

## NRES 442/642: Sustainable Energy Resources, Technologies, and Policies

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Spring, 2022  
Classroom: TNR 271  
1/24/2022 to 5/13/2022  
College of Natural Resources

3 credits  
Tue & Thu. 12:30 pm -1:45 pm  
Class Number 40677  
University of Wisconsin-Stevens Point

### INSTRUCTOR

**Nick Hylla**

Contact: [nhylla@uwsp.edu](mailto:nhylla@uwsp.edu)

Office hours: Virtually or before/after class by 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. Available for graduate credit as NRES 642.

### 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.

## INSTRUCTOR'S TEACHING APPROACH

I believe that teaching can inspire intellectual curiosity, facilitate the pursuit of lifelong learning, and help create a better and more informed society. I commit to you that I will aspire to this goal while teaching. To do so, my instructional strategies include creating an open and trusting environment that facilitates dialogue, challenging student perceptions and openly accepting challenges to my own, and leveraging the resources available to me to involve students in the analysis and advancement of solutions to real-world problems. I believe the purpose of teaching and learning is to develop the skill and motivation to pursue knowledge that contributes to the improvement of ourselves and our environment. In this sentiment, I look forward to seeing each of you become more dedicated and competent professionals with the skills and experience to better serve society and yourselves.

## 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](#), [PV 201: PV Site Assessment](#), and [PV 202: PV System Design](#). 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
Participation in Class Discussions	50	Throughout the semester
Presentation/Discussion of News Articles	50	Throughout the semester
MREA PV Associate Coursework	100	Completed by May 1
Leading Discussion (25 + 25 points)	50	Weeks 3 to 8
Midterm Exam	75	March 17
Group Project	100	
-Draft submission (30 points)		Week 12
-Project Report (50 points)		Week 14
-Presentation (50 points)		Week 15

-Team collaboration (20 points)		Week 15
Final Exam	75	Finals week
Total	500	

Final grades will be based on the percentage of the total 500 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.

93-100 =A	87-89 = B+	77-79 = C+	67-69 = D+
90-92 = A-	83-86 = B	73-76 = C	60-66 = D
	80-82 = B-	70-72 = C-	00-59 = F

I 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 me an email and we'll work to resolve any issues.

**1. Class Participation (50 points)**

Attendance of class lectures and active participation in class discussion is mandatory. For days when you are unable to attend a lecture, you should request an alternate means of participation from the instructor by email.

**2. Discussion of News Articles on CANVAS (50 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.

**3. 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](mailto: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.

**4. Leading Discussions (50 points)**

In groups of two, you will be assigned a topic and lead a 20-minute discussion during class. The discussions will be informed by class lecture and take place during weeks 3-8. I will provide a rubric and supportive resources to help guide your discussion, which will include a brief PowerPoint overview including status, trends, challenges, and potential. You must submit the PowerPoint slides in Canvas before class. You will need to come up with a series of questions and an innovative approach to involve classmates in discussion.

**5. Mid-term Exam (75 points)**

Midterm exam will focus on class lectures, reading materials, and discussion. This will not include content from the MREA coursework. More details on the exam will be shared as class progresses.

**6. Group Project: State Energy Policy Proposal (100 points)**

I will assign you to a group in first few weeks of the class. I expect you to actively collaborate with your team and work on the group project throughout the semester. I will provide a detailed rubric to guide the assignment, which will include a report and presentation. 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 and deliver a presentation to receive feedback from the class. The group will incorporate suggestions from the instructor and other students before submitted 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 me prior to the stated date and time. Assignments turned in after the deadline will be considered late and will be subject to late penalty.

**7. Final Exam (75 points)**

The final exam will be based on class lectures and resources covered throughout the semester. More details on the exam will be shared as the class progresses.

## 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/dats/Pages/default.aspx>.

## TENTATIVE CLASS SCHEDULE

Date	Topics	Activities & Assignments
<b>Week 1:</b> Jan 25 and 27	<p>Introductions</p> <p>Course Syllabus</p> <p>NRES 341 Review</p> <p>RENEW Wisconsin Policy Summit</p>	<ul style="list-style-type: none"> <li>Welcome, introductions, course syllabus</li> <li>Brief review of NRES 341 core content</li> <li>Sign Up to News Updates <a href="https://energynews.us/midwest/">https://energynews.us/midwest/</a> and <a href="https://www.canarymedia.com/">https://www.canarymedia.com/</a></li> <li>Virtual registration to the Renew Wisconsin Policy Summit. Sign up at <a href="https://whova.com/portal/registration/renew_202111/">https://whova.com/portal/registration/renew_202111/</a> using the discount code: uwspstudentfree</li> <li><b>Assignment:</b> Summit discussion on Canvas</li> </ul>
<b>Week 2:</b> Feb 1 and 3	<p>Summit Review</p> <p>PV 101 – Basic PV Registration</p> <p>Energy Market Fundamentals</p> <p>Systems Analysis</p> <p>Group assignment for “Leading Discussions”</p>	<ul style="list-style-type: none"> <li>Registration on <a href="http://MreaCourses.org">MreaCourses.org</a></li> <li>Review of Renew Wisconsin Policy Summit</li> <li>Lecture on energy market fundamentals</li> <li>Marginal analysis and systems thinking to analyze the energy system</li> <li><b>Assignment:</b> MREA PV 101, 201, and 202</li> <li><b>Assignment:</b> Leading Discussion groups, topics, schedule, and rubric</li> </ul>

<b>Week 3:</b> Feb 8 and 10	Competing Visions for the Energy System  Comprehensive Energy Planning Framework  Electricity Markets	<ul style="list-style-type: none"> <li>• Lecture and Discussion: Comprehensive Energy Planning Framework</li> <li>• Lecture: Electricity Markets</li> <li>• Check- In: PV 101</li> <li>• <b>Assignment:</b> Group Project on State Energy Policy Proposal             <ul style="list-style-type: none"> <li>○ Group assignments</li> <li>○ Rubric</li> </ul> </li> </ul>
<b>Week 4:</b> Feb 15 and 17	Energy Supply Chain  Large-Scale Renewables	<ul style="list-style-type: none"> <li>• Group 1 Discussion – Electricity Markets</li> <li>• Lecture: The Energy Supply Chain</li> <li>• Group 2 Discussion – Energy Supply Chain</li> <li>• Lecture: Large-Scale Renewables</li> <li>• Check In: PV 101</li> </ul>
<b>Week 5:</b> Feb 22 and 24	Beneficial Electrification  Efficiency and Demand Response	<ul style="list-style-type: none"> <li>• <b>Assignment Due:</b> Complete PV 101</li> <li>• Group 3 Discussion – Large-Scale Renewables</li> <li>• Lecture: Beneficial Electrification</li> <li>• Group 4 Discussion – Beneficial Electrification</li> <li>• Lecture: Efficiency and Demand Response</li> </ul>
<b>Week 6:</b> March 1 and 3	Community-Scale Renewables  Distributed Energy Resources	<ul style="list-style-type: none"> <li>• Group 5 Discussion – Efficiency and Demand Response</li> <li>• Lecture: Community-Scale Renewables</li> <li>• Group 6 Discussion – Community Scale Renewables</li> <li>• Lecture: Grid Optimization</li> <li>• Check in: PV 201</li> </ul>
<b>Week 7:</b> March 8 and 10	Grid Optimization  The Just Energy Transition	<ul style="list-style-type: none"> <li>• Group 7 Discussion – Distributed Energy Resources</li> <li>• Lecture: Grid Optimization</li> <li>• Group 8 Discussion – Grid Optimization</li> <li>• Lecture: Inclusive Financing and JET</li> </ul>
<b>Week 8:</b> March 15 and 17	Exam Review  Mid-Term Exam	<ul style="list-style-type: none"> <li>• Group 9 Discussion –The Just Energy Transition</li> <li>• Exam Review</li> <li>• Check In: State Policy Proposals</li> <li>• Check in: PV 201</li> </ul>
SPRING BREAK		
<b>Week 9:</b> March 29 and 31	Tour of MREA Campus  Promising Technologies and Policies for the Energy Transition	<ul style="list-style-type: none"> <li>• <b>Assignment Due:</b> Complete PV 201</li> <li>• PV, EV, Efficiency, Energy Storage at MREA Campus (7558 Deer Road, Custer, WI 54423)</li> <li>• Lecture: Leading Technology and Policy</li> </ul>

<b>Week 10:</b> April 5 and 7	National and State Energy Policy Tools  Guest Lecture: National Energy Policy Priorities	<ul style="list-style-type: none"> <li>Lecture: State Energy Policy Tools</li> <li>Guest Lecture: US Dept. of Energy TBD</li> <li>Check in: PV 202</li> <li>Group check in: State Policy Proposals</li> </ul>
<b>Week 11:</b> April 12 and 14	Guest Lecture: WI Energy Policy Priorities  Guest Lecture: IL Energy Policy Priorities	<ul style="list-style-type: none"> <li>Guest Lecture: Public Service Commission of Wisconsin</li> <li>Guest Lecture: Environmental Law and Policy Center</li> </ul>
<b>Week 12:</b> April 19 and 21	Guest Lecture: MN Energy Policy Priorities  Midwest Policy Vision  Final Preparation for Group Presentations	<ul style="list-style-type: none"> <li>Guest Lecture: Minnesota Clean Energy Resource Teams</li> <li>Discussion: A clean energy policy vision for the Midwest</li> <li>Group check in: Policy presentation and report</li> <li>Check in: PV 202</li> </ul>
<b>Week 13:</b> April 26 and 28	Group Presentations	<ul style="list-style-type: none"> <li>State policy presentations and class feedback</li> </ul>
<b>Week 14:</b> May 3 and 5	Group Presentations	<ul style="list-style-type: none"> <li>State policy presentations and class feedback</li> <li><b>Assignment Due:</b> Complete PV 202</li> </ul>
<b>Week 15:</b> May 10 and 12	Final Report Submission  Final Exam Review	<ul style="list-style-type: none"> <li><b>Assignment Due:</b> State policy recommendation report</li> <li>Final exam review</li> <li>Scheduling NABCEP PV Associate Exam</li> </ul>
<b>Final Exam</b>	<b>Tuesday May 17 from 8am to 10am in TNR 271</b>	

### 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.raonline.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>