

College of Engineering and Architecture
Electrical Engineering and Computer Science
COURSE SYLLABUS

EECE325 Fundamentals of Energy Systems

Instructor's full name: Charles Kim	CRN: 13717
Title: Fundamentals of Energy Systems	Credit hours: 4 credits
Office location: LKD 3014	Class meeting days and hours: MW 11:40 - 1:00 pm & M 1:10 – 2:00pm
Office/department phone: 202-806-4821	Classroom location: LKD3105
Office hours: WR 1 - 3	Semester and year: Spring 2023
Email address: ckim@howard.edu	Course website: www.mwfr.com/325S23.html

COURSE DESCRIPTION

This course focuses on the fundamentals of energy systems centered around electric power generation. Starting with the traditional system of large, central power stations connected to their customers by hundreds or thousands of miles of transmission lines, this course covers distributed, renewable, cleaner, smaller generation systems located closer to their loads. In that regard, while other generation sources such as Biomass and Fuel Cells are covered, wind power generation systems and photovoltaic (PV) power generation systems are highlighted in the course.

Prerequisites or Co-requisites

Pre-requisite: Fundamentals of Circuits

Co-requisite: EECE326 Fundamentals of Energy Systems Lab

Course Goals

1. Understanding and application of phasor concepts in power system
2. Understanding the distributed generators
3. Understanding the material balance and emission calculation in fossil fuel power plant
4. Wind power systems
5. PV power systems

Learning Objectives: Upon completion of the course, students attain

1. (ABET Outcome 1) Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. (ABET Outcome 4) Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

Instructional Methods

1. In-person class lecture
2. Essay writing

TEXTBOOKS AND OTHER RESOURCES

Required: Gilbert Masters, *Renewable and Efficient Electric Power Systems*, John Wiley & Sons, Hoboken, NJ, 2004

Supplementary: Sarma, *Electric Machines*, West publishing Co., 1996.

COURSE OUTLINE

- I. Power system review with phasors
- II. Electric power industry transition and distributed generation
- III. Wind power systems
- IV. Solar resources
- V. Photovoltaic materials and characteristics
- VI. Photovoltaic systems

COURSE REQUIREMENTS *(What must students do to fulfill the objectives?)*

1. Class Attendance
2. Active Participation
3. On-time submission of assigned work

4. **Academic Integrity**

The “Academic Code of Conduct” in the [H-Book](#) prohibits cheating, plagiarism, and copyright infringement. Penalties for violations range from a “0” for the assignment or exam to an “F” in the course or suspension. See CETLA’s [Plagiarism](#) webpage for more information about plagiarism as well as ways to avoid it. Please note that in this course I reserve the right to check your work using a plagiarism detector such as Turnitin.

COURSE POLICIES

1. Grading

Computation of Final Course Grade

Assignment	30 %
Essay (Socially Responsible Engineering)	10%
Exam 1.....	20%
Exam 2.....	20%
Final Exam	20%

Incomplete Grades and Withdrawals

A grade of Incomplete (I) is given only if you have fulfilled most of the course requirements prior to the Registrar's withdrawal deadline [*April 8, 2021*] and an emergency prevents you from completing the course. Such an emergency must be documented by your dean or advisor. However, if you have not completed most of the coursework, make sure you withdraw before the deadline; otherwise, I will have to enter the grade you have earned thus far. Please note that if you receive an Incomplete, you can complete only the coursework you missed, and you must complete that work by the end of the following semester, in accordance with University policy.

Lateness

If you cannot submit homework on time because of an emergency, you should document the emergency. (For instance, submit a doctor’s note.) If you experience computer-related problems, you should request a note from a technical assistant or, immediately e-mail helpdesk@howard.edu and “cc” me to document your problem.

Missed Exams or Classwork

If you miss a quiz or other classwork because of an emergency, you should submit a documented excuse as explained above. Then I will determine whether to excuse you from the assignment or permit you to make up the missed work.

2. Class Participation

Attendance, Tardiness, and Class Participation

You are expected to attend classes regularly and promptly. If you are absent or tardy, you will miss not only valuable instruction but possibly credit as well. In either case, you are responsible for finding out from your classmates what was discussed, assigned, or distributed in class.

Electronic Devices

You are expected to conduct yourself during class time in a professional and respectful manner. Therefore, unless I instruct otherwise, please turn your cellphone off or put it on "vibrate" during class. Also, please refrain from surfing the Web, emailing, texting, tweeting, and engaging in other distracting activities during class time. If you engage in such activities, you will be required to turn off the device or leave the classroom, forfeiting class participation points.

Academic honesty and integrity AND student code of conduct

You are expected to adhere to the student code of conduct in academic honesty and integrity. Giving or receiving help in assignments, exams, and any other required course submissions is cheating and violation of the code. If you are caught in the cheating, your score of the submission is automatically zero. Further disciplinary action may follow.

3. Communication

The best way to reach me is to email or Slack me. However, if you need to discuss a confidential matter, you may call my office, visit during my office hours, or make an appointment. However, please note that I check the collaboration platform, voicemail, and email only during business hours (M-F 9am – 5pm). If I receive a message, I will try to respond within 24 hours or the next business day.

SUPPORT SERVICES

1. American Disabilities Act (ADA)

Howard University is committed to providing an educational environment that is accessible to all students. In accordance with this policy, students who need accommodations because of a disability should contact [Special Student Services](#) (202-238-2420) as soon as possible after admission to the University or at the beginning of each semester. If you need a special accommodation required by the American Disabilities Act, please document and discuss your disability with me during the first week of classes.

2. Statement on Interpersonal Violence

Howard University takes sexual assault, dating violence, domestic violence, stalking and sexual harassment seriously. If a student reveals that he or she needs assistance with any of these issues, all Responsible Employees, which includes faculty, are required to share this information with the University Title IX Office (202-806-2550). Students can be referred for confidential services to the Interpersonal Violence Prevention Program (IVPP) (202 806-7647) or University Counseling Services (202 806-6870). For more information about these services, please go to www.CampusSafetyFirst.Howard.Edu.

2. Center for Academic Excellence

The Center for Academic Excellence provides tutors to assist undergraduates with a variety of General Education subjects. To request a tutor, go to <http://undergraduatestudies.howard.edu/cae/tutor-clearinghouse>. The center also provides academic counselors and student success workshops to help you stay in school and excel.

3. Program for Academic Support Services (PASS)

The Graduate School's PASS program offers courses for international graduate students and other graduate students who need to improve their English writing skills. To seek assistance, go to <http://www.gs.howard.edu/pass/default.html>.

4. Writing Center [FOR ENGLISH, WAC, OR WRITING MATTERS COURSES]

For assistance with your writing, you may visit the English Department's Writing Center online or in Locke Hall (Room 100)—with or without a referral. At the Center you will find tutors and software to help you with a variety of problems—from lack of organization to lack of subject-verb agreement. However, the tutors will not proofread or edit for you. Instead, the tutors will do the following: identify your writing problems, teach you how to solve those problems, and evaluate your progress. To schedule an appointment on campus, go to <http://www.coas.howard.edu/writingcenter>. To enroll in the online site, go to <http://www.cetla.howard.edu/wac/students.aspx>. Remember, however, that you can also find assistance on the Writing across the Curriculum (WAC) website, <http://www.cetla.howard.edu/wac/students.aspx>.

5. Canvas

You are expected to use Canvas throughout this course. If you are unfamiliar with Canvas, please complete the **hands-on orientation** described on the FAQs page and submit the confirmation page to me during the first week of classes.

6. Technical Support

If you encounter technical problems with your email, Canvas, Bison Web, or some other University-wide technology, go to <http://itsupport.howard.edu> to open a ticket or email helpdesk@howard.edu. For information about computer labs, software distribution, IT security, printing, and other IT topics, see the **service catalogue** (http://www.howard.edu/technology/services/service_catalogue.html) on the website of Enterprise Technology Services (ETS).

7. University Libraries

Go to <http://library.howard.edu/StudentLibraryInfo> to find out how to access resources and services at the Howard University Libraries. Be sure to check the “Research Help” portal at <http://library.howard.edu/searchportals>, and find out how to use the [Summon](#) search engine, the [RefWorks](#) bibliography manager, and [Ask a Librarian](#) to “chat” with a reference librarian.

OTHER COURSE-SPECIFIC POLICIES

1. Privacy

Video or Audio Recording

You are not permitted to record any of our classes without my written permission. If I authorize you to record a class, you may not distribute or disseminate the recording. If the Dean of Special Student Services has approved your request to record to accommodate a disability, I will require at least a week's notice to consider or prepare. Be advised that your voice or image may be recorded incidentally and shared with other persons interested in accessing the recording for educational purposes.

Student Writing

To build a learning community, I may ask students to read and critique one another's work. Not only can peer review provide student authors with helpful feedback, but it can also help them develop a "critical eye" to evaluate their own work. Therefore, please be advised that your coursework may be shared (online or in the classroom) with your classmates to improve everyone's learning. In addition, to improve teaching and learning, I may share sample student work with HU faculty or, anonymously, with other HU classes unless I receive a written request from a student to withhold his or her work. On the other hand, if I wish to publish student work, I will solicit permission from students via an Informed Consent Form. If you are asked, rest assured that your response will not affect your grade.

COURSE SCHEDULE (subject to change)

<i>Date</i>	<i>Topic</i>	<i>Assignment</i>
Week 1	Class kick-off	
Week 2	Phasor System	
Week 3	Single-Phase Systems	
Week 4	Three-Phase Systems	
Week 5	Power Industry in transition	
Week 6	Material Balance and Cost Parameters	
Week 7	Generation Mix and Energy Cost	Exam 1
Week 8	Spring Break	
Week 9	Power in the wind	
Week 10	Average Power and Wind Turbine Efficiency	
Week 11	Wind Energy Calculation	
Week 12	Solar Radiation and Average Daily Insolation	Exam 2
Week 13	Peak sun and PV energy	
Week 14	PV cell and PV module	
Week 15	PV system design I	
Week 16	PV system design II	
		Exam 3