Dordt College Engineering Department
EGR 322, Electronics I

Fall 2014 Syllabus

2011-12 Catalog Data:	**EGR 322 Electronics I (4 credit hours)** (Fall) A study of the flow of electricity in, and applications of semiconductor devices. Topics include basic signals and amplifier characteristics, operational amplifiers models and applications, diodes and applications, field effect transistors, bipolar junction transistors, and methods of amplification with single-transistor circuits. The laboratory includes a number of short design problems. Prerequisite: EGR 220.
Textbook:	Sedra and Smith, *Microelectronic Circuits*, 6th ed., Oxford University Press, 2010. (ISBN 978-0-19-532303-0)
References:	Horowitz and Hill, *The Art of Electronics*, 3rd ed., Cambridge University Press. Tuinenga, Paul W., *SPCE: A Guide to Circuit Analysis and Simulation Using Pspice*, 3rd edition, Prentice Hall, 1995.
Instructor:	Douglas De Boer
Course Objectives and Outcomes:	*Creational Structure*: Students will understand elementary semiconductor device physics at the level of equations which model the terminal characteristics of diodes and transistors. This means that students will be able to represent a diode or transistor 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 apply several design techniques for stabilizing bias levels. They will understand tradeoffs involved in choosing a bias technique. They will understand a historical perspective of how these techniques have improved over time.
Prerequisites by topic:	Calculus including techniques of integration, sequences, and series. Differential Equations. Linear circuit analysis including network theorems, first and second-order circuits, concepts in AC circuits such as frequency and phase, sinusoidal analysis and phasors. Corequisite: Linear systems theory including Laplace Transforms.
Laboratory:	The laboratory session meets for 3-hours each week. See the schedule on the next page for more detail.
Computer use:	Orcad-Pspice is supported for circuit simulation. Students are encouraged (but not required) to use programs such as Mathcad or Matlab for homework solutions when appropriate, especially for making graphs. Most assignments and handouts are available via Dordt's course management system, https://dordt.instructure.com.
Academic Integrity:	Students must do their own work. This course is subject to the College's policies on academic integrity. (http://www.dordt.edu/campus_life/student_handbook/generial information.shtml#academic_integrity.) Also see the homework standards posted on the course web page.
Accommodations:	Students who require assistance or accommodations based on the impact of a documented disability must contact Marliss Van Der Zwaag, the Coordinator of Services for Students with Disabilities to access accommodations. Telephone 722-6490, e-mail Marliss.VanDerZwaag@dordt.edu
Means of Evaluation:	Homework (10%), Two Tests (25% each), Formal Laboratory Reports (15 %), Final Exam (25%)

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EGR 322, Electronics I, Course Outline

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Dates			Class	Laboratory (Friday)
	8/27	8/29	Introduction & review of linear circuits *Text: Chapters 1*	1.) Transient simulations using PSpice
9/01	9/03	9/05	Models for amplifiers, signal sources, frequency response. *Text: Chapters 1*	2.) Op-amps—directed lab.
9/08	9/10	9/12	Operational amplifiers, slew rate, saturation *Text: Chapter 2*	3.) Transformers
9/15	9/17	9/19	Diodes: Terminal characteristics and normal modes *Text: Chapters 3 and 4*	4.) Diodes—directed lab.
9/22	9/24	9/26	Diodes: Rectifier Circuits *Text: Chapter 4*	5.) Power Supply Project (1st of 2 weeks)
9/29	10/01		Diodes Limiters, Clampers, and special-purpose diodes *Text: Chapter 4*	(no lab this week)
(no class Friday, 10/03)				
10/6	10/8	10/10	MOSFETs: Device structures and terminal characteristics. *Text: Chapter 5*	P.S. Project (2nd of 2 weeks)
10/13	10/15	10/17	MOSFET's: Terminal Characteristics *Text: Chapter 5*	6.) MOSFET characteristics
Friday, 10/17 Test			**Test on Friday**	
10/20	10/22	10/25	MOSFET's: Amplifiers and Bias techniques *Text: Chapter 5*	7.) MOSFET amplifiers (1st of 2 weeks)
10/27	10/29	10/31	MOSFET's: Amplifiers and Bias techniques *Text: Chapter 5*	MOSFET amplifiers (1st of 2 weeks)
11/03	11/05	11/07	The concept of small-signal analysis. *Text: Chapter 5*	8.) MOSFET logic gates
11/10	11/12	11/14	MOSFET's: Applications of small signal analysis	9.) MOSFET project (1st of 4 weeks)
11/17	11/19	11/21	BJT's: Device structures and terminal characteristics *Text: Chapter 6*	MOSFET project (2nd of 4 weeks)
Friday, 11/21 Test			**Test on Friday**	
11/24 (no class 11/26, 11/28)			BJT's: Amplifiers and biasing techniques *Text Chapter 6*	MOSFET project (3rd of 4 weeks)
(no class 12/1)	12/3	12/5	BJT's: Small-signal models *Text Chapter 6*	MOSFET project (4th of 4 weeks)
12/8 (no class Friday, 12/12)	12/10		Catch-up and review	(no lab this week)
Tuesday, 12/16			Final exam, 8:00 – 10:00 a.m.	

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