Spring 2017: Mondays 3:00 – 5:50 pm

**Instructor:** Professor Koichiro Ito
Harris School, Office 157
ito@uchicago.edu
Office hours: Mondays 2:00-3:00pm

**TA:** Chenyu Qiu: chenyuqiu@uchicago.edu, office hours: TBA

**Course Description:** Optimal environmental regulation requires an analysis of the trade-offs between market and regulatory imperfections. Market allocations are inefficient in the presence of imperfections such as externalities, market power, and informational asymmetries. On the other hand, government intervention to mitigate these imperfections is not costless, and can even make market performance worse.

This course is the third course in the Ph.D. environmental and energy economics sequence at the University of Chicago. We focus on recent empirical analysis of the costs and benefits of environmental and energy policies, including an introduction to the relevant econometric methodologies such as randomized controlled trials, regression discontinuity design, bunching analysis, and structural estimation. Topics will include: energy demand and the energy efficiency gap, fuel economy and appliance efficiency standards, non-linear and real-time electricity pricing, wholesale electricity markets, renewable electricity policies, natural gas markets, retail gasoline markets, and technology innovations.

**Prerequisites:** PhD-level coursework on microeconomics and econometrics either at the Harris School, the economics department or Booth, Environmental and Energy Economics I (PPHA443201), and Environmental and Energy Economics II (PPHA44330). If you have not taken these courses, please obtain consent of the instructor to enroll.

**Readings:** Course readings are listed below. There is no textbook.
Audits: I welcome students who choose to audit the course. However, my class is a no-free-rider zone, so auditing students will be required to participate in class presentations and discussions as if they were taking the course for credit. Specifically, auditing students are required to read assigned papers (* and ** in the reading list) and participate in class discussions. Auditors may also be asked to present a paper in class. Auditors are exempt from turning in referee reports, problem sets, research summaries, and from taking the exam.

Seminars: All students interested in environmental and energy economics should attend the EPIC lunch seminar. This will be held on Tuesday between noon and 1PM in Saieh Hall. In addition, two web sites that will be of interest to students in environmental and energy economics are the EEE NBER Working Paper series (http://www.nber.org/papersbyprog/EEE.html) and the Energy Economics Exchange blog from UC Berkeley (http://energyathaas.wordpress.com/). For both of these sites, you can sign up for notifications of new papers and posts.

Weekly Class Format: The first goal of this course is to understand key issues in environmental and energy economics, comprehend important theoretical and empirical findings, and acquire available tools for conducting original research. Toward these ends, classes will involve lectures by the instructor, student presentations, and class discussion.

More specifically, our meetings will focus on pre-assigned papers. In most of the weeks, I structure the 3-hour class in the following way:

1. **Lecture:** In the first half of the class (1.5 hours), I summarize key issues for the topic covered for that week. I primary use papers with * in the reading list. Students are asked to read these papers before coming to each class. I plan to actively ask questions about these papers and make the lecture much more like in-class discussions of these papers.

2. **Student Presentation and Discussion:** In the second half of the class (1.5 hours), two teams (each team consists of one or two students) present two papers with ** in the reading list. This will give you an opportunity to practice your presentation skill, which is actually quite important for your academic career (for both research and teaching).

The first team presents the first paper for 20 minutes and leads the class discussion for 20 minutes. Then, the second team does the same for the second paper. The presentation slides in PDF must be emailed to the TA by 3 pm on Sunday, a day before the presentation day. The presentation should include the following items:

   i. What is the research question?
   ii. Why is it interesting/important?
   iii. Brief data description
   iv. Estimation method (and a brief description of your model, if any, but not required)
v. Results
vi. Contributions of the paper relative to previous studies (compare the paper to a few of the most key/relevant studies in the literature and explain why the paper provides novel contributions).

vii. Your questions and critiques for the paper to lead the class discussion

3. **Brief Referee Reports:** In the beginning of the class, all students will submit a brief referee report for the two assigned papers with **. I will provide a guideline in the first class.

**Research Paper:** The second goal of this course is to help students to start conducting original research in this field. Remember that your goal in the PhD program is to produce original research. Understanding someone else’s research is useful but not a goal for your grad school.

With this motivation, I ask you to work on the following items:

1. **Summary of Preliminary Findings (deadline 3 pm on 4/24):** Email a summary of the preliminary findings of your project in PDF to TA and me. The summary should include texts (max 3 pages) along with a reference list, tables, and figures. It should contain the following six sections:
   
   viii. What is the research question?
   ix. Why is it interesting/important?
   x. Data description
   xi. Estimation method (and a brief description of your model, if any, but not required)
   xii. Preliminary results
   xiii. Contributions of your paper relative to previous studies (compare your paper to a few of the most key/relevant studies in the literature and explain why your study provides novel contributions).

2. **Meetings with TA and me (the week of 4/24):** Schedule a meeting with me (half an hour) and a meeting with the TA (half an hour) to get feedback for your preliminary findings.

3. **Final Presentation (deadline: 3 pm on 5/21, the day before the presentation day):** Email TA and me your slides in PDF. Your presentation will be 10 minutes with no interruptions followed by 5-minute Q&A. Your presentation needs to cover the six items described in “summary of preliminary findings.”

4. **Final Paper (deadline: 3 pm on 5/29):** Email TA and me your final paper in PDF. This should include texts (max 4 pages) along with a reference list, tables, and figures. Your paper needs to cover the six items described in “summary of preliminary findings.”
**Problem Sets:** There will be two short problem sets. The questions in the problem sets can be answered by the good understanding of your readings and class discussions. These are meant to be practice questions for your final exam. You are encouraged to work with other students, but please submit your own answer to the TA.

**Final Exam (Take-Home):** The questions in the final exam can be answered by the good understanding of your readings and class discussions. It will be open-book, but you are prohibited to talk to other students to complete the exam.

**Grading:** The course grades will break out as follows:

- Referee reports, presentation, and class discussion: 20%
- Two problem sets: 20%
- Research proposal (mid-term proposal, final proposal & presentation): 30%
- Final exam: 30%

**How is each assignment graded:** Final research paper and final exam will be graded with numerical scores. Other assignments are graded based on check (default), check+ (exceptional), and check- (require more efforts).

**Policy for Late Assignments:** Please meet the deadline. Each assignment that missed its deadline will create a 5-point deduction per day from your final course grade, with no exception.

**No electric device policy:** I ask you not to use electric devices in class, including laptops, and phones. Please seek permission from the instructor if you need to use an electric device for a special reason (e.g. a medical reason).
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<td>3</td>
<td>4/3 Electricity Markets: Supply</td>
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<td>5/22 Further topics in Environmental and Energy Economics (if time permitted)</td>
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<td>Student Presentation of Preliminary Research Results</td>
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**Reading list:** The asterisk (*) identifies required readings, and the double-asterisk (**) identifies readings for referee reports and student presentations. All papers with * and ** are required readings for the course, problem sets, and final exam.

1. **Introduction to Energy Markets: Market Power, Regulation and Deregulation**


2. **Electricity Markets: Supply**


### 3. Electricity Markets: Demand


4. Oil and Gasoline Markets


** Referee report due 4/17: Hastings, Justine, and Jesse Shapiro, “Fungibility and Consumer


5. **Automobile Markets**


* Knittel, Christopher R., "Reducing Petroleum Consumption from Transportation," forthcoming *Journal of Economic Perspectives*.


6. Renewable Energy Markets


http://www.windpoweringamerica.gov/docs/wind_potential_80m_30percent.xlsx.


7. Emission Markets/R&D and Innovation

1) Emissions Markets


2) R&D and Innovation


8. Energy and Environmental Markets in Developing Countries


Costa, Francisco and Francois Gerard. “Hysteresis and the Social Cost of Corrective Policies: Evidence from a Temporary Energy Saving Program.” Mimeograph. 2015. Available at: https://dl.dropboxusercontent.com/content_link/W6a9Hf2Z4zeuilLb5qR062240g92SP7kPB9vUZFMDZa1Aq3RBrWI790ASZYavqPjM/file


