Advanced Topics in Power
ECE 925 - section 001
Fall 2019

Course Information

Instructor:	Dr. Shanelle N. Foster Office: 3212 Engineering Building Phone:(517) 432-4589 Email: hogansha@egr.msu.edu
Instructor's Office Hours:	Th 10:30 - 11:30 am, or by appointment
Course Schedule:	Days: M W Time: 3 - 4:20 pm Classroom: 004 Urban Planning & Landscape Architecture Building
Course Website:	D2L website: `https://d2l.msu.edu/`
Prerequisites:	Undergraduate courses in Electrical machines - Energy conversion Undergraduate courses in Control systems
Textbook:	Rik De Doncker, Duco W.J. Pulle & André Veltman *Advanced Electrical Drives: Analysis, Modeling, Control* Springer, 2011 *Electronic copy available*
Additional Resources:	A. Veltman, D.W.J. Pulle & R. W. De Doncker *Fundamentals of Electrical Drives* Springer, 2007 *Electronic copy available* Seung-Ki Sul *Control of Electric Machine Drive Systems* Wiley-IEEE Press, 2011 *Electronic copy available* Paul C. Krause, Oleg Wasynczuk & Scott D. Sudhoff *Analysis of Electric Machinery and Drive Systems* Wiley-IEEE Press, 2002 *Electronic copy available*

Course Description

Control of AC Drives - this course has students of various levels of knowledge and experience on the subject. Fundamentals will be taught to ensure a common starting point. It is expected that everyone will improve their level of knowledge and skills.

Course Objectives

At the completion of this course, each student should be able to do the following:

1. Model AC machines at various frames of reference. The purpose here is to prepare for the analysis of operation and design of controls and fault diagnosis methods.
2. Understand basic drive control schemes and implement them, at least in MATLAB. These will include versions of field orientation, direct torque control, etc.
3. Develop observers and study their stability and errors, as well as the effect of errors on the operation of the drive.
4. Understand, model and account for nonlinearities in the machine and the delays, deadtimes, protection, etc. in controllers and inverters.
5. Determine experimentally the characteristics of electrical machines, so that they can be used in the implementation of controllers.

Course Policies

Attendance Policy

Classroom attendance is expected for all students that appear on the official class list. Absence is *not* an excuse for anything. **Students are expected to know exactly what is discussed in class and assigned - homework, notes, study, or changes in schedule.**

E-Mail Policy

All e-mails to me regarding this course **MUST** start the subject with "**ECE925**". To request a meeting, please send an e-mail at least 24 hours in advance and suggest three days/times that are convenient for you.

Homework Policy

Homework assignments will be posted on the course website regularly, including their due dates. Postings of new assignments will be announced in class. You **must** submit your homework **before** class on the due date. *No late homework will be accepted.*

Homework should be clean, legible, self-contained and self-explanatory. Homework must be original copies in the students' own handwriting. The final answer of every question must be enclosed with a box/circle or highlighted for the question to be graded. All assumptions must be stated and thoughts outlined. Sequences of equations and results are not adequate for a grade. There is *no partial credit* given for problems not solved to the end. Work that is not legible or well explained will not be graded.

Homework is not designed to test. *Homework is meant to promote active learning and progress toward meeting the course objectives.*

Exam Policy

The 80-minute mid-term exam will be held in the classroom during the regularly scheduled class time. **There are *NO MAKEUP EXAMS.*** The exam is closed book and notes.

Grading Policy

Final grades for this course are earned based on your performance on projects, exams and homework. Points are distributed as shown below.

Homework	**Midterm Exam**	**Project**
25%	30%	45%

Grading is assigned using the straight scale shown below.

Score	$\geq 85\%$	$\geq 75\%$	$\geq 70\%$	$\geq 65\%$
Grade	4.0	3.5	3.0	2.5

Code of Ethics and Professional Conduct

Students are expected to adhere to the Spartan Code of Honor which states,

"As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do."

Important Dates

Monday, September 2	No class - Holiday
Wednesday, September 4	The last day to *add* this course.
Monday, September 23	The last day to *drop* this course with *no refund* and *no grade* reported.
Monday,October 21	Midterm Exam (*TENTATIVE - subject to change*)