

SYLLABUS

UNIT 1 (Weeks 1-5)

Learning Outcomes:

- Prove your Skills! (Refresher assignment: Proof of Skills)
- Apply Ohm's Law, KVL, KCL to reduce and analyze simple DC circuits
- Find Thevenin and Norton equivalencies of circuits
- Analyze circuits with multiple sources using superposition
- Determine the response of circuits containing Operational Amplifiers (inverting/non-inverting amps, summing/differential amps, comparators)

Day & Date	Powerpoint	Pre- Lecture Course Videos	Pre-recorded Full length Lectures & Level Up Problems	Topics and Activities	Preparation	Assignments/Labs		
				in Class	Reading	Class Problems	Assigned	Due
M 8/25								
W 8/28			Fall 2020 Introduction Lecture	Be ready to talk to your classmates!			Design Ideation	
R 8/29	LEC1	LEC1.1 LEC1.2	Passive Sign Convention KCL, KVL, Ohm's Law Level UP Problems	Course introduction, units, symbols and variables, ideal/practical sources and loads, power, Ohm's law	Chapter 1 & 2.1	CP01 CP01 Solution	HW1	LEC1
T 9/3 Monday Schedule	LEC2	LEC2.1 LEC2.2	WebEx Live KCL, KVL, Circuit Reduction, Nodal Set Up Problem Lecture	Kirchhoff's laws, equivalent circuits, circuit reduction, V/I dividers, electrical measurements	2.2 thru 2.6	CP02 CP02 solution Team Assignment 1	Proof of Skills Day 2	Proof of Skills Day 1 (online Gradescope)
W 9/4				Refresh, relearn, teach, or learn skills to be successful....			Proof of Skills Day 2 (cont.)	
R 9/5	LEC3	LEC3.1 LEC3.2	WebEx Live Super Day, Mesh Analysis, Super Node, Super Mesh, Superposition Lecture	KCL, KVL Node and Mesh Analysis, Linear systems and solutions	3.1, 3.2	CP03 CP03 solution Team Assignment 2	Proof of Skills Day 3	Proof of Skills Day 2 (online Gradescope)
M 9/9	LEC4	LEC4.1 LEC4.2	WebEx Live Dependent Sources and Bridge Circuits Lecture	Superposition, dependent sources	3.3, 4.1, 4.2	CP04 CP04 solution Team Assignment 3	HW2 Proof of Skills Day 3 (cont.)	HW 1
W 9/11			Alpha and Omega Lab Continuum Full Length	Refresh, relearn, teach, or learn skills to be successful....			Proof of Skills Day 4	Proof of Skills Day 3 (online Gradescope)

			Explanation (Fall 2020)					
R 9/12	LEC5	LEC5.1	WebEx Live Thevenin/Norton Lecture Thevenin Norton Mesh Nodal Dependent Source Level UP Problems	Bridge circuit, Thevenin/Norton equivalent sources, Maximum signal transfer, Interface circuit design	3.4, 3.5, 3.6	CP05 CP05 solution	Proof of Skills Day 4 (cont.)	
M 9/16	LEC5 (cont.)					CP05 (cont.)		Proof of Skills Day 4 (online Gradescope)
W 9/18				Alpha Lab Topic: Sensors and Decisions, Comparators and Voltage Dividers Omega Lab Topic: MS1 Planning		Alpha Lab 1 Omega Lab MS1 Planning Milestone 1 (MS1) Begin		Proof of Skills Check-In (Video)
R 9/19	LEC6	LEC6.1 LEC6.2	WebEx Live All Things Op Amp Lecture	Ideal Op-Amps, Op-Amp circuit analysis, Lab instrumentation, amplifiers, statistical analysis	4.3-4.6	CP06 CP06 solution	HW3	HW2
M 9/23	LEC6 (cont.)					CP06 (cont.) Team Assignment 4		
Tues 9/24								Omega Lab Project Plan Review
W 9/25				Alpha Lab Topic: Comparators and Voltage Dividers, Mathematical Operational Amplifiers, Voltage Dividers as a Component Omega Lab Topic: MS1 Doing (start with simulation and analysis THEN build)		Alpha Lab 1 Omega Lab MS1		
R 9/26	LEC7 LEC8	Exam Review LEC8.1 LEC8.2		Exam Review Starting Unit 2 Below!		CP07 CP08 CP08 solution	HW4	HW3
Monday 9/30	Exam 1			Exam 1 7-9 pm DCC 330				

UNIT 2 (Weeks 6-9)

Learning Outcomes:

- Calculate the transient response of circuits with capacitors and inductors
- Analyze the responses of RLC series and parallel circuits
- Analyze circuits with resistance, inductance, and capacitance in terms of impedance
- Find the time domain response of circuits using Laplace transforms

Day &	Powerpoint	Pre-Lecture Course Videos	Pre-recorded Full length Lectures & Level Up Problems	Topics and Activities	Preparation		Assignments Labs	
Date					Reading	Class Problems	Assigned	Due
M 9/30	LEC8	LEC 8.3 LEC 8.4	WebEx Live Dynamic Component and First Order Circuit Diff Eq.	Capacitor, Inductor, Differentiator, Integrator Op Amp Circuits	5.1-5.4, 6.1,6.2,6.4	CP08 CP08 solution		
9/30 7-9pm	Exam 1							
W 10/2				Alpha Lab Topic: Capacitance (C), Inductance (L), RC Circuits Omega Lab MS1 Presentation Day			Alpha Lab 2	Milestone 1 Check-Ins and PoC documents <i>are extended to next week due to Exam 1.</i> You're welcome 😊
R 10/3	LEC9	LEC 9.1 LEC 9.2	WebEx Live First Order Transient Circuits	RC Circuits (Natural Response) RC Circuits (Forced Response), RC/RL General Equation	7-1 thru 7-3	CP09 CP09 solution		
Mon 10/7	LEC9 (cont.)	LEC 9.1 LEC 9.2	WebEx Live First Order Transient Circuits	RC Circuits (Natural Response) RC Circuits (Forced Response), RC/RL General Equation	7-1 thru 7-3	CP09 CP09 solution		
W 10/9				Alpha Lab Topic: RC/RL Circuits, Thevenin			Omega Lab MS1 Project Presentation Day	Alpha Lab 1 Proof of Concept Document

				Omega Lab Topic: MS2 Begin			Omega Lab MS2 Planning Alpha Lab 2	Alpha Lab 1 Check-In Omega Lab Proof of Concept 1 Document MS1 LTSpice Schematic
R 10/10	LEC10 LEC11	LEC 10.1 LEC 11.1 LEC 11.2	WebEx Live RC Series Circuit with an Exponential Input WebEx Live 2 nd order Diff. Eq. Lecture		7.4-7.5 6-3	CP10 CP10 solution Team Assignment 5	HW5	HW4
Mon 10/14	Indigenous Peoples' Day	LEC 12.1 LEC 12.2	To stay ahead of the lecture, at least watch pre-lecture videos on your own time		9-1 thru 9- 4	CP12 CP12 solution		
T 10/15								Omega Lab MS1 Project Manual Deadline MS2 Project Plan
W 10/16				Alpha Lab Topic: RLC Circuits, 2 nd order step response				
R 10/17	LEC 12 LEC13	LEC 12.1 LEC 12.2 LEC 13.1 LEC 13.2	WebEx Live Laplace Transforms Intro, Pole Zero Diagrams, 2 nd Order Diff eq. Full Analysis (with initial conditions)	Partial Fraction Expansion, Simple Real Poles, Complex Conjugates	9-5, 9-6	CP12 CP12 solution CP13 CP13 solution Team Assignment 6	HW6	HW5

M 10/21	LEC14 LEC15	LEC 14.1 LEC 14.2 LEC 15.1	WebEx Live Laplace Initial Conditions (Spring 2020..skip intro!) Laplace and Initial condition Sources Level UP Problems	Complete System Response Zero Initial conditions, Non-Zero Initial conditions	9-6	CP14 CP14 solution CP15 CP15 solution Team Assignment 7		
W 10/23				Alpha Lab Topic: Other forced responses				Note* Proof of Skills Deadline for Essential Skills or you'll be encouraged to drop course (Drop deadline is 11/6!)
R 10/24	LEC16 Exam 2 Review LEC 17		Exam 2 Review Level UP Problems	Complete System Response, Non-Zero Initial conditions (cont.)		CP16 CP16 solution CP 17 CP17 solution	HW7	HW6
Monday 10/28	Exam 2			Exam 2 7- 9 pm DCC 330 Fully in- person				

UNIT 3 (WEEK 10-12)

Learning Outcomes:

Analyze AC circuits in the frequency domain

Find the AC steady-state responses of circuits with resistances, inductances, and capacitances in terms of impedance

Recognize and analyze RLC series and parallel resonant circuits

Understand power in AC circuits

Transformer Circuits

Day & Date	Powerpoint	Pre-Lecture Course Videos	Pre-recorded Full length Lectures & Level Up Problems	Topics and Activities in Class	Assignments		Assignments/Labs	
					Reading	Class Problems	Assigned	Due
M 10/28	For your Ideation today! LEC18	LEC18.1 LEC18.2	WebEx Live Phasor Lecture	Steady state, Complex Frequency, Impedance review	8.1-8.4, 10.1, 10.2, 11-1, 11-2	No CP	Design Ideation "Can you teach Diff Eq/ Laplace to my 7 year old?"	
7-9pm	Exam 2 DCC 330							
W 10/30				Alpha Lab Topic: Phasors, Complex Power Omega Lab Topic: MS3 Begin				Note* Proof of Skills Deadline for Essential Skills or you'll be encouraged to drop course (Drop deadline is 11/6!)
R 10/31	LEC19 LEC20.1	LEC19.1	WebEx Live Phasor +Unit 1 Lecture Phasor Level UP Problems	Sinusoids and Phasors AC circuit analysis (ladder networks) AC steady state measurements	10.3-10.6 8.5	CP19 CP19 Solution CP20 CP20 solution Team Assignment 8	HW 8	HW 7
M 11/4	LEC21	LEC21.1	WebEx Live Power Circuits Lecture	Kirchhoff's laws with Phasors Frequency dependence of circuits	Reread 8.1-8.4	CP21 CP21 solution Team Assignment 9		

			Power Circuits Level UP Problems					
W 11/6				Alpha Lab Topic: Complex Power Omega Lab Topic: MS3			Omega Lab MS2 Project Presentation Day Omega Lab MS3 Planning Alpha Lab 3	Alpha Lab 2 Proof of Concept Document Alpha Lab 2 Check-In Omega Lab Proof of Concept 2 Document Omega Lab 2 Check-In
R 11/7	LEC21	LEC21.2	WebEx Live Power Circuits (cont.) Transformers Background Lecture	Power Circuits Power factor correction	16.1-16-4	CP21 CP21 solution		
M 11/11	LEC22	LEC22.1 LEC22.2	WebEx Live Transformer Lecture Transformers Level UP Problems	Mutual Inductance Dot Convention Ideal Transformer	15.1-15.4	CP22 CP22 solution		
Tues 11/12								Omega Lab MS2 Project Manual Deadline Omega Lab Project Plan MS3 Review
W 11/13				Alpha Lab Topic: Transformers, Mutual Inductance				

				Omega Lab Topic: MS3				
R 11/14	LEC 24	LEC 24.1 LEC 24.2	Exam 3 Concept Review and Links to Level UP Problems WebEx Live First Order Filters	Exam 3 Review Unit 4 Begins! First Order filters		CP24 CP24 solution Team Assignme nt 10	HW9	HW8
M 11/18	LEC25	LEC25. 1	Filter Level UP Problems WebEx Live 2 nd Order Filters 1	2 nd Order Filters	12.1, 12.2	CP25 CP 25 solution Team Assignme nt 11		
W 11/20				Alpha Lab Topic: Transformers, Mutual Inductance Omega Lab Topic: MS3				
R 11/21	LEC26	LEC26. 1 (cont. from above)	WebEx Live Second Order Filters 2 Filter Design Level UP Problems	Resonance Series/Parallel resonance	12.5, 12.6, 14.1- 14.5	CP26 CP26 solution		HW8
M 11/25	No class, enjoy your break! Travel safely...							
Mon 12/2	Exam 3 AFTER Thanks- giving break			Exam 3 7-9 pm DCC 337 Fully in-person				

UNIT 4 (WEEK 13-15)

Learning Outcomes:

- Frequency response of circuits
- Build and design filters
- Understand Bode plots

Day & Date	Powerpoint	Pre-Lecture Course Videos	Pre-recorded Full length Lectures & Level Up Problems	Topics and Activities in Class	Preparation Reading	Class Problems	Assigned	Due
11/27-11/29 Thanksgiving Break!								
Mon 12/2	Exam 3			Exam 3 7-9 pm DCC 330 Fully in-person				
M 12/2	LEC26 LEC 27	LEC26.1 (cont. from above)	WebEx Live Second Order Filters 2 Filter Design Level UP Problems	Resonance Series/Parallel resonance	12.5, 12.6, 14.1-14.5	CP26 CP26 solution CP27 CP27 solution		
W 12/4				Alpha Lab topic: 1 st and 2 nd order filters Omega Lab topic: MS3			Omega Lab Milestone 3 Check-in Omega Lab MS3 Project Presentation Day	Alpha Lab 3 Proof of Concept Document Alpha Lab 3 Check-In Omega Lab 3 Proof of Concept Omega Milestone 3 Check-In
R 12/5	LEC26 LEC 27	LEC26.1 (cont. from above)	WebEx Live Second Order Filters 2 Filter Design Level UP Problems	Resonance Series/Parallel resonance	12.5, 12.6, 14.1-14.5	CP26 CP26 solution CP27 CP27 solution		

M 12/9	LEC 27 Bonus Lecture Active filter LEC28	Continued from above LEC28.1		Course Bonus: Special filters Butterworth Salen-Key		Team Assignment 12 (Bring Laptops!)	HW10 <i>Optional</i>	HW 9
W/R 12/11- 12/12	Reading days							
F 12/13								
Sunday 12/15	midnight							All Optimizations Due HW10 Due Metacognition Journal Due
Final				Final Exam TBD				