?

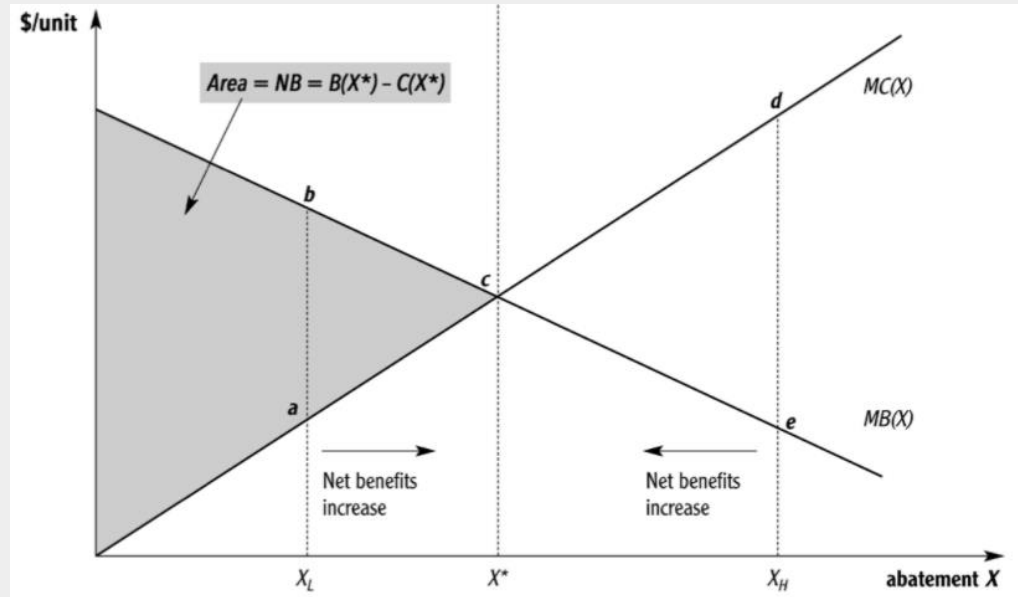
SOLUTION?



PART I: HOW DO WE DETERMINE OPTIMAL ENVIRONMENTAL QUALITY?

SOCIALLY OPTIMAL ENVIRONMENTAL QUALITY

Economics provides an answer in the form of an efficient level of environmental quality



ISSUES WITH FINDING EFFICIENCY

**HOW MUCH DOES
SOCIETY VALUE
THE TREE OUTSIDE
YOUR WINDOW?**

**HOW MUCH ARE
YOU BE WILLING TO
PAY TO BE ABLE TO
GO TO PIEDMONT
PARK?**

**HOW MUCH WOULD
IT COST TO SHIFT
TO 100%
RENEWABLE
ELECTRICITY
GENERATION?**

SOCIALLY OPTIMAL ENVIRONMENTAL QUALITY

Some think it is because of free markets that we have these environmental issues.

It is the absence of markets that drives these environmental issues.

In these cases, government intervention is needed.

PART 2: HOW DO WE DESIGN POLICY INTERVENTION?



The fleet-wide average will be



Consumers will have saved
\$1.7 TRILLION
at the pump over the
life of the program.



A family that purchases a new
vehicle in 2025 will save

\$8,200

in fuel costs when compared with
a similar vehicle in 2010.

Over the life of the program, the standards will:

Save **12** billion
barrels
of oil.



Eliminate **6** billion
metric
tons



of carbon dioxide pollution.

This program, together with standards already put into place by this
administration for Model Years 2011-2016, will result in significant
cost savings for consumers at the pump, dramatically reduce oil
consumption, cut pollution and create jobs.



Smartphone
QR Code™



CAUSES OF ENVIRONMENTAL ISSUES

Before we can design policy to correct environmental issues, we need to understand what is driving the problem.

The absence or incompleteness of markets can lead to market failure.

How can we create markets or market instruments to correct market failure?

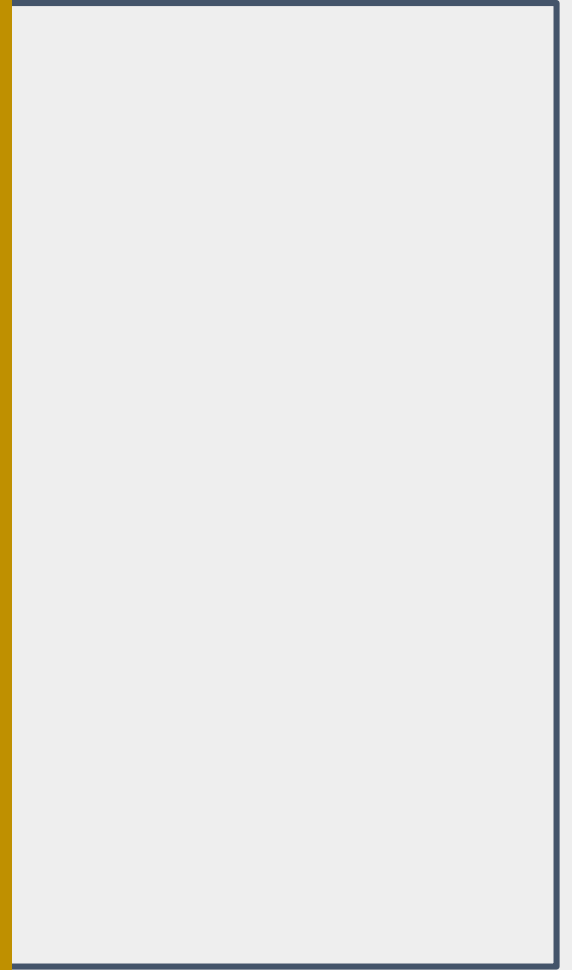
HOW TO DESIGN POLICY

**NOT ALL
POLICIES ARE
THE SAME**

**WE'LL LEARN
ABOUT THE DESIGN
OF “MARKET-
BASED” POLICY**

**WE'LL COMPARE TO
ALTERNATIVE POLICY
APPROACHES, SUCH AS
STANDARDS VS. TAXES**

PART 3: APPLICATIONS



TYPES OF QUESTIONS WE'LL ASK...

How should we manage
renewable resources?

Does it matter if we use tax
vs. standard?

What are the equity impacts?

What are possible
unintended consequences?

EFFICIENCY VS. EQUITY

U.S. Sets Higher Fuel Efficiency Standards



MARKETS ARE AMORAL

**OFTEN ENVIRONMENTAL
ISSUES HAVE AN EQUITY
COMPONENT**

**POLICY CAN ALSO HAVE
AN EQUITY IMPACT**

A Chevrolet Volt electric vehicle, front. Consumers so far have been slow to buy electric cars. Rebecca Cook/Reuters

UNINTENDED CONSEQUENCES

Renewable Energy Boom Not So Kind To Southern US Forests

RACHEL FRITS, MONGABAY

Policy Goal:

Encourage use of renewable energy

- Woody biomass

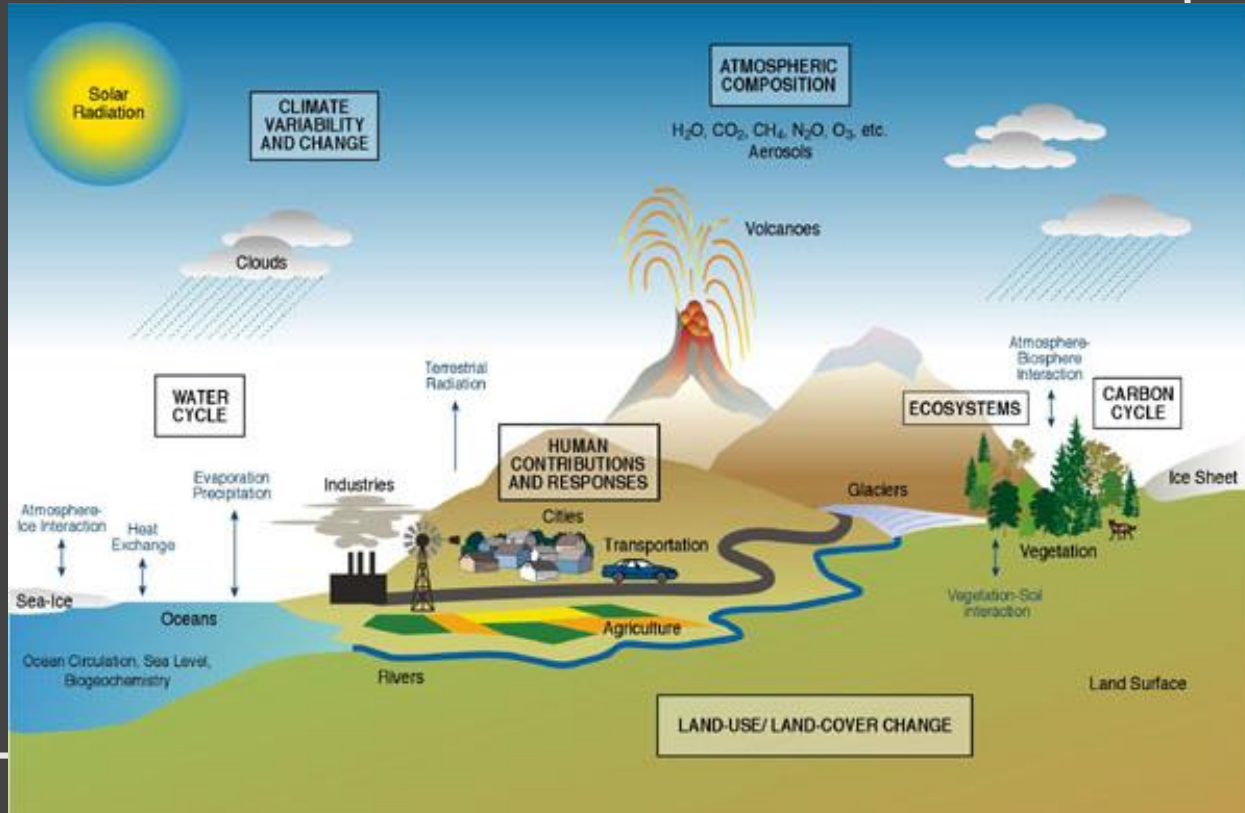
Unintended consequence:

Deforestation to satisfy high demand

ISSUES WE'LL LOOK AT...

CLEAN AIR ACT
ACID RAIN PROGRAM
FISHERIES
CLIMATE CHANGE

...



ATTENDANCE ACTIVITY PART I

I want to get to know everyone and learn more about why you are interested in environmental economics! Please spend a few minutes answering the following questions on Canvas.

- 1) Year and Major
- 2) What economics classes have you taken previously?
- 3) Why did you decide to take economics of the environment?
- 4) What do you hope to get out of this course?
- 5) Where are you based?
- 6) What technologies (eg. Computer, smartphone) do you have access to?
- 7) Do you have any technology concerns (eg. Intermittent internet access)

02

SYLLABUS OVERVIEW

COURSE GOALS



Course Goals and Learning Outcomes

By the end of this course, you will be able to...

1. Explain and analyze the socially optimal level of environmental quality ←
 - a. Calculate efficient market outcomes
 - b. Assess methods for non-market valuation
2. Explain and analyze sources of market failure around environmental issues
 - a. Explain externalities, public goods, and common pool resources
 - b. Explain market failure for depletable and renewable resources
3. Prescribe and assess policy interventions for market failures around environment
 - a. Evaluate private interventions
 - b. Evaluate and compare public interventions
4. Explain and analyze environmental policy applications ←
 - a. Analyze green growth and international environmental policy
 - b. Describe and explain key problems around climate change

PREREQUISITES

Prerequisites

An understanding of the principles of microeconomics is a prerequisite for this course. For this course, I will assume that you recall the important concepts, such as supply and demand, market equilibrium, surplus, opportunity cost, etc. I will not take time to review these concepts, especially given the short format of the short summer sessions, so I recommend reviewing these topics in the first week if you need to brush up on the material.

COURSE MATERIALS



COURSE MATERIALS

Required Text: *Markets and the Environment* by Keohane and Olmstead, Island Press, Washington, DC.

Availability: The course text can be purchased online or through the bookstore. I've selected this text because of its affordability. However, the tradeoff is in completeness. The material in the text will be supplemented with additional readings and lecture notes.

Course website: All course material will be distributed and managed on Canvas. It is important that you check the announcements regularly, as this is my primary method of communication given the online nature of the course.

Optional Supplementary Resources: *Environmental and Natural Resource Economics* (10th Edition) by Tietenberg and Lewis. This is a commonly used undergraduate textbook and a good alternative resource.

Environmental Economics (2nd Edition) by Kolstad. This is a commonly used undergraduate textbook and a good alternative resource.

Marginal Revolution University, <https://mru.org/>. Marginal Revolution University provides free and excellent supplementary text and video resources. If you are struggling with microeconomic concepts, I recommend using this resource to brush up.

COURSE ASSESSMENTS

Course Assignments

Assignment	Dates	Weight (Percentage)	Description
Homework	Weekly	30% (6% each)	Due Fridays at Midnight
Attendance	Daily	10% (~0.5% each)	Due by midnight next day
Analysis Essays	6/29, 7/6, 7/13, 7/20	20% (5% each)	One page summary and analysis
Quizzes (x4)	6/22, 6/29, 7/13, 7/20	20% (5% each)	30 minutes
Exams (x2)	7/6, 7/29	20% (10% each)	1 Hour 50 minutes

COURSE GRADING

Grading Scale

Your final grade will be assigned as a letter grade according to the following scale. Grades of C or higher are considered a pass for students taking the course pass/fail.

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

COURSE SCHEDULE PT. I

COURSE SCHEDULE

The following is an outline of the schedule for this course. The timing of the material is subject to change but the exam and assignment dates will remain fixed.

Class #	Date	Topic	Reading, notes
1	6/17	Introduction	KO Ch. 1, Fullerton and Stavins, "Welcome to the Anthropocene"
2	6/18	Efficiency	KO Ch. 2, EPA - Discount Rates
3	6/22	Benefits	Quiz 1, KO Ch. 3, Paul et al. (2020)
4	6/23	Benefits	KO Ch. 3, NPS
5	6/24	Benefits	KO Ch. 3, Cameron (2010), Carson (2000)
6	6/25	Costs	KO Ch. 3, RFF (2018)
7	6/29	BCA	AE 1 Due, Quiz 2, KO Ch. 3, MATS CS
8	6/30	Market Failure	KO Ch. 4/5, "The hidden cost of congestion"
9	7/1	Depletable Resources	KO Ch. 6, "Peak Oil Debate", "It takes a crisis"
10	7/2	Renewable Resources	KO Ch. 7, "Less Deadly Catch", "Getting Serious about Overfishing"
11	7/6	Midterm	AE 2 Due



COURSE SCHEDULE PT. II



11	7/6	Midterm	AE 2 Due
12	7/7	Coase Theorem	KO Ch. 8
13	7/8	Public Solutions	KO Ch. 8
14	7/9	Public Solutions	KO Ch. 9
15	7/13	Public Solutions	AE 3 Due, Quiz 3, KO Ch. 10
16	7/14	Green Growth	KO Ch. 11
17	7/15	Climate Change	
18	7/16	Climate Change	
19	7/20	Energy Transitions	AE 4 Due, Quiz 4
20	7/21	Wrap-up	
	7/29	Final Exam	

OFFICE HOURS

Office Hours

Office hours will be on Fridays 10am-12pm or by appointment. They will be held on a BlueJeans conference call that can be accessed at <https://bluejeans.com/2497063028/>.

During office hours, I will also monitor the Office Hours discussion board on Canvas. I encourage everyone to take advantage of my office hours. I'm here to help. If you can, please come with questions prepared. Additionally, prepared questions can be posted to the Office Hours discussion board at any time during the week. I will try to respond to posts when I can or during the subsequent designated office hours time.

ATTENDANCE ACTIVITY PART II

SYLLABUS QUIZ

On Canvas, please
complete the
Syllabus Quiz

FINAL THOUGHTS

GROUPS

Each of you will be assigned to a group (~3-4 students/group)

You will have assignments that you must complete as a group.

- Allows for discussion in a remote learning format
- Help you develop study groups quickly
- Help you get to know others in the class (positive spillovers!)

Please exchange information as quickly as possible.

If you have any questions/concerns, please let me know.

SHORT SUMMER SESSION FORMAT

- Class will move quickly
- Stay on top of readings and lessons
- Use your classmates as a resource

REMOTE TEACHING FORMAT

- Important to check announcements
- Stay involved
- Use Piazza

If you are having any issues, please don't hesitate to reach out.

I want and believe everyone **can** succeed!

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