
ECE 31032

Power Systems Engineering (Fall 2022)

Instructor	Junjie Qin, Assistant Professor, ECE
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Office hours	Thursdays 5-6pm, WANG 2051
Classroom	Mechanical Engineering Bldg 1009
Web page	Material will be posted on Brightspace
Revision	August 31, 2022

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

Credit Hours: 3.00

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 and state estimation.

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]

Requisites: Basic understanding of circuits (on the level of ECE 20001 or ECE 20100), physics (on the level of PHYS 27200 or PHYS 24100 or PHYS 25100 or PHYS 26100), multivariate calculus (on the level of MA 26100 or MA 17400 or MA 18200 or MA 27101), and linear algebra and differential equations (on the level of MA 26200).

Required Text: "Power System Analysis," by J. J. Grainger and W. D. Stevenson, Jr. McGraw-Hill, 1994, ISBN: 978-0-07-061293-8.
<http://shop.mheducation.com/mhshop/productDetails?isbn=1260268993>

Reference: "Power System Analysis & Design," by Glover, J. Duncan, Mulukutla S. Sarma, and Thomas Overbye. SI version. Cengage Learning

Tests: There will be three midterms and a final (comprehensive) exam during the semester. The tentative schedule for the exams are as follows:

Midterm 1	By the end of week 5
Midterm 2	By the end of week 9
Midterm 3	By the end of week 13
Final	TBD, scheduled by the registrar

The exact dates for the exams will be announced as the course proceeds. *The worst midterm grade (out of 3) carries half weight (compared to other midterms) in the grade calculation.*

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

Coding Project: As a part of the ABET requirement of the course (<https://tinyurl.com/vybck7cs>), a coding project will be assigned towards the end of the semester. The project will be graded on a pass/fail basis. To pass the project, a student needs to answer all the project questions correctly and submit a 10-minute recording in which he/she explains the code and solutions. A program will be distributed based on which students can check whether they get the correct answers. Passing the project means getting all the points assigned to the project, while failing the project means getting zero point for the project.

Homework: There will be regular homework assignments that will be posted on the Web. *The worst homework grade 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.

Course Grading Policy:

Homework	20%
Midterms	45%
Project	10%
Final	25%

Letter grades will be determined by the following guidelines:

$\geq 95\%$	A+
$\geq 85\%$	A
$\geq 80\%$	A-
$\geq 75\%$	B+
$\geq 70\%$	B
$\geq 65\%$	B-
$\geq 60\%$	C+
$\geq 55\%$	C
$\geq 50\%$	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

Attendance Policy: Students are encouraged to attend all classes in-person unless they are ill or otherwise unable to attend class. If they feel ill, have any symptoms associated with COVID-19, or suspect they have been exposed to the virus, students should stay home and contact the Protect Purdue Health Center (496-INFO).

In the current context of COVID-19, in-person attendance is not a factor in the final grades for this course. Students need to inform the instructor of any conflict that can be anticipated and will affect the timely submission of an assignment or the ability to take an exam.

Only the instructor can excuse a student from a course requirement or responsibility. When conflicts 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 conflicts, when advance notification to an instructor is not possible, the student should contact the instructor/instructional team as soon as possible by email, through Brightspace, or by phone. In cases of bereavement, quarantine, or isolation, the student or the student's representative should contact the Office of the Dean of Students via email or phone at 765-494-1747. Our course Brightspace includes a link to the Dean of Students under "Campus Resources".

Classroom Guidance Regarding Protect Purdue The Protect Purdue Plan, which includes the Protect Purdue Pledge, is campus policy and as such all members of the Purdue community must comply with the required health and safety guidelines.

Any student who has substantial reason to believe that another person is threatening the safety of others by not complying with Protect Purdue protocols is encouraged to report the behavior to and discuss the next steps with their instructor. Students also have the option of reporting the behavior to the Office of the Student Rights and Responsibilities. See also Purdue University Bill of Student Rights and the Violent Behavior Policy under University Resources in Brightspace.

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 is submitted the greater the opportunity for the university to investigate the concern. More details are available on our course Brightspace table of contents, under University Policies.

Nondiscrimination Statement A hyperlink to Purdue's full Nondiscrimination Policy Statement is included in our course Brightspace under University Policies.

Accessibility 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/Wellness Statement If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try WellTrack. 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 contact or see the Office of the Dean of Students. Call 765-494-1747. Hours of operation are M-F, 8 am- 5 pm.

If you find yourself struggling to find a healthy balance between academics, social life, stress, etc. sign up for free one-on-one virtual or in-person sessions with a Purdue Wellness Coach at RecWell. Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is completely free and can be done on BoilerConnect. If you have any questions, please contact Purdue Wellness at evans240@purdue.edu.

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 during and after hours, on weekends and holidays, or by going to the CAPS office on the second floor of the Purdue University Student Health Center (PUSH) during business hours.

Basic Needs Security Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday. Considering the significant disruptions caused by the current global crisis as it related to COVID-19, students may submit requests for emergency assistance from the Critical Needs Fund

Emergency Preparation 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 beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.

Acknowledgement: Some of the course material is adapted from earlier offerings of the course by Prof. Dionysios Aliprantis and Prof. Steve Pekarek at Purdue ECE.