

NRES 442/642: Sustainable Energy Resources, Technologies, and Policies (You have registered as NRES 499, but this is the same course and will be reflected in your minor)

Spring, 2022 3 credits

Asynchronous on Canvas

Instructors:

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Office hours: please contact us to set up an appointment

COURSE DESCRIPTION

Systems-based, technology assessment approach to examining potential sustainable energy solutions. Evaluate the scientific and engineering challenges and social and economic barriers each solution faces and cross-scale interactions between these factors. Formulate a portfolio of policies for each sustainable technology to drive deployment at the necessary scale.

COURSE CRITICAL QUESTIONS AND OBJECTIVES

This course will explore the following fundamental questions about the energy system:

- What assessments are most appropriate to evaluate current and potential energy technologies?
- How can human behavior, technology, and sustainable resource management help to improve the energy system?
- What strategies for extraction, conversion, storage, distribution, and use of energy best minimize negative externalities and maximize benefits?
- How can informed policy design and implementation work within existing social, economic, and environmental systems to advance sustainable energy goals?
- What is our role in the energy economy and what actions can we take to improve the energy system?

Upon completion of this course, students will be able to:

1. Use marginal analysis and systems thinking to evaluate energy resources and technologies.
2. Analyze the connections and conflicts between energy technologies, available resources, and socio-economic structures in the energy system.
3. Examine and apply an energy-planning framework to address challenges at the local, state, and federal level.
4. Identify, evaluate, and suggest improvements to policies that support sustainable energy development.

5. Collaborate with peers in a team environment, applying diverse sets of ideas and values to analyze energy issues.
6. Formally and professionally communicate ideas in writing and orally to your peers and other energy stakeholders.

READINGS AND OTHER COURSE MATERIALS

There is no required textbook for the course. I will select resources that represent the best available science and information on the topics we will be discussing. The readings and assignments will form the basis for our discussions and debates in class. I expect you to complete the assigned readings before coming to class and be able to explain, interpret, apply, analyze, and evaluate the material in discussion and assignments. I will post PDF copies of the readings and links to websites and videos in CANVAS. I will use lectures to emphasize concepts and facilitate further investigation, but I expect you to come prepared for discussion after fully exploring the readings and assignments.

In addition to the topical explorations, students will complete three, online MREA courses that qualify candidates to take the NABCEP PV Associate Exam and earn the industry-recognized credential. Details about the PV Associate Program can be found at [Associate Program - NABCEP](#). The courses satisfy the 32 hours of training required and include follow: [\(PV 101\) Basic Photovoltaics - Midwest Renewable Energy Association](#), [\(PV 201\) PV Site Assessment - Midwest Renewable Energy Association](#), and [\(PV 202\) PV System Design - Midwest Renewable Energy Association](#). MREA will lend a copy of the required textbook for PV 202, Solar Electric Handbook, to all students. The cost of the courses is included as part of the course enrollment, but students interested in taking the online PV Associate Exam will be responsible for the \$150 exam fee. MREA staff will work with interested students to schedule the exam.

EVALUATION

This course will rely upon a variety of evaluation methods to provide you an opportunity to understand and synthesize semester's work, and achieve the expected learning outcomes:

Assignments/Exams	Points	Due date/week
Discussion of New Articles	100	One Canvas post each week
MREA PV Associate Coursework	100	Completed by May 1
Lead a Canvas Discussion on an energy topic	25 + 25 (175)	Weeks 3 to 8
Project Proposal	100	February 24
Project Report	150	Week 15

Final grades will be based on the percentage of the total 625 points that you earn on your assignments. The grading scale listed below indicates what percentages are required to earn a certain grade. The percentage decimal points will be rounded up to the closest number in the grading range. Grades will not be curved.

We will post the grades and feedback in CANVAS with each assignment so that you can track your progress as the course goes along. If at any point you have questions or concerns about your grade or any of your assignments, send one of us an email and we'll work to resolve any issues.

1. Discussion of News Articles on CANVAS (100 points)

There will be a weekly discussion thread in CANVAS dedicated to the analysis of daily news articles. Sign up for the email news digests for both the Midwest and US Energy News (<https://energynews.us/digest/>) and Canary Media (<https://www.canarymedia.com/>) and follow energy news throughout the semester. Your contributions both in initiating and responding to discussion of important, related news throughout the semester will be graded at the end of term. In general, I expect each student to initiate discussion of at least 2 news articles and provide comment, questions, and/or additional resources to a majority of articles posted by classmates. This process should help you develop a working understanding of energy issues as well as a diversity of resources and references to support your class presentations.

2. NABCEP PV Associate Coursework from the MREA (100 points)

During the second week of class, students will be provided enrollment information to the MREA online courses (<https://www.mreacourses.org/>). The three courses are in sequence, and you must complete the first course to move to the second and complete the second to begin the final course. The general schedule for the coursework is as follows:

- Basic PV (101): Feb 1-21
- PV Site Assessment (201): Feb 22 - Mar 14
- PV System Design (202): Mar 15 - May 1 (MREA will loan required textbook to all students)

I strongly recommend that you begin the coursework immediately on Feb. 1 and dedicate a minimum of 2-3 hours each week as the formally recognized time to complete the three courses is 32 hours. The instructor will facilitate virtual office hours with MREA staff during class time to allow for student dialogue directly with the course instructor, Jenny Heinzen (jennyh@midwestrenew.org). Points will be determined on the percent of successfully completed modules with 100 points recognizing full completion of all three courses.

The courses provide the basic technical content, aligned with the industry-recognized Job Task Analysis, for entry-level work in the design, installation, operation, and maintenance of solar energy systems. Successful completion of all coursework will qualify a student to sit for the online, NABCEP PV Associate Exam. By passing this exam, students will earn an industry recognized credential in high demand by employers in the US solar industry.

3. Leading Discussions (25 + 25 points)

You will choose a topic and initiate a discussion on Canvas. You will upload a brief PowerPoint overview including status, trends, challenges, and potential. The discussions will be informed by class lecture and take place during weeks 3-8. You will need to come up with a series of questions and an innovative approach to involve classmates in discussion. The lead will receive up to 25 points for their PowerPoint and Canvas discussion questions. The rest of the class will receive up to 25 points based on their responses in Canvas to the discussion questions.

4. Project Proposal and Report: State Energy Policy Proposal (100 point and 150 points)

You will have chosen a topic to lead a discussion and this topic will comprise what you will write about for this report. We will provide a detailed rubric to guide the assignment, which will include a report. The purpose of the assignment will be to utilize a comprehensive energy planning framework to identify and define specific energy policy that would improve outcomes for state residents. Each group will submit a draft report to receive feedback from the class. You will incorporate suggestions from the instructor and other students before submitting the final project report (about 3,000 words, single space). No Late Assignments are expected. To receive full credit, all assignments must be uploaded to the drop-box on the course CANVAS site or otherwise turned into us prior to the stated date and time. Assignments turned in after the deadline will be considered late and will be subject to late penalty.

ACADEMIC INTEGRITY

I do not tolerate plagiarism or cheating. Plagiarism of any type in your work is academic misconduct and unacceptable – consequences for plagiarism may range from an oral reprimand to expulsion from the University. Plagiarism is defined as deliberate or accidental use of ideas, research, or words of another person without fully attributing them to their original sources.

According to the Merriam-Webster Online Dictionary, to "plagiarize" means 1) to steal and pass off (the ideas or words of another) as one's own 2) to use (another's production) without crediting the source 3) to commit literary theft 4) to present as new and original an idea or product derived from an existing source. Obvious examples of plagiarism include turning in someone else's work as your own, cutting and pasting website text into a paper, or failing to properly cite another author's work. Less obvious forms of plagiarism involve paraphrasing the work of another author (or student) by simply rearranging a few words. All work must be your own. Do not copy or hand in the work of other students, authors, sources. When using other sources in your writing, be sure to credit those sources both within the text and at the end of your reports/papers. If you have any questions about what constitutes plagiarism, please review the resources available at <https://libraryguides.uwsp.edu/plagiarism> and talk with me.

ACCESSIBILITY STATEMENT

If you have a learning or physical challenge which requires classroom accommodation, please contact the UWSP Disability Services office with your documentation as early as possible in the semester at <https://www.uwsp.edu/datc/Pages/default.aspx>.

Primary Resources:

- EIA Annual Energy Outlook <https://www.eia.gov/outlooks/aeo/>
- NREL Energy Analysis <https://www.nrel.gov/analysis/index.html>
- US Energy Flow Charts <https://flowcharts.llnl.gov/>
- US DOE <https://www.energy.gov/eere/office-energy-efficiency-renewable-energy>
- RAP <https://www.raponline.org>
- DSIRE <https://www.dsireusa.org>
- Clean Energy States Alliance <https://www.cesa.org>
- Solar Energy Industries Association <https://www.seia.org/>

News and Opinion

- The Energy News Network <https://energynews.us>
- Canary Media <https://www.canarymedia.com>
- The Energy Gang <https://www.greentechmedia.com/podcast/the-energy-gang>
- Rise Up Midwest <https://riseupmidwest.org/podcast>
- Institute for Local Self Reliance <https://ilsr.org/energy>