ECE 248: Introduction to Semiconductor Devices and Circuits

Instructor: Prof. Takashi Buma  
Office: Steinmetz 209  
Phone: x6334  
Email: bumat@union.edu  
Website: http://minerva.union.edu/bumat  

Course calendar and Syllabus (subject to change):

Week 1: Diode basics, Voltage clamps, Circuit simulation  
Flyback diode, diode properties  
No Lab

Week 2: Half-wave, full-wave, and bridge rectifiers  
Zeners, LEDs  
Lab 1: Fun with Diodes (battery back-up, flyback diode)

Week 3: Basic semiconductor physics  
BJT basic rules, active/saturated/cut-off modes  
Lab 2: DC Power Supplies (full-wave rectifier, LM317 adj regulator)

Week 4:  
EXAM #1  
Common emitter amplifier (biasing, small signal gain)  
Lab Exam #1

Week 5: Input and Output Impedance  
Emitter follower (DC and AC), Darlington  
Lab 3: Common Emitter Amplifier (LED driver, emitter degeneration, emitter bypass capacitor)

Week 6: Multistage amplifiers, swamped common emitter  
Saturation vs Cut-off, maximum undistorted output  
Lab 4: Emitter Follower (Zener Follower + DC motor, Darlington Follower + Speaker)

Week 7: BJT switches (analysis and design)  
Relays, flyback diode, BJT basic physics  
Lab 5: Water Sensor (two wires + Darlington LED switch) SOLDERING LAB 😊

Week 8:  
EXAM #2  
MOSFET switches, H-bridges, DC-DC converter intro, buck converter  
Lab 6: BJT Switches and Inductive Loads (relay controller, PWM for open-loop DC motor control)

Week 9: MOSFET basic physics (ohmic vs active region, field effect)  
Low frequency response  
Lab 7: MOSFET Switches (photocell switch, buck converter)

Week 10: High frequency response  
Final Exam Review  
No Lab