
ECE 4120 Section 001
Electrical Machines Laboratory

Class Location: 203 Riggs Hall
Class Meeting Time: Wednesday, 9:30am – 10:45am

Lab Teaching Assistant: Joshua Smith
Email: jms6@clemson.edu
Office: Riggs 203
Office and Office Hours: By Appointment

Instructor of Record: Dr. Sukumar Brahma
Email: sbrahma@clemson.edu
Office: Riggs 303-C
Office Hours: By Appointment Only

Course Description

Selected experiments to familiarize students with characteristics of transformers, DC and AC motors and generators. Measurement techniques and component modeling are included.

Pre-Requisite or concurrent enrollment: MATH 4340 with a C or better
ECE 3600 or ECE 4190, each with a C or better

Course Objectives

This laboratory course operates in co-ordination with the companion lecture course, ECE 3600, Electric Power Engineering. This course will develop the techniques and understanding critical to practical applications of single and 3-phase power. The laboratory experiments include basic AC analysis, transformers, machines, and transmission lines. After taking this lab, the student should feel comfortable in design of experiments in these areas while maintaining a safe work space. The student will also learn how to effectively communicate experiment results in writing.

Required Materials

Text: Lab Manual – Download from Canvas

Topical Outline

<u>Week of</u>	<u>Laboratory #</u>	<u>Laboratory Description</u>
1/22	-	Introduction
1/29	1	Vectors and Phasors in Series and Parallel AC Circuits
2/5	2	Single Phase Transformer Connections
2/12	3	Three Phase Circuits
2/19	4	*Three Phase Transformer Connections
2/26	5	Synchronous Motor/Torque Measurement
3/4	6	The V-Curves of a Synchronous Motor
3/11	6	The V-Curves of a Synchronous Motor
3/18	-	Midterm Exam
3/25	7	*Synchronous Machine Reactance
4/1	8	Induction Motor Circuit Model
4/8	9	Torque-Speed Characteristics of an Induction Motor
4/15	10	DC Motors
4/22	-	Final Exam

* Indicates lab for which a formal IEEE report will be written

Grading

Scale

A – 90% - 100%
 B – 80 to < 90%
 C – 70 to < 80%
 D – 60 to < 70%
 F – < 60%

Distribution

Attendance	10%
Post labs	20%
Lab Reports (2)	30%
Exams (2)	40%

Course Grade	100%

Additional Policies

Attendance is mandatory. If you must miss a lab due to special circumstances, please contact the TA who will attempt to find another section of the lab to for you to attend to make up for the missed lab. If you cannot do so due to course conflicts then let the TA know, and another course of action will be decided upon. You will receive a score of 0 for any missed labs that are not completed before the final lab exam.

Lab Notebooks:

A lab notebook should be maintained for this lab by the student. While this will not be checked, it is expected that the student will have all of their results available for the duration of the semester. The last lab of the semester will include giving practical and written exam of the labs.

Post-Lab:

Experimental results and responses to post lab questions should be submitted on Canvas by midnight a week after the completion of each lab. Please submit the file as a PDF named "S18-ECE4120-<username>-PL<#>" (e.g., the filename for my first prelab would be "S19-ECE4120-jms6-PL1").

Lab Reports:

All students must follow the format provided in the sample report for all lab reports. Lab reports must be typed – including circuit diagrams, graphs, and equations. Lab reports must be submitted on Canvas by midnight 2 weeks after the completion of each lab. Please submit the file as a PDF named "S18-ECE4120-<username>-LR<#>" (e.g., the filename for my first lab report would be "S19-ECE4120-jms6-LR1").
Suggested Software: Microsoft Word, Microsoft Excel, Microsoft Visio, MathType

Late Assignments:

Late assignments will be penalized 10 points per day after the specified due date. Late points will be assessed utilizing the time stamp from your Canvas submission. If you experience technical difficulties with your submission, please notify the TA and attach your assignment.

Safety:

Due to the nature of the equipment used in this lab, extreme care must be taken to ensure the safety of the students and the instructor. **ALL CIRCUITS WILL BE VERIFIED BY THE INSTRUCTOR PRIOR TO ENERGIZING.** If you notice something unsafe, stop working immediately and notify the instructor. Your lab manual outlines the safety rules that should be followed for this class as well as what to do in a first aid situation. It is very important that you are familiar with these protocols.

Clemson Fire and EMS: (864) 656-2242
Student Health Services: (864) 656-2233

Disclaimer:

I reserve the right to modify this syllabus at any time should the need arise. Students will be notified prior to any changes.