**Electronic Circuits (55:041)**
**(Required: Electrical Engineering Track)**

**Catalog Description:**
Design and analysis of FET and BJT amplifiers; low, midrange, high-frequency analysis; difference amplifiers; feedback amplifiers; SPICE simulation; power amplifiers; digital logic families.

**Pre(co)requisites:**
55:040 [P] and 57:018 [P]

**Textbook:**
D.A. Neamen, *Microelectronics,* 3rd Edition, McGraw-Hill, 2007

**References:**
Various materials on class web site

**Topics (Classes):**
1. Bipolar junction transistors (7 classes)
2. Computer aided design using SPICE (2 classes)
3. Transistor amplifiers (9 classes)
4. Frequency response (8 classes)
5. IC biasing (6 classes)
6. Feedback amplifiers (7 classes)
7. Filters (3 classes)
8. Power amplifier principles (4 classes)
9. Examination (3 classes)

**Laboratory Projects:**
Six Laboratory exercises using the Elvis National Instruments Educational Laboratory Virtual Instrumentation Suite (NI-ELVIS)

**Class/Laboratory Schedule**:
Three 50-minute lectures per week; six scheduled 3-hour lab sessions; additional open lab time as required to complete experiments

**Writing Assignments and Oral Presentations:**
Students write prelab designs, and then submit formal reports after the experiment is completed

**Design Component:**
Each lab experiment involves designing a circuit to satisfy given specifications. Four experiments involve designing a circuit to satisfy given specifications. Resultant data are analyzed and explained using theory learned in class.

**Contribution to the Requirements of Criterion 5:**
Engineering topics: 4 s.h.

**Course Goals: Basis for Assessment and Mapping onto Outcomes**

| Course Goal | Basis For Goal Assessment | Supports ABET Outcomes |
|---|---|---|
| 1. They will have the ability to apply knowledge of mathematics, science and engineering in their chosen fields. | Students complete many homework assignments that require application of mathematical and scientific principles. | a(●) |
| 2. They will have the ability to design and conduct engineering experiments, and to analyze and interpret experimental results. | Students design, perform, and report on five experiments. Four experiments involve designing a circuit to satisfy given specifications. Resultant data are analyzed and explained using theory learned in class. | b(●) |
| 3. They will have the ability to design systems, components, or processes to meet specified objectives in their chosen fields. | Each lab experiment involves designing a circuit to satisfy given specifications. Some homework and exams problems are design-oriented. | c(●) |
| 4. They will have the ability to work as members of multidisciplinary project and/or research teams, and have an understanding of leadership in teams and organizations. | Students work with lab partners. | d(●) |
| 5. They will have the ability to identify, formulate, and solve engineering problems. | The student completes many homework assignments that require application of engineering (vs. science) practices. | e(●) |
| 6. They will have the ability to communicate effectively in written and graphical form. | Students write prelab designs, and then submit formal reports after the experiment is completed. Some homework and exams question requires clear explanations rather than calculations. Written reports include graphical representation of data and circuit diagrams. Homework and exam problems require drawing and interpreting graphs. | g(●) |
| 7. They will have the ability to use the principles, techniques, skills and modern engineering tools necessary for successful engineering practice and/or research in their chosen fields. | Many homework problems involve computer simulations. Students use computer-based laboratory instruments. Students need to locate data sheets for components via web searches. | k(○) |

◦ denote moderate contribution to the outcome; • denote substantial contribution to the outcome

**Performance Criteria:**

Instructor completes a Course Outcome Rating (COR) that quantitatively evaluates student performance for each course goal-related outcome using a standard scale (4.0 = outstanding ability; 3.0 = good ability; 2.0 = adequate ability; 1.0 = poor ability; 0.0 = no ability). Instructor chooses appropriate graded course artifacts (homework questions, exam questions, etc) for each outcome rating. COR scores below 2.5 are indicative of problems with meeting course goals/outcomes and COR scores below 2.0 indicate failure to adequately meet course goals/outcomes.

**Prepared By:**

Anton Kruger (October, 2007)