

Proposed Course Syllabus

ELCT 753 – Electric Drives

Course Coordinator

Power & Energy Systems Group – EE Department, Graduate Program Committee

Catalog Description

Modeling of electric machines including induction, synchronous, and special machines for electrical drives, vector control and field orientation, power converters and controls.

Course delivery structure:

Lectures

Credit Hours: 3

Prerequisite(s) by course

Graduate standing

Prerequisite by topics

Electric machines

Required Textbooks and other materials

1. Vector Control and Dynamics of AC Drives, D. W. Novotny, T. A. Lipo, Oxford Science Publications, ISBN 978-0-19-856439-3.
2. Dynamic Simulation of Electric Machinery Using Matlab/Simulink, C-M Ong, Prentice Hall, ISBN 0-13-723785-5.
3. Class notes posted on Blackboard
4. Computer and internet access

Supplemental materials

Recommended: MATLAB/Simulink for homework and project submission
All readings/materials comply with copyright/fair use policies.

Learning Outcomes:

Students who successfully complete the course will be able to:

1. Learn about induction, synchronous, BLDC, and SRM machines.
2. Perform d-q modeling of induction machines.
3. Perform d-q modeling of synchronous machines.
4. Perform vector analysis and field orientation for induction and synchronous machines.
5. Develop controls for driving various electric machines.
6. Model electric machines and drives using Matlab/Simulink or other software.

Course Topics:

- Introduction to electric machines
- D-q modeling of electric machines
- Vector control of electric machines
- Field orientation of electric machines
- Field weakening operation
- Power converters for drives

Course Information

Instructor: Dr. Adel Nasiri

Class Location: 2A24 Swearingen

Class Meeting Time: MW 10:05 – 11:20 am ET

Lecture Type: Traditional

Office: Swearingen 3A32

Phone: 803-576-7796

E-mail: nasiri@sc.edu

Office hours: TuTh 9am – 10am ET or by appt

Graduate students are required to complete additional work. These students may have additional question(s) on homework assignments. Exams may have an additional question or a replacement question of higher difficulty. Class participation is expected by all students.

Class Requirements	All Undergraduates
Homework	25%
Quizzes	5% (bonus)
Midterm Exam	20%
Term Project	25%
Final Exam	30%

Approximate grading scheme is as follows:

Final Grade	Semester Average
A	90 – 100
B+	86 – 89
B	80 – 85
C+	76 – 79
C	70 – 75
D+	66 – 69
D	60 – 65
F	Below 60

Exam Dates:

Midterm Exam	Thursday, October 9 th
Final Exam	Tuesday, Dec. 9 - 9:00 am

Assignment Submissions

All assignments will be submitted to the appropriate Blackboard link by 11:55 pm ET on the due date.

Any handwritten assignments that are illegible will be returned without review. If you have poor handwriting, I recommend typing your assignment using LaTeX, Microsoft Word, or other word processor. All assignments should be submitted as PDFs in the following format:

LastName_FirstName_ELCT753_SEC_XXXX_YY.pdf

where SEC is your section number, XXXX is HMWK, PROJ, or EXAM, and YY is the homework number if needed.

Partial credit will be earned for the clear presentation of all the steps involved in solving all problems. Sketches should be included as necessary. Answers, including appropriate units, should be clearly identifiable.

Project Requirements

The project will consist of developing a model of electric machine or drive in Matlab/Simulink and analyzing. The project will be compiled into a 10-page PowerPoint presentation. Additional information will be provided at the time of assignment.

Course Communications

The instructor communicates with students using Blackboard announcement, Blackboard chat, Blackboard Collaborate tools. *Email is the least preferred method unless it is an individual matter.* Per student request, group, or individual online meetings, Q&A and consultation sessions can be arranged.

The instructor will return graded assignments within one week of submission and will respond to Blackboard discussion board messages within 24-48 hours.

Instructional Methods

The course will be taught using multiple instructional methods. These methods will include in class sessions, online lecture videos, YouTube videos, group projects, and video presentations.

Attendance Policy

Students are expected to attend each scheduled class meeting, to be on time, and to be prepared for each class session. Please DO NOT come to class late as it disturbs the class.

Make-up Policy

Make-up exams or assignments will only be allowed for students who have an excuse approved by the instructor before the due date, except in emergency situations. Acceptable reasons for delayed submissions include severe illness or immediate family emergencies. Make-up exam format and questions for excused absences may be different than the original exam.

Minimum Technology Requirements

Every EE class requires routine computer and online skills such as use of Blackboard Learning Management system (LMS), VPN, and composition of documents. In addition, this class has the following requirements:

- Students are encouraged to have laptops, tablets, or phones with internet access during every class session to access the above LMS and/or other tools used in the course.
- Students are expected to have sufficient skills and user credentials to download, install, and access the software required for the course: MATLAB/Simulink.
- Please contact your instructor or UTS if you need help with internet access setup, software installation or usage.

Graduate students must also have proficiency in:

- Literature searches through a research database (IEEE Xplore or UofSC library)

Academic integrity & responsibility

As a student of the University of South Carolina, you agree to comply with the University Code of Conduct (www.sc.edu/policies/ppm/staf626.pdf), Honor Code (www.sc.edu/policies/staf625.pdf), Carolinian Creed (www.sc.edu/policies/staf102.pdf), and all Other policies of the University of South Carolina.

You assume full responsibility for the content and integrity of the academic work you submit. The guiding principle of academic integrity shall be that your submitted work, examinations, reports, and projects must be that of your own work. Prohibited behaviors include plagiarism, cheating, falsification, and complicity. Lectures and course materials (which is inclusive of presentations, tests, exams, outlines, and lecture notes) may be protected by copyright. Homework solutions may be copyrighted by the publisher. You are encouraged to take notes and utilize course materials for your own educational purpose. However, you are not to reproduce or distribute this content without expressed written permission from the instructor. This includes sharing course materials to online social study sites like Chegg, CourseHero and other services. Students who publicly reproduce, distribute or modify course content may be in violation of the university's Honor Code's Complicity policy.

Deviation from these expectations will result in referral to the Office of Academic Integrity. Students found responsible for violating the Honor Code will be subject to non-academic penalties by the Office of Academic Integrity, as well as an academic penalties ranging from a zero on the assignment to a failing grade in the course.

When a student is uncertain as to whether his/her conduct would violate the Honor Code, it is the responsibility of the student to seek clarification from the instructor or the Office of Student Conduct and Academic Integrity www.sc.edu/academicintegrity

Mental health statement

If stress is impacting you or getting in the way of your ability to do your schoolwork, maintain relationships, eat, sleep, or enjoy yourself, please reach out to any of our mental health resources. Most of these services are offered at no cost as they are covered by the Student Health Services tuition fee. For all available mental health resources, check out [Student Health Services Mental Health](#) and the quick reference list below.

- Wellness Coaching can help you improve in areas related to emotional and physical wellbeing (e.g., sleep, resiliency, balanced eating and more) – schedule an appointment at (803) 777-6518 or on [MyHealthSpace](#).
- Access virtual self-help modules via [Therapy Assistance Online \(TAO\)](#) – see [TAO registration instructions](#).
- Access articles and videos on health and wellness topics on the Wellness Hub, thriveatcarolina.com, or by downloading the [CampusWell](#) app and searching for University of South Carolina.
- Counseling & Psychiatry offers individual and group counseling and psychiatric services – schedule an appointment at (803) 777-5223 or on [MyHealthSpace](#).
- Access the 24-hr Mental Health Support Line at (833) 664-2854
- Access an anonymous [mental health screening program](#).

Course accommodations

The University of South Carolina provides high-quality services to students with disabilities, and we encourage you to take advantage of them. Students with disabilities needing academic accommodations should: (1) Register with and provide documentation to the Student Disability Resource Center in Close-Hipp 102, and (2) Discuss with the instructor the type of academic or physical accommodations you need. Please do this as soon as possible. *All course materials are available in alternative format upon request*

Writing Center (<http://artsandsciences.sc.edu/write/university-writing-center>)

No matter what you choose to do after your college career, you can't escape spoken or written communication (emojis won't help you at work). The University Writing Center is an important resource you should use! It's open to help any UofSC student needing assistance with a writing project at any stage of development. The main Writing Center is in Byrnes 703.

University Library Resources (www.sc.edu/libraries)

- University Libraries has access to books, articles, subject specific resources, citation help, and more. If you are not sure where to start, please Ask a Librarian! Assistance is available at www.sc.edu/libraries/ask.
- Remember that if you use anything that is not your own writing or media (quotes from books, articles, interviews, websites, movies – everything) you must cite the source in IEEE format (<https://ieeeauthorcenter.ieee.org/wp-content/uploads/IEEE-Reference-Guide.pdf>).

Incomplete Grades

Incomplete grades will be granted only in accordance with university policy. A grade of 'I' (Incomplete) may be assigned if you are unable to complete some portion of the assigned course work because of an unanticipated illness, accident, work-related responsibility, family hardship or verified learning disability. An incomplete grade is not intended to give you additional time to complete course assignments or extra

credit unless there is indication that the specified circumstances prevented you from completing course assignments on time.

Deviations/Syllabus Clause & Contract (2 choices that you can modify)

This syllabus may be revised and adapted throughout the semester to better serve the needs of the class. The instructor may assign additional reading and assignments and alter the course calendar as necessary. Students will be notified of any changes to the syllabus via email.

Week	Date	Topic	Note
1	08/19/25	Introduction to SM, IM, and DC machines	
2	08/26/25	Introduction to SM, IM, and DC machines	HW#1 due date
3	09/02/25	d-q Modeling of Induction Machines	HW#2 due date
4	09/09/25	d-q Modeling of Salient SM	
5	09/16/25	Complex vector analysis of IM	HW#3 due date
6	09/23/25	Power Converters and SVM	HW#4 due date
7	09/30/25	Vector control and field orientation	
8	10/07/25	Midterm	
9	10/14/25	Vector control and field orientation	
10	10/21/25	Dynamics of vector control and field orientation	HW#5 due date
11	10/28/25	Dynamics of vector control and field orientation	HW#6 due date
12	11/04/25	Field weakening operation	
13	11/11/25	BLDC and SRM drives	HW#7 due date
14	11/18/25	Term Project Presentation	TP due date
15	11/25/25	Thanksgiving Break	
16	12/02/25	Review and preparations	
	12/09/25		Final exam