SYLLABUS

UNIT 1 (Classes 1-12)

Learning Outcomes:

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 &	Powerpoint	Course Videos	Topics and Activities	Preparation		Assignments/Labs	
Date			in Class	Reading	Class Problems	Assigned	Due
M 1/13	**LEC1**	**LEC1.1** **LEC1.2**	Course introduction, units, symbols and variables, ideal/practical sources and loads, power, Ohm's law	Chapter 1 & 2.1	**CP01** ***Design Ideation: NAE Grand Challenges!***	**HW1**	
W 1/15			Alpha Lab Topic: Ohm's law Resistance (series/parallel), Power, LTSpice introduction			**Alpha Lab 1** **Omega Lab MS1 Planning** **Omega Lab Milestone 1 Begin**	
R 1/16	**LEC2**	**LEC2.1** **LEC2.2**	Kirchhoff's laws, equivalent circuits, circuit reduction, V/I dividers, electrical measurements,	2.2 thru 2.6	**CP02** Team Assignment 1		
Monday 1/20	**No Class**						
Tues 1/21							**Omega Lab Project Plan MS1 Review**
W 1/22			Alpha Lab Topic: Analog Discovery and PSpice introduction, differential voltage measurements				
R 1/23	**LEC3**	**LEC3.1** **LEC3.2**	KCL, KVL Node and Mesh Analysis, Linear systems and solutions	3.1, 3.2	**CP03** Team Assignment 2 Design Ideation	**HW2**	**HW 1**
M 1/27	**LEC4**	**LEC4.1** **LEC4.2**	Superposition, dependent sources	3.3, 4.1, 4.2	**CP04** Team Assignment 3		

W 1/29			Alpha Lab Topic: Resistance bridges Thevenin/Norton equivalent sources, superposition, transistors			**Alpha Lab 2**	**Alpha Lab 1 Proof of Concept Document** **Omega Lab Proof of Concept 1 Document**
R 1/30	**LEC5**	**LEC5.1**	Bridge circuit, Thevenin/Norton equivalent sources, Maximum signal transfer, Interface circuit design	3.4, 3.5, 3.6	**CP05**		
M 2/3	**LEC6**	**LEC6.1** **LEC6.2**	Ideal Op-Amps, Op-Amp circuit analysis, Lab instrumentation, amplifiers, statistical analysis	4.3-4.6	**CP06**	**HW3**	**HW 2**
W 2/5			Alpha Lab Topic: Op-Amp circuit design, Comparators, Inverters, Summing Amplifiers				
R 2/6	**LEC7**		Exam Review	Review	**CP07** Team Assignment 4		
Tuesday 2/11	**Exam 1**		Exam 1 – 7- 9 pm Location **SAGE 3510**				

SYLLABUS

UNIT 2 (Classes 11-22)

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	Course	Topics and Activities	Preparation		Assignments Labs	
Date		Videos	in Class	Reading	Class Problems	Assigned	Due
M 2/10	**LEC8**	**LEC 8.1** **LEC 8.2** **LEC 8.3** **LEC 8.4**	Signals and Waveforms, Capacitance and Inductance	5.1-5.4, 6.1,6.2,6.4	**CP08**		
Tuesday 2/11	***Exam 1***		***Exam 1 – 7- 9 pm Location SAGE 3510***				
W 2/12			Alpha Lab Topic: Capacitance (C), Inductance (L) RC circuits			**Alpha Lab 3** Omega Lab Milestone 1 Checkoff Omega Lab MS1 Presentation Day	**Alpha Lab 2 Proof of Concept Document** **Omega Lab Proof of Concept 2 Document** **MS1 LTSpice Schematic**
R 2/13	**LEC9**	**LEC 9.1** **LEC 9.2**	RC circuits, RL Circuits 1st order step response (general) Switched 1st order circuits	7-1 thru 7-3	**CP09**	**HW4**	**HW3**
Tues (Mon schedule) 2/18	**LEC10**	**LEC 10.1**	Switched 1st order circuits (review), 1st order sinusoidal circuit response,	7.4-7.5	**CP10** Team Assignment 5		**Omega Lab MS1 Project Manual Last Deadline Due Date** **Omega Lab MS2 Project Plan Review**

W 2/19			Alpha Lab Topic:RL/RC Circuits Thevenin			**Omega Lab MS2 Begin**	
R 2/20	**LEC11**	**LEC 11.1** **LEC 11.2**	2nd order series RLC circuits 2nd order systems & transients	6-3	**CP11**	**HW5**	**HW4**
M 2/24	**LEC12**	**LEC 12.1** **LEC 12.2**	2nd order series RLC circuit response Basic Laplace transform properties and pairs	9-1 thru 9-4	**CP12** Team Assignment 6		
W 2/26			Alpha Lab Topic: RLC circuits 2nd order step response			**Alpha Lab 4**	**Alpha Lab 3 Proof of Concept Document** **Omega Lab Proof of Concept 3 Document**
R 2/27	**LEC13**	**LEC 13.1** **LEC 13.2**	Pole-zero diagrams, Partial fraction expansion, Laplace transform inversion, Special cases	9-5, 9-6	**CP13**		
M 3/2	**LEC14**	**LEC 14.1** **LEC 14.2**	Complete system response	9-6	**CP14** Team Assignment 7		
W 3/4			Alpha Lab Topic: Other Forced Responses				
R 3/5	**LEC15**	**LEC 15.1**	Initial and final value properties Laplace transforms with initial conditions Laplace using impedances		**CP15** **Design Ideation**	**HW6**	**HW5**
3/9-3/13 **Spring Break!**							
M 3/16	**LEC16**	**See Lec 15.1**	Total Circuit solutions	9-6	**CP16**		
W 3/18			Alpha Lab Topic: Optional lab catch up or get ahead day....			**Optional Lab**	
R 3/19	**LEC17**	**LEC 17**	**Exam 2 Review**		**CP17**		

Tuesday 3/24		EXAM 2, 7-9pm, Location SAGE 3510					

SYLLABUS

UNIT 3

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	Course Videos	Topics and Activities in Class	Assignments		Assignments/Labs	
				Reading	Class Problems	Assigned	Due
M 3/23	**LEC18**	**LEC18.1** **LEC18.2**	Steady state, Complex Frequency, Impedance review	8.1-8.4, 10.1, 10.2, 11-1, 11-2			
Tuesday 3/24	***Exam 2***		***EXAM 2, 7-9pm, Location SAGE 3510***				
W 3/25			GM Day! Optional Lab				
R 3/26	**LEC19**	**LEC19.1**	Sinusoids and Phasors AC circuit analysis (ladder networks) AC steady state measurements	10.3-10.6 8.5	**CP19** Team Assignment 8	**HW 7**	**HW 6**
M 3/30	**LEC20**	**LEC20.1**	Kirchhoff's laws with Phasors Frequency dependence of circuits	Reread 8.1-8.4	**CP20** Team Assignment 9		
W 4/1			Alpha Lab Topic: Phasors RC and RL circuits			Alpha **Lab 5** Omega Lab Milestone 2 Checkoff Omega Lab MS2 Presentation Day	**Alpha Lab 4 Proof of Concept Document** **Omega Lab Proof of Concept 4 Document** **MS2 LTSpice Schematic**
R 4/2	**LEC21**	**LEC21.1** **LEC21.2**	Power Circuits Power factor correction	16.1-16-4	**CP21**		

M 4/6	**LEC22**	**LEC22.1** **LEC22.2**	Mutual Inductance Dot Convention Ideal Transformer	15.1-15.4	**CP22** Team Assignment 9	**HW 8**	**HW 7**
Tues 4/7						**Omega Lab MS3 Planning Begin**	**Omega Lab Project Manual Deadline** **Omega Lab MS3 Project Plan Review**
W 4/8			Alpha Lab Topic: Transformers, Mutual Inductance				
R 4/9			Exam 3 Review				
Tuesday 4/14			**EXAM 3, 7-9 pm, SAGE 3510**				

SYLLABUS

UNIT 4

Learning Outcomes:

Frequency response of circuits
Build and design filters
Understand Bode plots

Day & Date	Powerpoint	Course Videos	Topics and Activities in Class	Preparation: Reading	Preparation: Class Problems	Assignments/Labs: Assigned	Assignments/Labs: Due
M 4/13	**LEC24**	**LEC24.1** **LEC24.2**	Frequency response 1st order filters revisited	12.1, 12.2	**CP24**	**HW 9**	**HW 8**
Tuesday 4/14			***EXAM 3, 7-9 pm, SAGE 3510***				
W 4/15			Alpha Lab Topic: 1st order filters			**Alpha Lab 6**	**Alpha Lab 5 Proof of Concept Document** **Omega Lab Proof of Concept 5 Document**
R 4/16	**LEC25** **Bode**	**LEC25.1**	Resonance Series/Parallel resonance **Bode m-file**	12.3, 12.4	**CP25** Team Assignment 11		
M 4/20	**Lec26**	**Continued from above**	Bode diagrams	12.5, 12.6	**CP26**		
W 4/22			Alpha Lab Topic: 2nd order filters				
R 4/23	**LEC27**	**LEC27.1**	Design problems	14.1-14.5	**CP27** Team Assignment 12 (Bring Laptops!)	**HW10 Extra Credit**	**HW 9**
M 4/27	**LEC28** Review	**LEC28.1**	Course Review Special filters Butterworth Salen-Key				
							Omega

W 4/29						Omega Lab Milestone 3 Checkoff Omega Lab MS3 Presentation Day	**Lab Proof of Concept 6 Document** **MS3 LTSpice Schematic**
Saturday 5/2							HW 10 and **Alpha Lab 6 Proof of Concept Document** due **Omega Lab Project Manual MS3 Last Deadline Due Date**5/2 midnight
Final			**Final Exam** **TBD**				