ECE 3600

Introduction to AC Power Engineering
Fall 2022 Class Syllabus

Instructor: Arn Stolp
Office: MEB 2262
Phone: U of U: 581-4205
Only if it's important: Cell: (801) 657-7766 text 1st, start text with "ECE 3600"
E-mail: arnstolp@ece.utah.edu (I don't check my e-mail everyday, so let me know by some other method if you send me email that I need to read.) Subject should start with "ECE 3600". DO NOT use other email addresses.
Office hours: My "office hours" are the problem sessions at the end of class. Otherwise it's catch me if you can. To increase your chances, talk to me after class. I'm usually around between 12:20 a.m. & 2 p.m. T & Th. If I'm not in my office, check the lab.
DO NOT send messages via Canvas. I don't have the time to monitor them.

Web Site: http://www.ece.utah.edu/~ece3600/

Required and Recommended books and lab supplies:
Textbook: *Electrical Machinery and Power System Fundamentals*, by Stephen J. Chapman. International edition is cheaper and fine for this class.
Lab notebook (bound or spiral) and standard ECE lab supplies

Prerequisites: ECE 2210 or ECE 2240

Introduction:

Why do people care about electricity? Basically for two reasons-- information and energy. Computers, TVs, wireless devices, ipods and control systems all process, present, store and use information in the form of electrical signals. The circuits and theories behind these occupy the majority of your studies in Electrical Engineering. These circuits also require some energy to function (power supplies) and often need to control some energy to produce outputs (power amplifiers), both subjects for a power electronics class, not this class. Here we cover electrical energy in a more primal form– the energy that lights your house, washes your clothes and moves you up the ski lift, all of which is done with AC power.

This class will introduce you to AC power use and generation, AC and DC machines, and AC power systems. We will study single-phase and 3-phase power, power factors and corrections, transformers, synchronous and induction machines, DC motors, power transmission lines, and introduce the concepts used to analyze power flow and faults.

I teach will concepts and the use of those concepts to solve problems, not formulas and memorization. The hands-down easiest way get a good grade in this class is to learn the concepts.

This class consists of:

Lectures: T & Th 2:00 - 3:20 pm in WEB L103

Lectures set the direction and tone of the class and cover more than the written material. You will be held accountable for everything discussed in the lectures, so your attendance is important.

Problem Sessions: on zoom, time: TBA

I will use this time to work examples and to answer your questions in detail. I will not cover new material in the problem session times.

Textbook:

Electrical Machinery and Power System Fundamentals, by Stephen J. Chapman.

Handouts:

There will be a number of handouts for, homework, labs, notes, etc.. I may hand these out before class or may have to download them from the class web site; http://www.ece.utah.edu/~ece3600/.

Homework, homework, and more homework: 15%

I will assign a lot of homework, it will be your main study tool. As such, I'll give you all the numeric answers so that you can check your work immediately. In fact, you'll have to self-correct your homework. If you can't get the answer, check the web site for corrections, study some more, come to the problem session, ask for help, or see the posted solutions. Sometimes I even post solutions before the homework is due. So, you might ask, "Why is it handed in and 'graded'?". Well, to answer a question with a question, "Would you even do it otherwise?"

Your homework should be neat and clear and show all your work. For most problems the grader will simply check to see that you've done it and that your paper shows the necessary work to get the answer. Only a few problems will be checked in greater detail. You may collaborate with others to learn how to do the homework, but will need to hand in your own work. Copying or allowing another student to copy your work is considered cheating.

You will probably learn more from doing the homework than any other part of this class. If you thoroughly understand the homework, you will know what the class is about, and the exams should give you no trouble.

You will need to scan your homework, create a .pdf file, and turn that in on canvas by 11:59 pm of the due date. Solutions will be posted in my office window. Most graded material will be returned on Canvas.

Midterms: (300 exam pts) 43.75%

You will take three midterms throughout the semester. They will cover material up to the time of the test. These exams will be in two parts, a closed-book section where I may ask for items straight from the book or homework, and a cheat-sheet section where I will ask you to solve problems. The second section will be designed to see if you learned concepts and problem solving strategies and whether you can work with them, sometimes in new and different ways. Don't try to memorize formulas or specific problems. Exams also cover what you learn in the labs and field trips. Exams will be returned in class or to a file cabinet in MEB 2365. They will be an unlocked drawer and will **not be secure**. If you want your material returned to a locked location, simply remove your file and slip it under my office door.

Final: Friday, 12/16/22, 1:00 - 3:00+ pm (180 exam pts) 26.25%

The final will be comprehensive with greater emphasis on the most recent material. It will also be in two parts. There will be a zoom review session. Listen for details in class.

Labs: MEB 2365 15%

Lab will be held every other week. Many of the subjects covered in lab aren't covered anywhere else in class, so make sure you pay attention and read the lab instructions. You will have to keep a laboratory notebook as a requirement of the lab. Your lab TA will collect and grade these notebooks.

Labs are not optional. For each lab that you miss or fail (< 60% score), your final grade will suffer a half letter drop (5% of possible points). Be sure to make-up any labs you miss or fail.

Field Trips: scored as labs

I'm planning three field trips which will take place during lab time (approximately); Gadsby power plant, Rocky Mountain Power dispatch, and Terminal Substation. You will be responsible for your own transportation. If you cannot make a field trip you will have to make it up with some personal field investigation. Field trip reports will be graded with your labs. A missed field trip can also result in a 5% grade drop.

Grades:

Homework:	15%
Labs:	15%
Exams:	70%
Total:	100%
Failed lab:	-5%
Cheating:	-100%

% of total	Grade
> 93	A
90-93	A-
87-90	B+
83-87	B
80-83	B-
77-80	C+
73-77	C
70-73	C-
67-70	D+
63-67	D
60-63	D-
< 60	E

If you want any deviations from the normal requirements (say credit for labs, you've done before) you will need to see me before the work would normally be due and get an agreement *in writing*. You'll need to turn in your copy of the agreement with your final, so I'll remember to grade you properly.

Disclaimer:

All information provided here is subject to change due to external factors or unintended typos or errors.

ECE 3510

A. Stolp

Tentative

01/09/22

Fall 2022 COURSE SCHEDULE

Week		Date	lect	Topics	Bodson	Nise
1	T	08/23	1	Introduction to Feedback Systems, Block diagrams	1.1	1.1 - 6
				Transfer functions and signals, The Laplace transform of signals	2.1	2.1
				The Laplace transform, Relationship between pole locations and signal shapes	2.1	2.2
	T	08/30	3	Inverse of Laplace transforms using partial fraction expansions	2.2 - 3	2.2
	Th	09/01	4	Inverse of Laplace transforms, Properties of signals	3.1	2.2
3	M	09/06		Labor Day		
3	T	09/06	5	Transfer functions, Interconnected systems, Feedback system	3.1	2.3, 5.1,2
				Systems, Circuits, BIBO stability	3.2	2.4
				Responses to step inputs, % overshoot, effect of zeros	3.3	4.1 - 4.5
4	T	09/13	7	Responses to sinusoidal inputs, sinusoidal steady-state	3.4	4.6 - 8
				Effect of initial conditions, State-space advantages	3.5 - 6	3.5
				Electrical analogies of mechanical systems	notes	3.1 - 3
5	T	09/20		Exam 1		
	Th	09/20	9	Electrical analogies of mechanical systems	notes	2.5 - 9
6	T	09/27	10	Stability and Performance of Control Systems	4.1	6.1
				Control system characteristics	4.1	7.1
				Steady-state error and integral control	4.2	7.2 - 5
				Routh-Hurwitz stability test	4.3	6.2 - 5
7	T	10/04	12	Root-locus introduction, main rules RL1	4.4	8.1 - 5
				Root-locus main rules, examples fill in from screen	4.4	8.5 - 7
	S	10/08		Fall Break		
	Su	10/16				

Books: Bodson, Nise

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A. Stolp 8/22/22

Month	Week	Mon	Tue	Wed	Thur	Fri
Aug	1	22	23	24	25	26 Last day to add or drop simply
	2	29	30	31	1	2 Last day to reverse CR/NC
Sept	3	5 Labor Day	6	7	8	9
	4	12	13	14	15	16
	5	19	20	21	22 Exam 1	23
	6	26	27	28	29	30
Oct	7	3	4	5	6	7
		10 Fall break	11	12	13	14
	8	17	18	19	20	21 Last day to withdraw
	9	24	25 Exam 2	26	27	28
Nov (tue)	10	31	1	2	3	4
	11	7	8	9	10	11
	12	14	15	16	17 Exam 3	18
	13	21	22	23	24 Thanksgiving	25
	14	28	29	30	1	2 Last day to add or drop or elect CR/NC
Dec	15	5	6 ME Design Day in Union bldg (maybe)	7	8 Last Day of Classes	9 Reading Day
	16	12 Finals	13	14	15	16 ECE 3600, 1:00

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MERRILL ENGINEERING BUILDING (BLDG. 064)

SECOND FLOOR PLAN