GG572E: Energy and Environmental Economics

Fall 2018

Instructor Information

Instructor	Contacts	Office Location & Hours
Professor Euncheol Shin	E-mail: eshin.class@gmail.com Phone: 02-958-3591	Location: S210 Office Hours: MW 10:30 – 11:30

Prerequisites and Requirements

Prerequisites

Basic knowledge of probability and calculus are necessary.

Requirements

Formal requirements will be composed of (1) class participation, (2) problem sets, and (3) one exam:

- Class attendance and participation are essential parts of the learning process. Thus, students must consider them as both a privilege and a responsibility. Attendance counts for 20% of the final grade.
- There will be seven problem sets. Students are highly recommended to work together, but each student must submit his/her own answer in a hard copy. The average score of the seven problem sets counts for 40% of the final grade.
- There will be one final exam. The final exam will be an in-class and closed-book exam. The exam score counts for 40% of the final grade.

Course Plan and Keywords

Description

This class focuses on the fundamental logic of environmental economics. To that effect, the class will explore from basic microeconomic theory to recent research techniques on environmental issues. The goal of the class is to introduce students to (1) necessary microeconomic tools to analyze environmental problems, (2) both classical and modern theoretical techniques to model externalities, (3) contemporary ideas to solve multidisciplinary problems.

From this class, students are expected to (1) learn real-world applications of microeconomic theory, (2) scientifically and critically evaluate environmental policies, and (3) get some exciting directions for future research.

The following is a tentative road-map for the class including references. Of course, I am very open to spending more time on topics that students find exciting.

A. Thinking like an economist

We study rational decision-making processes by a single economic agent, given a set of beliefs and values. We will also consider behavioral decisions influenced by psychological factors. Finally, we study strategic interactions between multiple agents.

- Field, Barry C. and Martha K. Field (2016). *Environmental Economics* (7th Edition). McGraw-Hill.
- Frank, Robert H. (2014). *Microeconomics and Behavior* (9th Edition). McGraw-Hill.
- Osborne, Martin J. (2012). *Introduction to Game Theory*. OUPI.

B. Externalities and mechanism design

We consider situations where each agent's behavior directly influences other agents' utilities, and vice versa. For those situations, we study how to evaluate agents' inter-personal impacts into their strategic calculations. We determine the best social choices for the society.

- Baliga, Sandeep and Eric Maskin (2003). Mechanism Design for the Environment in *Handbook of Environmental Economics Vol 1*. pp. 305–324. Elsevier.
- Bramoulle, Yann and Rachel Kranton (2007). "Public goods in networks". *Journal of Economic Theory* 135, pp. 478–494.
- Elliott, Matthew and Ben Golub (2018). "A network approach to public goods". *Journal of Political Economy*, Forthcoming.
- Hindriks, Jean and Gareth D. Myles (2013). *Intermediate Public Economics* (2nd Edition). MIT Press.

C. Electricity market design

We study an exciting multidisciplinary research topic, *electricity market design*. We first examine critical features of electricity markets. In the meanwhile, we review *Kirchhoff's circuit law*, which becomes a physical constraint of the electricity market design problem. Then, we consier an economic approach to analyze electricity markets.

- Kirschen, Daniel S. and Goran Strbac (2018). *Fundamentals of Power System Economics* (2nd Edition). Wiley.

Keywords

The following is a list keywords to be covered in this class:

- Consumer and producer theory
- General equilibrium
- The first and second welfare theorems
- Samuelson rule

- Coase theorem
- Lindahl equilibrium
- Pigouvian tax
- Game theory
- Mechanism design
- Electricity market design

Additional Information

A. Grades

- Final letter grades will be definite, and no grade will be changed for any reason.
- To pass the course, each student must take the final exam.
- Each student must obtain at least 50 points to pass this course - that is, any student earning less than 50 points may receive an F grade.

B. Attendance and Absences

- It is the absentee's responsibility to obtain any missing class notes.
- You can miss 3 classes during the semester without any penalty. However, further absences will result in a 2 points deduction from the attendance grade.

C. Miscellaneous

- Please do not use electronic devices such as phones and iPads during the lectures. Any student found to be inappropriately using electronic devices will be subject to get out of the classroom.
- Please do not take pictures of the chalkboard or record the lecturer's voice during the class because it disrupts the lecturer a lot.
- The current syllabus is only for a guideline. We may not follow the same course plan linearly. All the items on this syllabus are subject to change depending on students' understanding of the material.

Course Schedule

Week	Topics	Readings and Exercises
Week 1	Mathematical Preliminaries	**Problem set 1**
Week 2	Preference and Utility Function	
Week 3	Optimal Consumption Choice	**Problem set 2**
Week 4	Intertemporal Choice	
Week 5	Choice under Uncertainty	**Problem set 3**

Week	Topics	Readings and Exercises
Week 6	Behavioral Economics	
Week 7	Exchange Economy and Equilibrium	**Problem set 4**
Week 8	Review Session	
Week 9	Game Theory 1	
Week 10	Game Theory 2	**Problem set 5**
Week 11	Economics of Externalities 1	
Week 12	Economics of Externalities 2	**Problem set 6**
Week 13	Economic Networks	
Week 14	Electricity Market Design 1	**Problem set 7**
Week 15	Electricity Market Design 2	
Week 16	Cumulative Final Exam	

References

Baliga, Sandeep and Eric Maskin (2003). Mechanism Design for the Environment in *Handbook of Environmental Economics* Vol 1. pp. 305–324. Elsevier.

Bramoulle, Yann and Rachel Kranton (2007). "Public goods in networks". *Journal of Economic Theory* 135, pp. 478–494.

Card, David and Alan B. Krueger (1994). "Minimum wages and employment: A case study of the fast-food industry in New Jersey and Pennsylvania". *American Economic Review* 84(4), pp. 772–793.

Diamantaras, D., E. Cardamone, K. Campbell, S. Deacle, and L. Delgado (2009). *A Toolbox for Economic Design*. Palgrave Macmillan US.

Elliott, Matthew and Ben Golub (2018). "A network approach to public goods". *Journal of Political Economy*, Forthcoming.

Field, Barry C. and Martha K. Field (2016). *Environmental Economics* (7th Edition). McGraw-Hill.

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Hindriks, Jean and Gareth D. Myles (2013). *Intermediate Public Economics* (2nd Edition). MIT Press.

Jackson, Matthew O. (2010). *Social and Economic Networks*. Princeton University Press.

Kirschen, Daniel S. and Goran Strbac (2018). *Fundamentals of Power System Economics* (2nd Edition). Wiley.

Osborne, Martin J. (2012). *Introduction to Game Theory*. OUPI.