

Tentative Syllabus – EEE 145

Part 1: Course Information

Instructor Information

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Course Description

Catalog Description:

EEE 145. Power System Relay Protection. Principles of relay techniques (classical and solid state), current and potential transformers and their application in relaying technique, overcurrent, differential, impedance, frequency, overvoltage and undervoltage relays, relay protection of overhead and underground power lines, generators, transformers, motors, buses and computer applications in relay protection. **Prerequisite:** EEE 130, EEE 141. **Graded:** Graded Student. **Units:** 3.0

Tentative areas of concentration in Fall xxxx

Tentative areas will include selected topics from the following list:

- Review of Fundamentals and Protection Philosophies
- Symmetrical Components Techniques and Fault Analyses
- Relay Input Sources (Current and Voltage Transformers)
- Basic Concepts of Over-Current Protection
- Basic Concepts of Differential Protection
- Basic Concepts of Over/Under Voltage & Frequency Protection
- Concepts in Transmission Line Protection including:
 - Over-Current / Directional Over-Current,
 - Distance,
 - Differential,
 - Pilot (Communication Assisted)/Non-Pilot
- Concepts in Transformer Protection

- Concepts in Generator, Motor, & Other Equipment Protection

Prerequisite course (s);

- EEE 130 Graded.
- EEE 141 Graded.

Prerequisite by Subject(s);

- Analysis of single phase and three phase AC circuits
- Transformer and Machine modeling and analyses
- Transmission line modeling and analyses
- Basic concepts of Linear Algebra and Vector analysis

Textbook & Course Materials

Main Textbook:

- Protective Relaying – Principles and Applications, 3rd Ed. J. Lewis Blackburn, Thomas J. Domin, CRC Press 2007

Other Recommended Texts & Reading Material

- Power System Relaying. 2nd Ed. Stanley H. Horowitz, Arun G. Phatke, Research Studies Press. 2000
- Other readings may be made available in the course packet/Web site/SacCT environment

Part 2: Course Requirements

- *Attendance*
- *Assignments*
- *Quizzes (unscheduled)*
- *Scheduled Written Exams (Test 1 and Test 2)*
- *Team Projects involving research, report, and presentation*

Course Structure

In class lectures, Take home assignments (team work is promoted), In class unscheduled Quizzes, In class and scheduled examinations, Supplemental assignments.

Major Objectives of the course:

- Review Power System Fundamentals

- Learn and understand method of Symmetrical Components and utilization of the components for analyses and calculation of various faults
- Learn the major concepts and philosophies used for Protection of Power System apparatus and equipment
- Learn about the main Input Sources to Protective Relays and the various connections
- Learn the concepts of Over-Current, Directional/Non-Directional, Differential, Distance, and Over/Under Voltage & Frequency protection
- Introduction to the various schemes and techniques used for Protection of Transmission Lines, Transformers, Generators, and other Power System Equipment
- Introduction to the various Pilot (Communication Assisted) & Non Pilot protection schemes

Part 3: Tentative Topic Outline/Schedule

Week	Topic / Activity	Comments
1, 2	Introduction, Objectives, Syllabus and Basic Concepts	Various reading and other assignments
3, 4	Method of Symmetrical Components and Application to Fault Analyses	
5	Relay Input Sources: Current and Voltage Transformers	
6, 7, 8	Fundamentals of Protective Schemes and Basic Design principles	Test 1 schedule will be discussed and determined in class
9, 10	Over-Current and Directional Over-Current protection of Transmission Lines	
11, 12	Distance Protection and introduction to Pilot vs. Non Pilot protection schemes	
13,14, 15	Various Schemes for protection of Transformers, Machines, Buses and other elements	Test 2 schedule will be discussed and determined in class

Note: Actual schedule may deviate from the above table

Part 4: Grading and Specific Policies-EEE 145

1 – Test 1 (40%), Test 2 (40%), in class Examinations; No make up for missed exams unless the absence is caused by a valid, unavoidable reason.

This may be subjected to a satisfactory proof of the "validity" and the "unavailability". Maximum attainable score for a make up exam is 80% of its original value and the content may be different than the original exam.

2 – Homework (5% If collected) is assigned and the due date is announced. Homework may or may not be collected for grading. If the homework is not graded, higher points will be considered for Pop Quizzes.

3 – Pop Quizzes (15% or 20% if no points are considered for the homework), very similar to homework and class lectures. Quizzes will be unannounced to serve as an incentive for attendance and doing the homework.

4 – Every student's lowest score for Quizzes and lowest score for Homework will be dropped out before averaging. This provides an equal chance for every student to miss one of the collected home-works and be absent for one of the quizzes. So, students should use their best judgment on how to take advantage of this rule. No late assignments are accepted.

5 – Instructor's opinion on positive/negative behavioral patterns and professional ethics (such as timeliness/tardiness, etc.) can add/subtract up to 5% to/from the students' grade.

6 – No Lap Top usage, Web browsing, or text messaging is permitted during lectures, quizzes, or tests. Cell Phones must be on their silent modes. Violations will significantly impact student's final grade.

Letter Grade Assignment

Letter grades are assigned based on an adjusted class distribution curve. The final grades can usually (but not necessarily!) be approximated by the following table. The actual final grade may be different based on various factors and unforeseen circumstances.

Adjusted Overall Performance in Percentile	Possible Final Grade
85% - 100%	A ⁻ , A
70% - 85%	B ⁻ , B, B ⁺
55% - 70%	C ⁻ , C, C ⁺
40% - 55%	D ⁻ , D, D ⁺
Below 40%	F

Important note: For more information about grading at Sac State, visit the academic policies and grading section of the university catalog.

Part 5: General University Policies

Attend Class

Students are expected to attend all class sessions as listed on the course calendar.

Build Rapport

If you find that you have any trouble keeping up with assignments or other aspects of the course, make sure you let your instructor know as early as possible. As you will find, building rapport and effective relationships are key to becoming an effective professional. Make sure that you are proactive in informing your instructor when difficulties arise during the semester so that they can help you find a solution.

Complete Assignments

Assignments must be submitted by the given deadline or special permission must be requested from instructor *before the due date*. Extensions will not be given beyond the next assignment except under extreme circumstances.

All discussion assignments must be completed by the assignment due date and time. Late or missing discussion assignments will effect the student's grade.

Understand When You May Drop This Course

It is the student's responsibility to understand when they need to consider disenrolling from a course. Refer to the Sac State Course Schedule for dates and deadlines for registration. After this period, a serious and compelling reason is required to drop from the course. Serious and compelling reasons includes: (1) documented and significant change in work hours, leaving student unable to attend class, or (2) documented and severe physical/mental illness/injury to the student or student's family.

Incomplete Policy

Under emergency/special circumstances, students may petition for an incomplete grade. An incomplete will only be assigned if **agreed by both the instructor and the department Chair**. All incomplete course assignments must be completed within **the terms of agreement**.

Inform Your Instructor of Any Accommodations Needed

If you have a documented disability and verification from the [Office of Services to Students with Disabilities](#) (SSWD), and wish to discuss academic accommodations, please contact your instructor as soon as possible. It is the student's responsibility to provide documentation of disability to SSWD and meet with a SSWD counselor to request special accommodation *before* classes start.

SSWD is located in Lassen Hall 1008 and can be contacted by phone at (916) 278-6955 (Voice) (916) 278-7239 (TDD only) or via email at sswd@csus.edu.

Commit to Integrity

As a student in this course (and at this university) you are expected to maintain high degrees of professionalism, commitment to active learning and participation in this class and also integrity in your behavior in and out of the classroom.

Sac State's Academic Honesty Policy & Procedures

"The principles of truth and honesty are recognized as fundamental to a community of scholars and teachers. California State University, Sacramento expects that both faculty and students will honor these principles, and in so doing, will protect the integrity of academic work and student grades." Read more about Sac State's [Academic Honesty Policy & Procedures](#)

Definitions

At Sac State, "**cheating** is the act of obtaining or attempting to obtain credit for academic work through the use of any dishonest, deceptive, or fraudulent means."

"**Plagiarism** is a form of cheating. At Sac State, "plagiarism is the use of distinctive ideas or works belonging to another person without providing adequate acknowledgement of that person's contribution."

Source: Sacramento State University Library

Important Note: Any form of academic dishonesty, including cheating and plagiarism, may be reported to the office of student affairs.

Course policies are subject to change. It is the student's responsibility to check SacCT for corrections or updates to the syllabus. Any changes will be posted in SacCT.