

# Syllabus

## EN.800.102 Sustainable Energy Engineering, Summer 2024

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### About the Course

#### Description

Fossil fuels will eventually run out, and before they do, burning them for energy production will continue to contribute to our warming planet. Where does all the energy go, that we use and how can we use less energy? Recognizing that even with reductions in our energy use, we will still need to make changes to energy production, how can we design and implement new sustainable energy technologies that are resilient and economical, and that may be incorporated into the existing power grid? To answer these questions, we need to take a deep look the ways we currently use energy so that we may find ways to reduce our use, and we must study the science and engineering concepts behind our current methods of energy production and distribution, as well as the impact of policy on our ability to make change. This course will introduce students to these topics, giving them the fundamental knowledge necessary to understand the challenges and opportunities in sustainable energy engineering, and to decide whether this is a field they want to pursue.

#### Prerequisites

- High school algebra II and trigonometry
- High school science course with lab
- As and Bs in high school math and science courses

#### Objectives

By the end of the course students will be able to:

- Describe the importance and impact of sustainable energy production and energy efficiency measures.
- Describe the basic operation of the electric grid and the challenges associated with integrating more intermittent energy generation.

- Use physical prototypes to demonstrate important properties of an AC generator, a wind turbine, a photovoltaic array, and the electric grid.
- Apply engineering principles to estimate the capacity of a hydropower, solar, or wind power plant in a specific geographic area.
- Perform basic calculations to estimate the cost effectiveness of an energy efficiency improvement or a small-scale power generation technology.
- Use ArcGIS to create maps that display geospatial data relevant to sustainable energy.
- Describe the pros and cons of each sustainable energy source.

## Topics

- Energy in our daily lives
- Buildings
- Transportation
- The electric grid
- Hydropower
- Wind power
- Solar power
- Additional sources (biomass/biofuels, geothermal, nuclear, hydrogen and fuel cells, and marine energy)
- Energy cost and policy
- Excel and ArcGIS

## Textbook

There is no textbook for the course. Recommended reading will be available online through publicly available websites or through the Johns Hopkins University library.

## Teaching Team

The course is taught by an instructor with support from a teaching fellow (TF). Teacher biographies and contact information can be found in Canvas under the Getting Started module.

## Schedule

Class meets every weekday for six hours (excluding the July 4 holiday). Part of each six-hour meeting will include a break for lunch. A calendar with due dates is available in the Calendar area of the Canvas course menu. Unless otherwise noted, **all homework is due at the beginning of class.**

## Access

### Required Software

You will need access to a computer with the following capabilities:

- Access to a spreadsheet application to analyze data\*
- Access to a word processing program to write course lab and project reports\*

- Access to a presentation program\*
- USB port to communicate with the Vernier GoDirect Energy Sensor
- Reliable internet access

\*All students are granted a Microsoft Office 365 license during the program.

## Johns Hopkins Online Account

The Johns Hopkins Enterprise Directory (JHED) system is an online, comprehensive source of contact information for Johns Hopkins University faculty, staff, and students that grants access to the following resources:

- [Canvas](#) – access the course files
- [Microsoft Office 365](#) – access Word, Excel, PowerPoint, OneDrive, etc.
- [myJHU](#) – view and update your student profile
- [SIS](#) – view your final grade at the end of the course
- [Library](#) – access online reference materials

Sign into these applications using JHEDID@jh.edu (**NOT @jhu.edu**) and your password.

New students should receive an email from the registrar containing their JHED ID shortly after enrollment. Instructions for activating the account are provided in the Online Account Activation Instructions Form during course enrollment. Contact [webregistration@jhu.edu](mailto:webregistration@jhu.edu) or call 410-516-8080 for assistance, if needed.

## Canvas – Course Materials

All course materials will be provided through [Canvas \(canvas.jhu.edu\)](https://canvas.jhu.edu). Sign into Canvas using your JHEDID@jh.edu (**NOT @jhu.edu**) username and password. If you have difficulty logging in or accessing the course on Canvas, please contact the Help Desk at [cldtsupport@jhu.edu](mailto:cldtsupport@jhu.edu).

The course materials are divided into modules, which can be accessed by clicking Modules on the Canvas course menu. A module will have several sections including the overview, lecture videos, discussions, and assignments. You will have access to the Canvas site for one month following the last day of class.

## Microsoft Office 365 Software

While you are enrolled in the course, you will have access to the software included in the Microsoft Office 365 Suite such as Microsoft Word, PowerPoint, and Excel. You will need your JHED to download the software to your device.

- Go to <https://www.office.com> and click Sign In.
- Sign in using JHEDID@jh.edu (**NOT @jhu.edu**) and your password.
- When you land on the Office.com home screen, you can click Install Office in the upper right corner. Installing the software is optional; you can also use the web versions directly in the browser.

## Communication

### Course Announcements

Important announcements will be posted to Canvas. You should check for new announcements each day.

### Canvas Inbox

Canvas Inbox (also called Conversations) can be used for communication outside of class. Inbox is a two-way messaging tool used instead of email to communicate with members of a course, a group, or an individual user. You can communicate with other people in your course at any time. Check out the Inbox guide at <https://community.canvaslms.com/t5/Student-Guide/How-do-I-use-the-Inbox-as-a-student/ta-p/532>.

You are encouraged to discuss the course content with your peers. Be respectful and reach out to a teacher if you believe someone is behaving inappropriately. Recall that you are bound by the Academic Integrity policy for the duration of this course.

### Canvas Notifications

Ensure you don't miss any important notifications by [choosing your preferred email address](#) and customizing your Canvas notification settings to notify you of changes immediately or as part of a daily summary. See the Canvas Notifications guide at <https://community.canvaslms.com/t5/Student-Guide/How-do-I-manage-my-Canvas-notification-settings-as-a-student/ta-p/434>.

## Grading

### Submission Format

Documents should generally be submitted in PDF format. Typed submissions are preferred, but handwritten work can be scanned or photographed. One option is to use a program like [CamScanner](#) to digitize handwritten work. Please take the time to ensure scans are not blurry, handwriting is legible, pictures are not sideways, and text and photos are not too small.

### Late Policy

Unless otherwise noted, all homework is due at the start of class. Large files take time to upload, so you should not wait until the last minute to submit your work.

Because this course moves at a fast pace, in general, late work will not be accepted. Submitting something on time is better than submitting nothing. There are a few exceptions to this rule:

- All students will be able to submit one assignment or activity late (up to 12 hours late) with no penalty.
- The second late assignment (up to 12 hours late) will be penalized at 50% credit
- Exceptions will be made for genuine hardships experienced during the course.

You should contact your teaching team as soon as possible to let them know why an assignment is late.

## Grade Questions and Regrade Policy

You may submit work to be regraded if they feel there is an error or if you have questions about how it was graded. Requests should be made in-person or via Canvas Inbox with the teaching team within 48 hours of the grade being posted in Canvas. You should indicate what portion of the work should be regraded and explain the rationale for your request. The new grade may be higher, the same, or lower than the original grade. Once work is regraded, it may not be submitted for another regrading analysis.

## Grade Calculation

Final grades will be determined by the following weighting:

Category	% of Grade
Communicate with a General Audience	30%
Demonstrate Essential Properties with Physical Models	30%
Analyze and Design Energy Production Systems	30%
Contribute to a Positive Class Experience	10%
TOTAL	100%

The projects that fall under each category are shown in Canvas. You can [sort assignments by type](#) or sort them by date.

### Communicate with a General Audience

- Personal Energy Audit
- Visualizing Building Energy Use (with ArcGIS)
- Mapping Transportation Energy Use by State (with ArcGIS)
- Presentations on Additional Sustainable Energy Sources
- Sustainable Energy Engineering Poster Session

### Demonstrate Essential Properties with Physical Models

- AC Generator Lab
- Resistor Networks Lab
- Estimating R-Values Lab
- Wind Turbine Model Lab
- Solar Cells Lab

### Analyze and Design Energy Production Systems

- Conowingo Hydroelectric Plant Analysis

- Planning a Wind Power Project
- Planning a Solar Power Project
- Energy System Design and Presentation

Contribute to a Positive Class Experience

- Participation in Class (Evaluation by Teachers)
- Group Project Contributions (Evaluation by Peers)
- Reflections

**Final Grade Letters**

Your grading scheme—chosen at the time of enrollment—is either a Letter Grade or S/U Grade. You can switch grading schemes by submitting a request to the Registrar (<https://support.sis.jhu.edu/case/>) on or before the deadline. The deadline for Summer 2024 is July 19.

Letter Grade	S/U Grade
97% ≤ A+	Satisfactory (S): 70% and above
93% ≤ A < 97%	
90% ≤ A- < 93%	
87% ≤ B+ < 90%	
83% ≤ B < 87%	
80% ≤ B- < 83%	
77% ≤ C+ < 80%	
73% ≤ C < 77%	
70% ≤ C- < 73%	
67% ≤ D+ < 70%	
63% ≤ D < 67%	Unsatisfactory (U): Below 70%
F < 63%	

**Policies**

**Surveys**

The Engineering Innovation office hires an external evaluator to assess the strengths and weaknesses of this course. Your feedback is essential to that process. A pre-course survey will be sent by email on or about the first day of class. A post-course survey will be sent by email during the last week of class. Your participation is voluntary.

**Academic Integrity**

You are required to read, know, and comply with the Procedures for Dealing with Issues of Academic Misconduct as detailed in the enrollment form you signed.

This policy prohibits academic misconduct, including but not limited to the following: cheating, plagiarism, submitting the same or substantially similar work to satisfy the requirements of more than one course without permission, submitting as one's own the same or substantially similar work of another, knowingly furnishing false information to any agent of the University for inclusion in academic record, falsification, forgery, alteration, destruction or misuse of official University documents or seal.

Plagiarism is defined as taking the words, ideas, or thoughts of another and representing them as one's own. If you use the ideas of another, provide a complete citation in the source work; if you use the words of another, present the words in the correct quotation notation (indentation or enclosed in quotation marks, as appropriate) and include a complete citation to the source.

### **Generative Artificial Intelligence (AI) Tools**

Use of generative artificial intelligence (AI) tools such as Bard and ChatGPT can augment learning experiences when used appropriately. You may use generative AI to brainstorm and refine ideas, find reliable sources, outline, check grammar, and format bibliographies. You should note, however, that the material generated by these programs may be inaccurate, incomplete, biased, or otherwise problematic. You are ultimately responsible for what you submit.

Use your interaction with AI as a learning experience. Then, let your submitted work reflect your improved understanding. All writing and calculations you submit must be your own. Beyond bibliographies, you are not allowed to copy and paste material generated by AI and use it in your submitted work. Including AI-written content in any part of your submitted work will be considered academic misconduct.

### **Disability Services**

To receive accommodations for a disability, you must register with the JHU Office for Student Disability Services (SDS) at <https://studentaffairs.jhu.edu/disabilities/>. You are highly encouraged to do so as soon as possible after admission and no later than two weeks prior to the start of class. Although requests can be made at any time, there may be a delay in implementation depending on the nature of the request.

To begin the registration process with Student Disability Services and to establish eligibility for disability related accommodations and services, please complete and submit [the SDS Online Registration Form](#) and upload supporting documentation. You can also find this form by visiting the Student Disability Services website at <https://studentaffairs.jhu.edu/disabilities/> and clicking on the link on the left hand side labeled "SDS Application Form (New Students and First-Time Requests)". Select "Homewood..." as the primary school and "Engineering Innovation (Pre-College Program)" as your affiliation.

Once your form and documentation are received, the next step in the process will be a phone call or virtual meeting with an SDS professional staff member, when needed, to complete your requested accommodations. If you have any difficulty providing documentation or need more information about any aspect of the process, please contact SDS staff at [studentdisabilityservices@jhu.edu](mailto:studentdisabilityservices@jhu.edu).



## **Discrimination and Harassment**

JHU will not tolerate harassment, sexual harassment (including sexual violence), discrimination or retaliation in the workplace or educational environment whether committed by managers, faculty, administrators, staff, or students, or by visitors to our institution of higher learning. If you are a victim of any such situation, you are strongly encouraged to file a complaint through official university channels.

You may reach out to the Engineering Innovation office at [ei@jhu.edu](mailto:ei@jhu.edu) or submit a Discrimination and Harassment Report Form to the JHU Office of Institutional Equity - <https://forms.jh.edu/view.php?id=164822>.