



2021

Economics of the Renewable Energy Transition

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**RESECON 499C and 499D
ECONOMICS OF THE RENEWABLE ENERGY TRANSITION
Department of Resource Economics**

**Fall 2021/Spring 2022
HONORS THESIS SEMINAR
Commonwealth Honors College**

Dr. Christine L. Crago

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Objectives:

(1) Familiarize students with the energy sector and electricity markets

(2) Equip students with analytical tools to examine economic problems related to the renewable energy transition

(3) Provide an environment for conducting independent research while engaging with peers from other disciplines

(4) Develop skills in self, peer, and group assessments

(5) Develop skills in information searching and retrieval using library and public domain sources

Overall Guidance for Your Honors Thesis

Students will work with the course instructor to define a research question related to the renewable energy transition and develop a research proposal in the fall semester. At the end of the spring semester students are expected to complete their Honors Thesis and submit their manuscripts to the Commonwealth Honors College. A thesis manuscript is typically 35-50 pages in length. Formatting requirements can be found at: <https://www.honors.umass.edu/capstone/formatting>. For additional guidance on the Honors Thesis see: <https://www.honors.umass.edu/capstone-experience>.

Course Text and Readings

Required textbook:

*Booth, W. C., Colomb, G. G., Williams, J. M., Bizup, J. & Williams, T.F. (2016). *The Craft of Research* (4th Edition). University of Chicago Press.

Optional reference:

* Bradford, T. (2018). *The energy system: Technology, economics, markets, and policy*. MIT Press.

Absences and Late Work

Please provide documentation when asking for accommodation for missed classwork due to absence. Late work will be accepted with a penalty of 5% for every day past the deadline, up to one week. Homework submitted one week after the due date will not be accepted. This policy

does not apply to the final Thesis Proposal and Thesis Manuscript, which must be submitted by the due date.

Academic Honesty Policy

Honesty and integrity are fundamental to good academic work. It is expected that the work you present will be your own and that of your group (if applicable). Violations will be pursued to the fullest extent possible under the procedures outlined in your *Undergraduate Rights and Responsibilities Handbook*:

http://www.umass.edu/dean_students/codeofconduct/.

Accommodation Policy

The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services, you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify the Honors Professor within the first two weeks of the semester so that appropriate arrangements can be made.

RESECON 499C Fall 2021

Lecture: MW 2:30-3:45PM Location TDB

Course Website: Available on Moodle

Requirements

1. Submission of Honors Thesis proposal
2. Engagement in the campus discussion of energy topics through attending academic seminars and public lectures. The requirement is to attend one seminar and give a presentation in class related to the seminar.
3. Participation in class/group discussions and peer assessment activities

Grading

The final grade for RES-ECON 499C will be calculated as follows:

Thesis Proposal – 50%

Section drafts – 20%, Final proposal – 25%, Presentation – 5%

Homework and Exercises (including class presentations) – 30%

Class Participation – 20%

Final grades will be on a numeric scale. Students scoring 93% to 100% will receive an A, scores between 90% and 92.9% will receive an A-, 87-89.9% = B+, 83-86.9% =B, 80-82.9%=B- and so on.

Important Dates for Fall 2021 – To be updated

Sep 7 - Last day to add or drop any class with no record

Oct 8 - Columbus Day holiday

Oct 9 - Monday schedule

Oct 15 - Last day to drop with 'DR'

Nov 12 - Veterans' Day holiday

Nov 14 - Monday shedule

Nov 18-25 - Thanksgiving recess

Dec 12 - Last day of classes

Jan 2 – Final grades due by Noon

Lecture Topics and Readings.

(Refer to Moodle for up-to-date class lecture schedule and additional readings.)

Week 1-2: Energy in modern society & Energy Transition/Defining a research question

Bradford Ch 1/ Craft of Research (COR) Ch 3,4

Net Zero America: Potential Pathways, Infrastructure and Impacts (Princeton University)

https://environmenthalfcentury.princeton.edu/sites/g/files/toruqf331/files/2020-12/Princeton_NZA_Interim_Report_15_Dec_2020_FINAL.pdf

Week 3-5: Renewable energy sources (Wind, Solar, Hydro)/Literature reviews

A. Technology overview

B. Cost, valuation and grid integration

* Submit possible topics and discuss with professor
Bradford Ch 7, 8, 11/COR 5,6

Crago, Christine L. (In Press.) Economics of Solar Power. *Oxford Research Encyclopedia of Environmental Science*.

Hirth, L. (2013). The market value of variable renewables: The effect of solar wind power variability on their relative price. *Energy economics*, 38, 218-236.

Joskow, P. L. (2011). Comparing the Costs of Intermittent and Dispatchable Electricity Generating Technologies. *American Economic Review*, 101(3), 238–241

Sinn, H.-W. (2017). Buffering Volatility: A Study on the Limits of Germany's Energy Revolution. *European Economic Review*, 99, 130–150

Week 6: Prosumers: Household production and consumption

* Draft Introduction due

Dastrup, S. R., Graff Zivin, J., Costa, D. L., & Kahn, M. E. (2012). Understanding the Solar Home Price Premium: Electricity Generation and "Green" Social Status

La Nauze, A. (2019). Power from the People: Rooftop Solar and a Downward-Sloping Supply of Electricity. *Journal of the Association of Environmental and Resource Economists*, 6(6), 1135–1168

Week 7-8: Policies to incentivize renewable energy

* Draft Literature Review due

Abrell, J., Rausch, S., & Streitberger, C. (2019). The Economics of Renewable Energy Support. *Journal of Public Economics*, 176, 94–117

Borenstein, S. (2017). Private Net Benefits of Residential Solar PV: The Role of Electricity Tariffs, Tax Incentives, and Rebates. *Journal of the Association of Environmental and Resource Economists*, 4, S85-122

Crago, C. L., & Chernyakhovskiy, I. (2017). Are Policy Incentives for Solar Power Effective? Evidence from Residential Installations in the Northeast. *Journal of Environmental Economics and Management*, 81, 132–151

Hughes, J. E., & Podolefsky, M. (2015). Getting Green with Solar Subsidies: Evidence from the California Solar Initiative. *Journal of the Association of Environmental and Resource Economists*, 2(2), 235–275

Week 9: Methods lecture

One on one meetings with professor to discuss Methodology

Week 10-11: Energy and Equity

A. Inequities in current energy system

B. Prospects for improving social welfare and equity through the renewable energy transition

* Draft Methodology due

Carley, S., Konisky, D.M. (2020) The justice and equity implications of the clean energy transition. *Nat Energy* 5, 569–577

Sunter, D. A., Castellanos, S., & Kammen, D. M. (2019). Disparities in rooftop photovoltaics deployment in the United States by race and ethnicity. *Nature Sustainability*, 2(1), 71-76.

Week 12: Thanksgiving Break

Week 13: Peer Review Discussion

*Proposal draft due for peer review

Week 14-15: Presentation of Thesis Proposals

*Final Thesis Proposal due

RESECON 499D Spring 2022

Lecture: TBD

Course Website: Available on Moodle

Requirements

4. Submission of Thesis Manuscript to instructor and Commonwealth Honors College
5. Presentation of research at the Undergraduate Research Conference and Resource Economics Honors Research Conference
6. Engagement in the campus discussion of renewable energy through attending academic seminars and public lectures on related topics. The requirement is to attend one seminar and give a presentation in class for the seminar attended. ¹
7. Participation in class/group discussions and peer assessment activities

Grading

The final grade for RES-ECON 499D will be calculated as follows:

Thesis Manuscript – 70%

URC Poster, Proposal Presentation and Final Presentation – 15 %

Seminar Presentation – 5%

Homework and Class Participation – 10%

Final grades will be on a numeric scale. Students scoring 93% to 100% will receive an A, scores between 90% and 92.9% will receive an A-, 87-89.9% = B+, 83-86.9% =B, 80-82.9%=B- and so on.

Important Dates for Spring 2019 – To be updated

¹ A list of seminars will be available on the course website. In order to count toward the course requirement, you must attend a UMass or Five College-sponsored event. In addition, you should schedule a presentation date with the course instructor within a week of the event date.

Feb 4 - Last day to add or drop class with no record
Feb 18 - President's Day, no class
Feb 19 – Tuesday, Monday class schedule will be followed
Mar 11-15 - Spring break
Mar 19 - Last day to drop with 'W'
April 15 – Patriot's Day, no class
Apr 17 – Wednesday, Monday class schedule will be followed
April 26 – Undergraduate Research Conference
May 1 – Last class meeting

Lecture Topics and Tentative Schedule² - Dates to be updated

WEEK 1-2: Presentations, Organizing work plan and timetable (Jan 23-Feb 1)

Prepare a 10-minute presentation based on your thesis proposal. Submit presentation file on Moodle the DAY BEFORE your presentation.

WEEK 3-4: Research implementation/Making and supporting arguments (Feb 4-15)

Reading: COR Chapter 7, 8 and 9, 10, 11 and page 197 (Abstract)
Draft abstract for Undergraduate Research Conference due (Feb 11)
Deadline URC Abstract (Feb 15), submit using URC website

WEEK 5-6: Research implementation/Organizing your manuscript (Feb 18 – Mar 1)

Reading: COR Chapter 12, 13

WEEK 7: Research implementation/Presenting results (inc graphs and figures)

Reading: COR 15

WEEK 8: Spring Break (March 11-15)

Week 9-10: Writing Conclusion, Re-writing Introduction (March 18-29)

Reading: COR 16

Week 11-12: Giving a public research presentation, Creating a poster presentation, and Formatting thesis manuscript, Reviewing manuscript (April 1-12)

Draft of manuscript due for peer review (April 10, Wednesday)
Reading: COR 17

Week 13-14: Submission of Project Manuscript, URC Conference

* RESERVE YOUR POSTER PRINTING TIME AT THE DUBOIS LIBRARY WELL AHEAD OF TIME.

Week 15: Course wrap-up discussion and reflection (Apr 30)

Presentation of research at the Resource Economics Honors Research Conference (Date TBD)
Bring your Thesis Approval forms for instructor signature.

² This is a tentative schedule. Class schedule may change depending on student needs (example, pre-testing of surveys, etc). Refer to the syllabus posted on Moodle for up to date class information.