

PURDUE

UNIVERSITY

SCHOOL OF ELECTRICAL
AND COMPUTER ENGINEERING
UNDERGRADUATE ADVISING OFFICE

Engineering Faculty Document 45-20
February 27, 2020
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To: The Engineering Faculty
From: School of Electrical and Computer Engineering
Re: ECE 31032

The School of Electrical and Computer Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

ECE 31032 Power Systems Engineering

Semesters offered: Fall

Non-repeatable

Credit 3

Pre/Co-requisites:

ECE 20001 or ECE 20100

PHYS 27200 or PHYS 24100 or PHYS 25100 or PHYS 26100

MA 26100 or MA 17400 or MA 18200 or MA 27101

MA 26200 or (MA 26500 and (MA 26600 or MA 36600))

Learning Outcomes

1. Understand the function of the main components in a power system, and the basis of their circuit models.
2. Able to build a system representation from components' circuit models and to apply solution techniques to certain operational needs.

Course Description

Introduction to the economic operation of power systems. Three-phase circuit analysis. Modeling of transformers and transmission lines. Steady-state network analysis using a power flow. Analysis during faults. State estimation.

Reason

This course previously ran as ECE 43200; however, the content has been changed to run as a junior-level course.

History of Previous Offering

This course previously ran as ECE 43200 for over 15 years with average enrollment of 40-55 students per offering.



Michael R. Melloch, Associate Department Head of ECE

ECE 31032

Power System Engineering

Fall 2020

Instructor: Dionysios Aliprantis, Professor, ECE
Contact: WANG 2055, (765) 494.4434, e-mail: dionysis@purdue.edu
Office hours: Tuesday & Thursday 1:00pm–2:00pm, or by appointment
Classroom: Mechanical Engineering Bldg 1012, MWF 12:30pm–1:20pm
TA: TBD
Web page: N/A; material will be posted on Blackboard Learn
Revision: August 15, 2019

Communication: Feel free to communicate with me in any way that is convenient to you (after class, during office hours, phone, email), for questions about the course material or assignments.

Credit Hours: 3.00

Course Description: Fundamental concepts of power system analysis, transmission line parameters, basic system models, steady-state performance, network calculations, power flow solutions, fault studies, symmetrical components, operating strategies, and control.

Course Objectives: The course is designed to give the student an understanding of the problems encountered in the design and operation of electric power systems.

Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:

1. an understanding of the function of the main components in a power system, and the basis of their circuit models. [1]
2. an ability to build a system representation from components' circuit models and to apply solution techniques to certain operational needs. [1,2,6]

Prerequisites: ECE 20001 or ECE 20100; and PHYS 27200 or PHYS 24100 or PHYS 25100 or PHYS 26100; and MA 26100; and MA 26200 or (MA 26500 and (MA 26600 or MA 36600))

Required Text: "Power System Analysis," by J. J. Grainger and W. D. Stevenson, Jr.
McGraw-Hill, 1994, ISBN: 978-0-07-061293-8.

Available online: <http://shop.mheducation.com/mhshop/productDetails?isbn=1260268993>

Tests: There will be four midterms and a final (comprehensive) exam during the semester.

Midterm dates are as follows:

Midterm 1 TBD

Midterm 2 TBD

Midterm 3 TBD

Midterm 4 TBD

The fourth midterm will be during your final exam time (during the first hour). The worst exam grade (out of 5) will be automatically dropped. You will be assigned a (random) designated seat at the beginning of each exam. Exams may be video-taped, to ensure that no cheating takes place.

Calculator Policy: During exams, you are allowed to use your own scientific calculator.

ABET: Every student needs to satisfy all ABET outcomes of this course. See: <http://tinyurl.com/q9tk48h> , and <http://tinyurl.com/gqca3w4> . To this end, a special sixth exam will be assigned towards the end of the semester as a take-home exam. This test will be graded orally during the instructor office hours. If answers are incorrect, the students will be asked to revise & resubmit, until all answers are correctly answered. Failure to complete this exam means that you get an 'F'!

Homework: There will be regular homework assignments that will be posted on the Web. Assignments will be collected at the beginning of class. This policy will be strongly enforced. If, for any reason, you are unable to submit your assignment by the beginning of class, you are welcome to return it early via email. The two worst homework grades will be automatically dropped.

Missed or Late Work: In general, missed or late work will not be accepted. If, for some unforeseen circumstance, you are unable to complete on time, please contact me as soon as possible.

Class ID: Each student will be assigned a random identifier between 100,000 and 999,999. This will help mitigate grading bias, and will simplify the delivery of graded work back to students. When submitting homework/exams, you should only use this ID number! Do not write your name or Purdue ID on your assignments!

Attendance: Students are expected to be present for every meeting of the classes in which they are enrolled. An attendance sign-up sheet will be circulated every time. Only the instructor can excuse a student from a course requirement or responsibility. When conflicts or absences can be anticipated, such as for many University sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email, phone, or by contacting the main office of the department that offers the course. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor's department because of circumstances beyond the student's control, and in cases of bereavement, the student or the student's representative should contact the Office of the Dean of Students. For more information, please see:

http://www.purdue.edu/studentregulations/regulations_procedures/classes.html .

Grief Absence Policy: Students will be excused for funeral leave and given the opportunity to earn equivalent credit and to demonstrate evidence of meeting the learning outcomes for missed assignments or assessments in the event of the death of a member of the student's family. For more information, please see:

http://www.purdue.edu/studentregulations/regulations_procedures/classes.html

Course Grading Policy:

Homework	20%
Exams	80%

Letter grades will be determined by the following guidelines:

≥ 95%	A +
≥ 85%	A
≥ 80%	A –
≥ 75%	B +
≥ 70%	B
≥ 65%	B –
≥ 60%	C +
≥ 55%	C
≥ 50%	C –
< 50%	F

TENTATIVE SCHEDULE OF LECTURES

# of Weeks	Topic
1	Economic operation
2	Basic concepts
2	Transformers
2	Transmission line parameters
1	Transmission line representations
2	Power system modeling
3	Power flow solutions
2	State estimation

Purdue Honor Pledge:

"As a boilmaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together – we are Purdue."

Academic Integrity: Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

Academic Dishonesty: Purdue prohibits “dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty.” [Section B-2-a, Code of Student Conduct: <http://www.purdue.edu/studentregulations/studentconduct/regulations.html>] Furthermore, the University Senate has stipulated that “the commitment of the acts of cheating, lying, and deceit in any of their diverse forms (such as the use of ghost-written papers, the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest.” [University Senate Document 72-18, December 15, 1972]. Incidents of academic misconduct in this course will be addressed by the course instructor and referred to the Office of Student Rights and Responsibilities (OSRR) for review at the university level. Any violation of course policies as it relates to academic integrity will result minimally in a failing or zero grade for that particular assignment, and at the instructor’s discretion may result in a failing grade for the course. In addition, all incidents of academic misconduct will be forwarded to OSRR, where university penalties, including removal from the university, may be considered. This means that cheating may lead to an ‘F’ for the course. For more information, please see: https://www.purdue.edu/odos/osrr/resources/documents/responding_to_academic_dishonesty.html .

Violent Behavior Policy: Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity. See <http://www.purdue.edu/policies/facilities-safety/iva3.html> for more information.

Nondiscrimination: Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.

Purdue University views, evaluates, and treats all persons in any University related activity or circumstance in which they may be involved, solely as individuals on the basis of their own personal abilities, qualifications, and other relevant characteristics.

Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, genetic information, marital status, parental status, sexual orientation, gender identity and expression, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in Purdue’s Equal Opportunity, Equal Access and Affirmative Action policy which provides specific contractual rights and remedies. Additionally, the University promotes the full realization of equal employment opportunity for women, minorities, persons with disabilities and veterans through its

affirmative action program. Any student who believes they have been discriminated against may visit <http://www.purdue.edu/report-hate> to submit a complaint to the Office of Institutional Equity. Information may be reported anonymously.

Accessibility and Accommodations: Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

Mental Health Statement:

- If you find yourself beginning to feel some stress, anxiety, and/or feeling slightly overwhelmed, try WellTrack, <https://purdue.welltrack.com/> . Sign in and find information and tools at your fingertips, available to you at any time.
- If you need support and information about options and resources, please see the Office of the Dean of Students, <http://www.purdue.edu/odos> , for drop-in hours (M–F, 8 am–5 pm).
- If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 and <http://www.purdue.edu/caps/> during and after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

Emergencies: In the event of a major campus emergency, course requirements, deadlines, and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Any changes will be posted on the web. You are expected to read your @purdue.edu email on a frequent basis. Also please review emergency preparedness plans that can be found here: http://www.purdue.edu/emergency_preparedness/.

Emergency preparedness is your personal responsibility. Purdue University is actively preparing for natural disasters or human-caused incidents with the ultimate goal of maintaining a safe and secure campus. Let's review the following procedures:

- To report an emergency, **call 911**.
- To obtain updates regarding an ongoing emergency, sign up for **Purdue Alert text messages**: <http://www.purdue.edu/emergency> .
- There are nearly 300 **Emergency Telephone Systems** throughout campus that connect directly to the Purdue Police Department (PUPD). If you feel threatened or need help, push the button and you will be connected to the PUPD.

- If we hear a **fire alarm** during class we will **immediately suspend class, evacuate the building,** and proceed outdoors. We will exit the ME building using the nearest exit for instruction and head count.

- **Do not use the elevator.**




- Our primary Emergency Assembly Area (EAA) is the atrium of the MSEE building. Please stay clear of all emergency vehicles and personnel.

- If we are notified during class of a **Shelter in Place requirement for a tornado** warning, we will suspend class and calmly proceed to the closest tornado shelter.

- If we are notified of a **Shelter in Place requirement for a hazardous materials release** we will shelter in our classroom shutting any open doors and windows.

- If we are notified during class of a **Shelter in Place requirement for a civil disturbance,** including a shooting or other use of weapons, we will follow these instructions: If the location of the threat is known and you can safely exit the building, leave the area and travel away from the disturbance. Alternatively, seek immediate shelter, preferably in a room that can be barricaded or secured. Use any available communication means (i.e. radio, cell phone, etc.) to find out more details about the emergency. Remain in place until police, fire, or other emergency response personnel provide additional guidance.



-  Tornado Shelter
-  AED
-  Evacuation Route

First Floor ME

Gatewood Wing

