Dordt College Engineering Department
EGR 220, Linear Circuits and Electronics

Fall 2008 Syllabus

2008-09 Catalog Data:	**EGR 220 Linear Circuits and Electronics (4 credit hours)** (Fall) Assumes a prerequisite knowledge of DC electrical circuits including the definitions of electrical quantities, circuit elements (sources, resistors, capacitors, inductors), understanding of Kirchhoff's laws and basic concepts in AC circuits such as frequency and phase. Topics in this course include general linear circuit analysis including Norton's and Thevenin's theorems, superposition, nodal and loop analysis, natural and forced responses in RLC circuits, and sinusoidal steady state analysis. The course also gives introductions to operational amplifier circuits, single stage BJT and FET transistor circuits and steady-state balanced 3-phase power calculations. The lab includes a formal design project. Prerequisite: one of Engineering 104 or Physics 116 or 202. Corequisite: Mathematics 204. [Cross listed: Physics 206]
Textbook:	Dorf and Svoboda, *Introduction to Electric Circuits*, 6th ed., Wiley, 2004 (ISBN 0-471-44795-1).
References:	Horowitz and Hill, *The Art of Electronics*, 3rd ed., Cambridge University Press. Edminister, Joseph, *Schaum's Outlines—Electric Circuits*
Instructor:	Douglas De Boer
Course Objectives and Outcomes:	*Creational Structure*: Students will understand electrical theory to the extent that they will be able to apply systematic techniques of linear circuit analysis as described in the college catalog. This means that students will be able to represent a circuit via a well labeled schematic drawing, derive appropriate equations from the schematic, and know how to solve those equations. This will be the main goal of this course. Additional goals are listed below. *Creational Development*: Students will be able to recount several of the important historical contributions in the development of the modern techniques of circuit analysis. This includes knowledge of the names of some of the persons who made these important contributions. *Contemporary Response*: Students will write on how the technical subjects of this course have been applied in culture. *Religious Orientation*: Students will write on the worldview or religious motivations of one of the key contributors to the field of linear circuit analysis or a related field.
Prerequisites by topic:	Calculus including techniques of integration, sequences, and series. DC electrical circuits including the definitions of electrical quantities, circuit elements (sources, resistors, capacitors, inductors), understanding of Kirchhoff's laws. Basic concepts in AC circuits such as frequency and phase.
Laboratory:	The laboratory session meets for 3-hours each week. The first six weeks are used to cover basic instrumentation including measurement uncertainties and loading effects. Three of the first six weeks are devoted to a design project. Two weeks are devoted to transients in first and second-order circuits. Six weeks are devoted to miscellaneous topics: operational amplifiers, circuit simulation, diodes and rectifiers, single transistor circuits, etc..
Computer use:	Orcad-Pspice is used for circuit simulation. Students are encouraged (but not required) to use programs such as Mathcad or Matlab for homework solutions when appropriate.
Means of Evaluation:	Homework (10%), Two Tests (25% each), One Formal Laboratory Report (8 %), One Research paper (7%), Final Exam (25%)

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EGR 220, Linear Circuits and Electronics, Course Outline

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Dates			Class	Laboratory (Mon, Tu.)	
	8/27	8/29	Introduction, basic definitions, circuit elements *Text: Chapters 1–2*		(no lab this week)
9/01	9/03	9/05	Meters, Dependent Sources, Switches, KVL, KCL *Text: Chapters 2–3*	1.)	Safety and introduction to the instrumentation
9/08	9/10	9/12	Nodal and mesh analysis including handling of supernodes and supermeshes *Text: Chapter 4 emphasis on sections 4-4, 4-5, 4-7, omit section 4-9*	2.)	Uncertainty, Tolerances, and Loading Effects
9/15	9/17	9/19	Circuit Theorems: Superposition, Thevenin's, *Text: Chapter 5 through section 5-5*	3.)	Introduction to the oscilloscope and signal generator
9/22	9/24	9/26	Circuit Theorems: Norton's, Maximum Power Transfer *Text: Chapter 5, section 5-6 to the end.*	4.)	Introduction to circuit simulation
9/29	10/01		Operational amplifiers. *Text: Chapter 6*	5.)	Project (1st of 3 weeks)
(no class Friday, 10/03)			Test on Wednesday		
Wed, 10/01 Test					
10/06	10/08	10/10	Capacitors and inductors. *Text: Chapter 7.*		Project (2nd of 3 weeks)
10/13	10/15	10/17	Capacitors and inductors.		Project (3rd of 3 weeks)
10/20	10/22	10/24	First order circuits. *Text Chapter 8*	6.)	Op amps
10/27	10/29	10/31	Second order circuits. *Text Chapter 9* Test on Wednesday, covers through Chapter 7	7.)	RL and RC circuits, step and pulse responses
11/03	11/05	11/07	Sinusoidal Steady State Test on Wednesday	8.)	RLC circuits
Wed, 11/05 Test					
11/10	11/12	11/14	Sinusoidal steady-state analysis. *Text Chapter 10*	9.)	Diodes and Rectifiers
11/17	11/19	11/21	Diodes and Transistors *Handout*	10.)	Sinusoidal Steady-State and Phasors
11/24			Introduction to AC steady-state power, *Text Chapter 11.*	11.)	Transistors
(no class 11/26, 11/28)					
	12/03	12/05	AC steady-state power, transformers, diodes, rectifier circuits. *Text Chapter 11.*		(no lab this week)
(no class 12/1)					
12/08	12/10		Three-Phase circuits. *Text Chapter 12.*	12.)	Common Emitter Amplifier
(no class Fri., 12/12)					
Monday, 12/15			Final exam, 10:30 a.m. – 12:30 p.m.		

Note: Schedule may vary by up to two weeks in order to accommodate the dynamics of this particular cohort of students.