

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

**EECE326 Fundamentals of Energy Systems Lab**

Instructor's full name: Charles Kim	CRN: 13721
Title: Fundamentals of Energy Systems Lab	Credit hours: 1 credit
Office location: LKD 3014	Class meeting days and hours: M 3:10 - 5:00 pm
Office/department phone: 202-806-4821	Classroom location: LKD3028
Office hours: WR 1 - 3	Semester and year: Spring 2023
Email address: ckim@howard.edu	Course website: <a href="http://www.mwftr.com/325S23.html">www.mwftr.com/325S23.html</a>

**COURSE DESCRIPTION**

This course focuses on augmentation of the theoretical foundations introduced in the Fundamentals of Energy Systems course through lab experimentations. The subjects include power systems, its individual components, power generation, and distributed generation, and renewable energy generation. Under an unexpected situation in which the lab facility and equipment are not accessible, a software-based simulation of each lab experiment would replace the physical counterpart.

***Prerequisites or Co-requisites***

Pre-requisite: Fundamentals of Circuits

Co-requisite: EECE325 Fundamentals of Energy Systems

**Course Goals**

1. Understanding and application of phasor concepts in power system
2. Understanding real and reactive power
3. Understanding synchronous machines and induction machines
4. Stand-alone and grid-connected micro-power systems
5. Renewable energy systems

**Learning Objectives:** Upon completion of the course, students attain

1. (ABET Outcome 2) Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
2. (ABET Outcome 6) Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

**Instructional Methods**

1. In-Person Lab Experiment
2. LTSpice software
3. HOMER software

**TEXTBOOKS AND OTHER RESOURCES**

Lab manual is provided

**COURSE OUTLINE**

- I. Intro to Lab equipment

- II. Single-phase system with RLC load
- III. Three-phase system real and reactive power
- IV. Power flow and phase angle and voltage regulation
- V. Rotating machines
- VI. Micro-power system configuration

**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***

Lab Reports (Pre-Lab (20%) + Main Lab (60%)).....	80 %
Mid-term Exam .....	10 %
Final Exam .....	10%

***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](mailto: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](http://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://undergradtestudies.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](mailto: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](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 Kickoff	
Week 2	MLK Holiday	
Week 3	Lab 1 - Intro to lab equipment	
Week 4	Lab 2 - Single-Phase Systems	
Week 5	Lab 3 - Three-Phase Systems	
Week 6	Lab 4 - Power Flow and Voltage regulation	
Week 7	School Holiday	
Week 8	Lab 5 - Phase angle and voltage drop	
Week 9	Spring Break	
Week 10	Mid-term Exam	Mid-Term Exam
Week 11	Lab 6 - Power Flow between two sources	
Week 12	Lab 7 - Synchronous generator	
Week 13	Lab 8 - Induction Machine	
Week 14	Lab 9 - Stand-alone micro-power systems	
Week 15	Lab 10 - Grid-connected micro-power systems	
Week 16	Lab 11 - Renewable micro-power systems	
Week 17	Final Exam	Final Exam