

## ECE 331 ELECTRONICS I

Type (check one):                      Required:      X                        Elective:              

**2005-2006 Catalog Data:**                      ECE 331. Electronics I. (Formerly EE 331) Properties of semiconductors. PN-junction diodes: theory, models, and circuit applications. Operation and characteristics of bipolar junction and field effect transistors. Analysis and design of transistor bias circuits. Low frequency transistor models. Analysis and design of single stage amplifiers. Introduction to the operational amplifier and some of its applications. Introduction to frequency response of amplifiers. Introduction to oscillation. Prerequisite: ECE 221. Offered in the Fall semester. *One semester; three credits.*

**Prerequisites:**                                      ECE 221

**Co-Requisites:**                                    None required; ECE 341 recommended.

**Textbook:**                                         *Electronic Circuit Analysis and Design*, Second Edition, Donald A. Neamen, McGraw-Hill, 2001.

**Other Required Materials:**                    Familiarity with PSPICE software

**Other References:**                              None

**Instructor:**                                        Dr. Robert L. Drake

**Course Objectives:**                            Prepare students for analysis and design of electronic single-stage amplifiers, power supplies, and oscillators using diodes, bipolar junction transistors, field effect transistors, and operational amplifiers.

**Prerequisites by Topics:**                      Kirchoff's laws, nodal and mesh analysis, Thevenin's theorem; dc, sinusoidal, and transient analysis.

**Topics:**    1. Solid state circuit models  
    2. Components of the design process  
    3. Ideal operational amplifiers  
    4. Semiconductor diodes  
    5. Bipolar junction transistors and field effect transistors  
    6. Bias stability of BJT amplifiers, MOSFETS.  
    7. BJT and MOSFET amplifiers  
    8. Power amplifiers and power supplies  
    9. Introduction to oscillation and oscillators  
    10. Introduction to frequency response of amplifiers

**Class Schedule:**                                Three 50-minute sessions per week

**Prepared by:**    Robert L. Drake, Ph.D., P.E.                      **Date:**    August 2005

**Professional Component:  
ECE 331 ELECTRONICS I**

Category (check one)	<input type="checkbox"/> Math/Basic Science <input checked="" type="checkbox"/> Engineering <input type="checkbox"/> General Education <input type="checkbox"/> Other
Design (check one)	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Some <input type="checkbox"/> None
Realistic Constraints (check all that apply)	<input type="checkbox"/> Economic <input type="checkbox"/> Environmental <input type="checkbox"/> Sustainability <input type="checkbox"/> Manufacturability <input type="checkbox"/> Ethical <input type="checkbox"/> Health & Safety <input type="checkbox"/> Social <input type="checkbox"/> Political

**Relationship to Program Outcomes:**

Check all that apply:

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a recognition of the need for and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice