

**ECON 455 – ENVIRONMENTAL ECONOMIC THEORY**  
**UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL**  
**SPRING 2025 SYLLABUS**

## **Course Information**

---

**Instructor:** Tugba Somuncu

**Email:** [tsomuncu@unc.edu](mailto:tsomuncu@unc.edu)

**Zoom:** <https://unc.zoom.us/my/tsomuncu>

**Office:** Gardner 202

**Credit Hours:** 3.0

**Lectures:** M/W 2:30 PM-3:45 PM - Gardner 209

**Office Hours:** Monday 4:00 PM-5:30 PM

Tuesday 1:30 PM- 3:00 PM OR **by Appointment**

**Course Website:** [Canvas 455](#)

**Prerequisites:** ECON 400 and 410, a grade of C or better in both courses is required.

Permission of the instructor for students lacking the prerequisites.

## **Course Description**

---

This course will cover advanced theory and applications underlying environmental economics and examples from real-world scenarios. The course will first address how markets fail, then continue with methods frequently used to measure these failures and review policy tools designed to correct the markets. We will work on economic analysis of environmental issues with a particular emphasis on the problem of designing appropriate institutions and regulations under private information and uncertainty. The goal is to develop a strong understanding of environmental-economic issues and equip you with a toolkit to contribute effectively to discussions on environmental policy using economic theory.

## **Course Objectives**

---

The course aims for students to:

- Evaluate resource allocation, identify potential market failures, and identify possible corrective policies.
- Build an understanding of the environmental economic policy toolkit and the underlying economic theory.
- Solve graphically, algebraically optimum, efficient, and market outcomes with and without policy actions.
- Identify the challenges in the design of environmental policies and develop insights into creating more effective and efficient regulations.

- Develop an understanding of economic analyses of environmental issues presented in policy documents produced by governmental, international, and research organizations.

## Course Resources

---

There is no required textbook for this course. I will provide lecture notes, slides, readings, podcasts on the Course website (**Canvas**).

**Optional Text (Not Required):** Markets and the Environment; *Nathaniel Keohane and Sheila Olmstead*, (Island Press, 2007 or 2016)

### **Podcasts and Media on Policy & Practice (Not Required):**

1. [Resources for Future Podcast Series](#)
2. [Catalyst Podcast Series with Shayle Kann](#)
3. [CleanLaw: Harvard Environmental & Energy Law Podcast Series](#)
4. [University of California Energy Institute Blog](#)
5. [Heatmap News](#)
6. [Latitude Media](#)

## Course Content

---

1. **Introduction and Review of Microeconomics**
2. **Public Goods, Externalities, and Market Failures**
  - Efficient vs. Market Outcomes with Externalities
  - Private vs. Socially Optimal Public Good Provision
3. **Introduction to the Theory of Environmental Policy**
  - Damage Function
  - Abatement Costs
  - Efficient Allocation
  - Pollution Models
  - Coase Theorem and Property Rights

#### 4. Environmental Policy Instruments

Command and Control

Taxes and Subsidies

Permits – Auctioned and Freely Distributed Permits

Permits – with Citizen Participation

#### 5. The Design of Environmental Policy

Random Variables and Economic Models

Uncertainty – Abatement Cost Function and Damage Function Uncertainty

Policy Choice Under Uncertainty and the Weitzman Theorem

Hybrid Regulations

Market Power

Policy Choice under Market Power and the Tinbergen Theorem

#### 6. Carbon Regulation

A Spatial Pollution Model

A Temporal Pollution Model

Cap and Trade – Emission Trading System

Cap and Trade– Overlapping Regulations

#### 7. What the Evidence Says: Environmental Policy and Outcomes (TBD based on interest from the class)

Major Environmental Policies in U.S.

Evidence on the Effectiveness of Key Policies (e.g., CAA, CWA, SDWA)

Recent Empirical Research in Environmental Economics

### Course Requirements and Grading

---

**Problem Sets:** You will complete **6 problem sets** and **your lowest homework score will be dropped**. While working together is encouraged, each student must submit their own answers. Identical answers will be considered a violation of the Honor Code (see below).

**Presentation:** You will be randomly placed on a team. **Your team will be expected to present one of the journal articles in the list included on Canvas**. On the first day of class, you and your group members (details will be on Canvas) will choose the article. You will have 15-17 minutes to present. The team must meet with me to go over the paper in the week before your presentation. Presentation must clearly lay out the hypotheses, the data, the research method, and the results.

**Exams:** There will be **2 in-class midterms**, which will be closed-book and closed-notes. The **final exam is cumulative** and will be administered according to the University Final Exam Calendar. Dates and grading details are provided below.

Your grade will be determined from the following components:

Problem Sets	20%
Class Presentation	10%
Midterm 1	20%
Midterm 2	20%
Final exam	30%

I will use the following grading scale, although I may curve numerical grades to higher letter grades at the end of the semester if needed.

A	[93, 100]	C+	[77, 80)
A-	[90, 93)	C	[73, 77)
B+	[87, 90)	C-	[70, 73)
B	[83, 87)	D+	[67, 70)
B-	[80, 83)	D	[60, 67)
		F	[0, 60)

### Tentative Exam Dates

---

**Midterm 1** – February 26, Wednesday (In class)

**Midterm 2** – April 9, Wednesday (In class)

**Comprehensive Final Exam** (University Final Exam Calendar) – April 30, 8:00 AM

### Academic Policies

---

**Attendance:** Regular class attendance is **strongly** encouraged. I will explain concepts and solve problems in class, clearly demonstrating each step. Active participation is expected, as engaging in discussions on these topics is an integral part of the course.

**Email Policy:** I will communicate through **Canvas Announcements**, so please keep an eye on **Canvas**. You may have questions related to the course; I am here to help. When sending an email, be sure to include **Econ 455** in the subject line. Allow up to 48 hours for a reply. If you haven't received a response within that time, feel free to send me a follow-up. Please refrain from sending emails to the **TAs**.

**Honor code:** I expect you to follow the guidelines of the [UNC Honor Code](#); each of you has pledged “not to lie, cheat, or steal.” Collaboration is encouraged on assignments but prohibited on exams. Lying or cheating could result in a failing or zero score for an assignment or exam, or for the course as a whole. If you have questions about the honor code, please ask me.

**Gradescope:** We will use Gradescope for grading in this class. You can register for Gradescope for this course through our Canvas page by clicking the link in the menu on the left-hand side. When uploading an assignment, make sure the pages are properly oriented and clearly indicate where each problem appears.

**Regrade Requests:** All regrade requests must be made **within 1 week** of the date the assignment's grade is posted. Regrade requests for the final exam are due within **12 hours** of the grade being posted. There will be no exceptions to this rule except in extraordinary circumstances. Regrade requests will be addressed by the TA who graded the assignment. If you are unsatisfied with how your regrade request is resolved, please then contact me directly via email [tsomuncu@unc.edu](mailto:tsomuncu@unc.edu).

**Late and Makeup Policy:** All due dates are firm, and no extensions or makeups will be given. If you have an **Official and Documented Excuse**, such as a documented medical illness that prevents you from taking the exam, a death in your immediate family, or a documented mandatory court date, please notify me in advance of the exam. I will reweight your exams by either moving the weight of the missed midterm entirely to your final exam or by splitting the weight, with half going to the final exam and half to the other midterm, whichever benefits you more.

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

**AI Policy:** Generative AI is useful, **but it can often be inaccurate!** AI should assist your thinking, not replace it. Use these tools to generate ideas to analyze problems, but do not rely on them to do your work for you. For example, do not input an assignment question and copy the response as your answer. This will result in getting zero on the assignment. You are 100% responsible for your final product.

## Academic Resources and Student Support

---

**Accessibility Resources and Services:** [ARS](mailto:ars@unc.edu) ([ars@unc.edu](mailto:ars@unc.edu)) receives requests for accommodations, and through the Student and Applicant Accommodations Policy determines eligibility and identifies reasonable accommodations for students with disabilities and/or chronic medical conditions to mitigate or remove the barriers experienced in accessing University courses, programs and activities. ARS also offers its Testing Center resources to students and instructors to facilitate the implementation of testing accommodations.

**Counseling and Psychological Services:** UNC–Chapel Hill is strongly committed to addressing the mental health needs of a diverse student body. The Heels Care Network website is a place to access the many mental health resources at Carolina. CAPS is the primary mental health provider for students, offering timely access to consultation and connection to clinically appropriate services. [Go to their website](#) or visit their facilities on the third floor of the Campus Health building for an initial evaluation to learn more. Students can also call CAPS 24/7 at 919-966-3658 for immediate assistance.

**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](#) or by contacting the University's Title IX Coordinator or the Report and Response Coordinators in the Equal Opportunity and Compliance Office ([reportandresponse@unc.edu](mailto:reportandresponse@unc.edu)). Confidential resources include Counseling and Psychological Services and the Gender Violence Services Coordinators ([gvsc@unc.edu](mailto:gvsc@unc.edu)) and see additional contact info at [safe.unc.edu](http://safe.unc.edu)

**Writing Center:** For free feedback on any course writing projects, check out UNC's Writing Center. Writing Center coaches can assist with any writing project, including multimedia projects and application essays, at any stage of the writing process. You don't even need a draft to come visit. To schedule a 45-minute appointment, review quick tips, or request written feedback online, visit <http://writingcenter.unc.edu>.