

Syllabus

Course Information

Course Number: ECEN 460
Course Title: Power System Operation and Control
Section: 501, 502, 503, 504, 505, 506
Time: TR 2:20 – 3:35 PM Lecture
Section 501 Lab, W 8:00-9:50 AM
Section 502 Lab, F 11:10 AM – 1:00 PM
Section 503 Lab, F 1:30-3:20 PM
Section 504 Lab, F 4:10-6:00 PM
Section 505 Lab, W 11:10 AM – 1:00 PM
Section 506 Lab, W 1:30-3:20 PM
Location: Lecture Zach 210, Lab Zach 326
Credit Hours: 4
Syllabus Version: 12/31/2025
Course Website: <https://birchfield.engr.tamu.edu/>

Instructor Details

Instructor: Prof. Adam Birchfield
Office: WEB 215-E
Phone: 979-862-2545 (email is preferred)
E-Mail: abirchfield@tamu.edu
Office Hours: Tuesdays 4-5 PM

Course Description

Credits 4. 3 Lecture Hours. 2 Lab Hours. Load flow studies; power system transient stability studies; economic system loading and automatic load flow control.

Course Prerequisites

Prerequisites: Grade of C or better in [ECEN 340](#); junior or senior classification.

Course Learning Outcomes

- Students will be able to explain the structure, history, modeling, and analysis techniques of bulk electric power systems.
- Students will be able to apply ac circuit theory, power flow, economic dispatch, and transient stability calculation methodologies to solve power system problems.
- Students will be able to analyze and evaluate problems in power system operations and control and design appropriate solutions.
- Students will be able to communicate power system study results and draw relevant conclusions.

Textbook and/or Resource Materials

Required textbook: Glover, Overbye, Sarma, and Birchfield, *Power Systems Analysis and Design*, Seventh Edition, Cengage Learning, 2023.

You are required to have a laptop capable of running software that requires a Windows operating system. This will be necessary for the labs and some assignments. More information is available at the following link. [TAMU Engineering BYOD](#)

Grading Policy

First in-class exam	20%	Tentatively scheduled for Tuesday, February 17, in class
Second in-class exam	20%	Tentatively scheduled for Thursday, April 2, in class
Final exam	20%	Tuesday, May 5, 1:00-3:00 pm
In-class quizzes	20%	
Laboratory	20%	

All exams are closed-book, closed-notes. You may use one hand-written note sheet (8.5" by 11", front and back) and standard calculators.

Each grade in the course is given a percentage. Final grades are determined based on these percentages. If your final average falls within the following ranges you are guaranteed to receive at least the letter grade indicated: A: 90-100; B: 80-89; C: 70-79; D: 60-69; F: 59 or lower.

Late Work Policy

For full credit students must turn in assignments, such as lab reports, by the day and time they are due.

Lab reports are usually due at the beginning of the next lab time. They may be turned in up to 1 week late with a 10 point late penalty. Lab reports may not be accepted beyond 1 week late.

Work submitted by a student as makeup work for an excused absence is not considered late work and it is exempted from this late work policy. Details on what constitutes an excused absence are detailed in TAMU Student Rule 7 (<https://student-rules.tamu.edu/rule07/>).

AI Policy

Artificial Intelligence (AI) text generators and natural language processing tools – such as ChatGPT – should not be used for any work turned in for this class, including lab reports. This includes using AI to (1) create or revise drafts (2) edit your work, or (3) review a peer's work. Such use could be considered plagiarism (the appropriation of another person's ideas, processes, results, or words without giving appropriate credit), and a violation of the Aggie Honor Code.

Pre-existing software that functions merely as a spelling and grammar checker is an exception to this rule and is acceptable.

Course Schedule

Week of	Chapters	Topics	Lab
Jan 13	1, 2	Introduction to power systems, Review of complex power, three-phase, per unit	No lab
Jan 20	1, 2	Modeling generators and loads	Lab 1: Power system ops, max loading
Jan 27	3	Modeling transformers	Lab 2: Machine parameters
Feb 3	4, 5	Modeling transmission lines	Lab 3: Machine operation
Feb 10	6	Power system operations fundamentals	No lab due to Exam 1
Feb 17	6	First Exam Bus admittance matrix, power flow formulation	Lab 4: Power flow analysis 42 bus and 2000 bus cases
Feb 24	6	Power flow solutions	Lab 5: System planning and upgrades
Mar 3	6	Power flow sensitivities, large system studies	No lab due to spring break
Mar 10		Spring break	No lab due to spring break
Mar 17	7	Economic dispatch	Lab 6: Economic dispatch and contingency analysis
Mar 24	7	Optimal power flow, security-constrained optimal power flow, energy markets	Lab 7: OPF, SCOPF, and LMPs
Mar 31	12, 13	Large power system operation and control Second Exam	No lab due to Exam 2
Apr 7	12, 13	Power system dynamics	Lab 8: Market auctions
Apr 14	12, 13	Power system dynamics	Lab 9: Transient stability and dynamics
Apr 21	12, 13	Power system dynamics High-impact, low-frequency events	Lab 10: Interactive operations
Apr 28		No class	No lab due to finals
May 5		Final Exam	

University Policies

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to [Student Rule 7](#) in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to [Student Rule 7](#) in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" ([Student Rule 7, Section 7.4.1](#)).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" ([Student Rule 7, Section 7.4.2](#)).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See [Student Rule 24](#).)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" ([Section 20.1.2.3, Student Rule 20](#)).

Texas A&M at College Station

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Notice of Nondiscrimination

Texas A&M University is committed to providing safe and non-discriminatory learning, living, and work environments for all members of the University community. The University provides equal opportunity to all employees, students, applicants for employment or admission, and the public regardless of race, color, sex (including pregnancy and related conditions), religion, national origin, age, disability, genetic information, or veteran status. Texas A&M University will promptly, thoroughly, and fairly investigate and resolve all complaints of discrimination, harassment (including sexual harassment), complicity and related retaliation based on a protected class in accordance with System Regulation 08.01.01, University Rule 08.01.01.M1, Standard Administrative Procedure (SAP) 08.01.01.M1.01, and applicable federal and

state laws. In accordance with Title IX and its implementing regulations, Texas A&M does not discriminate on the basis of sex in any educational program or activity, including admissions and employment. The following person has been designated to handle inquiries and complaints regarding the non-discrimination policies: Jennifer M. Smith, TAMU Associate VP & Title IX Coordinator at YMCA Ste 108, College Station, TX 77843, 979-458-8407, or email civilrights@tamu.edu. For other reporting options, visit <https://ocrcas.ed.gov/contact-ocr> to locate the address and phone number of the office that serves your area, or call 1-800-421-3481.

Civil Rights, Free Speech, and Title IX Policies

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit discrimination and harassment based on an individual's race, color, sex, (including pregnancy and related conditions), religion, national origin, age, disability, genetic information, veteran status, or any other legally protected characteristic. This includes forms of sex-based violence, such as sexual assault, sexual harassment, sexual exploitation, dating/domestic violence, and stalking.

Students can report discrimination/harassment, access supportive resources, or learn more about their options for resolving complaints on the [University's Civil Rights & Title IX webpage](#).

Students should be aware that all university employees (except medical or mental health providers) are mandatory reporters, which means that if they observe, experience or become aware of an incident that they reasonably believe to be discrimination/harassment alleged to have been committed by or against a person who was a student or employee at the time of the incident, the employee must report the incident to the university.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact the Disability Resources office on your campus (resources listed below). Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

To request academic accommodations, contact the designated ADA office based on your location:

- Texas A&M University, College of Nursing, College of Dentistry, Irma Lerma Rangel College of Pharmacy College Station, College of Medicine, School of Public Health, Institute of Biosciences and Technology, EnMed Program, Bush School in Washington DC, Mays Business School – CityCentre, TAMU Engineering Academies, Texas A&M University Higher Education Center at McAllen and Texas A&M University at Galveston should contact [Disability Resources](#) at (979) 845-1637 or disability@tamu.edu.
- Texas A&M University School of Law should contact the Office of Student Affairs at (817) 212-4111 or law-disability@law.tamu.edu to request accommodations.
- Irma Lerma Rangel College of Pharmacy in Kingsville should contact the Disability Resource Center at Texas A&M University - Kingsville at (361) 593-3024 or drc.center@tamuk.edu to request accommodations.

- Texas A&M University College of Veterinary Medicine & Biomedical Sciences in Canyon should contact the Office of Student Accessibility at West Texas A&M University – Canyon at (806) 651-2335 or osa@wtamu.edu.
- Texas A&M University at Qatar (TAMUQ) should contact the campus psychologist, Dr. Steve Wilson +974-4423-0047 or stephen.wilson@qatar.tamu.edu.

If you are experiencing difficulties with your approved accommodations, contact the office responsible for approving your accommodations or the Texas A&M ADA Coordinator Julie Kuder at ADA.Coordinator@tamu.edu or (979) 458-8407.

Pregnancy Accommodations

Texas A&M provides reasonable accommodations to students due to pregnancy and/or related conditions, such as childbirth, recovery and lactation. Students should contact the University's [Pregnancy Coordinator](#) as soon as they become aware of the need for accommodation. Depending on the circumstances, accommodations could include extended time to complete assignments or exams, changes in course sequence, or modifications to the physical classroom environment. Texas A&M will also allow a voluntary leave of absence, ensure the availability of lactation space, and maintain grievance procedures to provide for the prompt and equitable resolution of complaints of sex discrimination. For information regarding pregnancy accommodations, email TIX.Pregnancy@tamu.edu.

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors influencing a student's academic success and overall wellbeing. Students are encouraged to engage in healthy self-care practices by utilizing the resources and services available through [University Health Services](#) on its [mental health webpage](#). The [TELUS Health Student Support app](#) provides access to professional counseling in multiple languages anytime, anywhere by phone or chat, and the 988 Suicide & Crisis Lifeline offers 24-hour emergency support at 988 or 988lifeline.org.

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Students needing a listening ear can contact University Health Services (979.458.4584) 24-hour emergency help is also available through the 988 Suicide & Crisis Lifeline (988) or at 988lifeline.org.

Statement on the Family Educational Rights and Privacy Act (FERPA)

FERPA is a federal law designed to protect the privacy of educational records by limiting access to these records, to establish the right of students to inspect and review their educational records and to provide guidelines for the correction of inaccurate and misleading data through informal and formal hearings. Currently enrolled students wishing to withhold any or all directory information items can do so within howdy.tamu.edu using the Directory Information Withholding Form. The complete [FERPA Notice to Students](#) and the student records policy is available on the Office of the Registrar webpage. Items that can never be identified as public information are a student's social security number, citizenship, gender, grades, GPR or class schedule. All efforts will be made in this class to protect your privacy and to ensure confidential treatment of information associated with or generated by your participation in the class.

Directory items include name, UIN, local address, permanent address, email address, local telephone number, permanent telephone number, dates of attendance, program of study (college, major, campus), classification, previous institutions attended, degrees honors and awards received, participation in officially recognized activities and sports, medical residence location and medical residence specialization.