

ECE-321 Electronics I

1. **Course number and name:** ECE-321 Electronics I
2. **Credits:** 5, **Contact hours:** 4 per week (lecture) plus 2 per week (lab).
3. **Instructor:** Dan Ewert and Jacob Glower
4. **Textbook:** *Microelectronic Circuit Design* by Richard Jaeger and Travis Blalock.

5. **Specific course information:**
 - a. **Catalog description:** Characterization and modeling of diodes, BJTs, and FETs. Biasing of transistors. Analysis of transistor amplifiers. Frequency response. Feedback amplifiers. Op amps. Power supplies. BJT and MOS logic gates. 4 one-hour lectures, 1 two-hour laboratory. Coreq: ECE 311. F, S.
 - b. **Prerequisite:** ECE 321 requires ECE 311 as a co-requisite and students must be EE or CompE majors.
 - c. **Corequisite:** ECE 311 Circuits II
 - d. This course is “**required**”.

6. **Specific goals:**
 - Explain what a p-type and n-type semiconductor is and how charge is carried in a semiconductor.
 - Solve coupled nonlinear equations using numerical and graphical (load-line) techniques (G)
 - Analyze and design circuits using a diode (A,B,C,E,K)
 - Analyze and design circuits using a transistor as a switch and as an amplifier (A,B,C,E,K)
 - Analyze and design circuits using a MOSFET as a switch and as an amplifier (A,B,C,E,K)
 - Analyze and design circuits using an operational amplifier as an amplifier and filter (A,B,C,E,K).

Brief list of topics to be covered

Week	Topics
1	Introduction, MATLAB, SciLab, VisSim, Phoenix visit – Solving $f(x) = 0$
2	Lab Safety, O-Scopes, & Volt Meters, Semiconductors, PN Junction
3	Diode VI Characteristics, Ideal Diode Circuit Models, Light Emitting Diodes (LEDs), Diode Circuits: Clipper, Clamper
4	Diode Circuits: Max / Min AC to DC Converters

	DC to DC Converters Transistor Theory
5	Test #1 Presentations Using a Transistor as a Switch (saturated mode) H-Bridge
6	DC to AC Converters Semiconductor Relay Transistors in Active Mode: Common Emitter Amplifiers
7	CB, CC Amplifiers Multi-Stage Amplifiers Frequency Response of CE Amplifiers
8	Push-Pull Amplifiers Boolean Logic DTL Logic TTL Logic
9	Test #2 - Presentations MOSFETS & Multi-Transistor Circuits: MOSFET Theory JFET Theory
	SPRING BREAK (no classes)
10	MOSFET used as a switch MOSFET amplifiers CMOS Logic
11	Transistor Differential Amplifier Inverting Amplifiers Instrumentation Amplifiers Comparitors & Schmitt Triggers
12	Envelope Detectors, Single Sided Amplifiers Current Amplifiers, Current Mirror Adders, Multiplies, log, exp
13	Phasors Filters: Gain and Phase Poles, zeros, and Frequency Response
14	Active Filters Butteworth, Chebychev, Elliptic Filters RC Oscillators 555 Timers
15	More on 555 Timers
16	Term Projects and Presentations
17	Final Exam 8:00-10:00am, May 8th