

Tentative Syllabus – EEE 143

Part 1: Course Information

Instructor Information

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Course Description

Catalog Description:

EEE 143. Power System Laboratory. Simulation of three phase operations and transmission line operation including voltage regulation, efficiency of long lines, power system stability, voltage control and load-frequency control, load flow and optimal dispatch for simplified interconnected systems. **Prerequisite:** EEE 130, EEE 141, and (GWAR Certification before Fall 09, or WPJ score of 70+, or at least a C- in ENGL 109M/W). **Graded:** Graded Student. **Units:** 1.0

Tentative areas of concentration (subject to change)

Tentative areas will include selected topics from the following list:

- Measurement of Electrical Quantities in a Single-Phase Power Circuit.
- Measurements of Electrical Quantities in Three-Phase, Four-Wire Three-Wire systems with balanced and unbalanced loads.
- Measurements of Electrical Quantities in balanced symmetrical Three-Phase, Three-Wire Power Circuits Connected in Wye and Delta Configuration.
- Measuring Input and Output Voltages, Load Current and the Magnetic Coupling Angles of a Single-Phase Induction Voltage Regulator.
- Measurements on a Set of Two Machines Comprised of a Three-Phase Synchronous Motor and Three-Phase Frequency Doublers.
- Experiments With an Electric Utility Equipment Systems.
- Paralleling Two, Three-Phase Synchronous Generators in an Electric Power Plant.
- Measurements on an Isolated Synchronous Generator Under Different Loading Conditions.

- Operating Characteristics and use of a Large, DC Shunt-Excited Motor as the prime mover for a Synchronous Generator.
- Experiments with Electric Faults and Relay operations using the “Electric Utility Equipment System”.
- Paralleling Three-Phase Synchronous Generators in an Electric Power Plant with the “Infinite Bus” and Measurements of Real and Reactive Power Exchanges.

Prerequisite course (s);

- EEE 130 Graded.
- EEE 141 Graded.
- GEAR Certification before Fall 09, or WPJ score of 70+, or at least a C- in ENGL 109M/W

Prerequisite by Subject(s);

- Electrical circuits theory including three-phase electrical circuits and magnetically couple circuits.
- Synchronous generator and motor.
- Symmetrical components and application in power systems.
- Power distribution, including substation basic hardware.
- Voltage regulation and reactive power control.

Textbook & Course Materials

Recommended Textbook:

- Handouts printed by the instructor.

Other Recommended Texts & Reading Material

- Other readings may be made available in the course packet/Web site/SacCT environment

Part 2: Course Requirements

- *Safety (Please see below for safety guidelines)*
- *Attendance & Completion of Experiments*
- *Handwritten Lab Reports*
- *Quizzes (unscheduled)*
- *Scheduled Written Exams (2 Tests)*
- *Teamwork, Active participation and task sharing by all members*

Electrical Safety Guidelines

The hazards associated with the use of electricity include electrical shock and electrical fires caused by short circuits and/or overloaded circuits or wiring. Most incidents are results of unsafe work practices, improper use, and faulty equipment. Another factor taken into consideration is the lack of knowledge as well as the over confidence. Observing the following rules and safety procedures can significantly reduce the electrical hazards found in the laboratory:

1. Know the location of electrical panels and disconnect switches.
2. Do not overload circuits or wiring. Overloading can lead to overheated wires and arcing, which can cause fires, electrical shock, or injuries.
3. Inspect all equipment before use to ensure that no equipment is worn, twisted, frayed, etc. Any damaged equipment should be reported to the instructor or TA, and please "DO NOT!! Try to fix it!!"
4. All wiring work during the laboratory must be done on de-energized equipment and only after the main source of electric power has been disconnected.
5. Prior to closing the switch that energizes the equipment, all wiring work done during the laboratory must be checked by laboratory instructor or TA.
6. Again, "Do Not Energize" any equipment unless wiring work has been checked and approved by Instructor or TA.
7. Thick rubber shoes and insulated gloves should be worn when working on equipment at all times.
8. Avoid jewelry, and long hair should be wrapped in a ponytail or braided such that it does not interfere with or obscure the work area.
9. Rule number #1: Assume all equipment in the laboratory is "Energized". Do not touch anything without previous clearance from your lab instructor or TA, or ensuring that it is "DE-Energized".
10. In an electrical emergency, if a person received an electrical shock, do not touch the equipment, cord or person. Shut down the main power source and call 911.

Course Structure

Lectures, Lab Experiments, Unscheduled Quizzes, Scheduled examinations, active lab participation Possible Supplemental assignments.

Major Objectives of the course:

Provide students with concepts and hands on experience in:

- Electrical measuring: voltage, current, resistance, inductance, capacitance, real and reactive power in three-phase balanced and symmetrical systems serving balanced and unbalanced loads connected in wye or delta configuration (four wires and three wires)
- Working/testing of induction voltage regulator/phase shifter, synchronous motor dynamics including delta/wye loading and measuring parameters of a three-phase induction motor .
- Connecting generation, transmission, and loading on a scale down electric utility system simulator.
- Synchronizing two synchronous generators to a common bus and studying the behavior of a synchronous generator under variable loading conditions.
- Connecting a scale down model of a power transmission line and studying the behavior of the power line under variable loading.

Part 3: Tentative Topic Outline/Schedule

Week	Topic / Activity	Comments
1	Introduction, syllabus review, policies, and safety measures/gear requirement	
2	Lab#1 Measurement of electrical quantities in a single-Phase power circuit	
3	Lab#2 Measurements of electrical quantities in three-phase, 3 & 4 wire symmetrical and asymmetrical power circuits connected in Wye configuration	
4	Lab#3 Measurements of electrical quantities in three-phase, three-wire symmetrical and asymmetrical power circuits connected in Delta configuration	
5	Lab#4 Measurements of electrical quantities in an induction voltage regulator	

6	Lab#5 Energizing, loading, and de-energizing electric utility system machine set	
7	Test 1	It will be comprised of questions from previous 5 labs, lectures and pre-requisites
8	Lab#6 Measurements on a large synchronous generator under loading conditions	
9	Lab#7 Paralleling two three-phase synchronous generators in an electric power plant	
10	Lab#8 Paralleling Synchronous generator to infinite bus (utility)I	
11	Lab#9 Paralleling Synchronous generator to infinite bus (utility)Part II power flow analysis.	
12	Lab#10 Simulating a single-line-to-ground fault on electric utility system	
13	Test 2	It will be comprised of questions from all labs, lectures and pre-requisites
14	Make up lab week	

Note: Actual schedule may deviate from the above table

Part 4: Grading and Specific Policies-EEE 143

1 – 2 tests @ 25% each, No make ups 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 – Quizzes maybe given at prior to start of the lab sessions to promote timeliness 5% (total if given). No make ups

3 – Active participation, task sharing, and teamwork in wiring, checking, completion of experiment, clean up, and restoration of wires and portable equipment to proper locations. 10%.

Note: This is strictly as evaluated by the instructor and/or the TA when the experiments are in progress. For example, any team member (not only the leader) will be asked to trace and show the correctness of the wiring before energizing.

4 – Lab reports 40% (35% if there are quizzes). Each lab reports must be turned in at the beginning of the next lab session. Only one lab experiment maybe missed but must be completed on the “pre-scheduled” make up session.

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’ overall grade.

6 – No Lap Top usage, Web browsing, or text messaging is permitted during lectures, quizzes, experiments, 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 the 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 dis-enrolling 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.