EE 304 - Principles of Electronics II - 3 hours
Required Course

1. *2007-2008 Catalog description*
   Modeling of discrete bipolar and field effect transistors. Circuit analysis and design of macro-electronic circuits using discrete bipolar and field effect transistors. Design process covering top-down methods and software simulation. Prerequisite: EE 303 with minimum grade of C.

2. *Prerequisites by topic*
   a Basic electrical concepts.
   b Time-domain network analysis for DC circuits.
   c Time-domain & frequency-domain network analysis for AC circuits.
   d Transfer functions and frequency response.
   e PN junctions

3. *Textbook (s) and/or other required material*
   Required: Microelectronic Circuits, 5th ed., by Sedra & Smith, Oxford Press
   All course material is posted on Blackboard allowing online student access.

4. *Class/Laboratory Schedule*
   Three sessions per week, each 50 minutes, for 14 weeks, plus two hour final exam session

5. *Topics Covered (Outcomes influenced)*
   - Darlington pair using BJTs (7a,b)
   - Frequency response of the common emitter amplifier (7a)
   - Physical operation, I-V characteristics and large signal models of MOSFETs (7a)
   - Analysis of MOSFET circuits at DC (7a,b)
   - Small signal operation and models of MOSFETs (7a,b)
   - Design, analysis and simulation of single stage MOSFET amplifier circuits(7a,b,c)
   - Frequency response of the common source amplifier (7a)
   - Design, analysis and simulation of the CMOS based CS amplifer (7a,b,c)
   - Design and analysis of the MOSFET cascode circuit (7a,b)
   - Design and analysis of differential amplifiers (7a,b)
   - TTL and CMOS inverters (7a)
   - Identify a contemporary technical issue related to course topics (7d)

6. *Contribution of course to meeting the curriculum components*
   Engineering Science - 50%, Engineering Design - 50%

7. *Course Outcomes (Program Outcome contributions): In learning the course topics, the student will attain the following outcomes*
   a The student will analyze circuits containing electronic components using appropriate models. (9A, B, C, D)
   b The student will design circuits containing electronic components to manipulate signals (9B, C, D)
   c The student will use SPICE to simulate circuits containing electronic devices. (9B, C, D, G)
   d The student will identify a contemporary technical issue related to course topics. (9D)

8. *Grading policy and criteria:*

   There will be three hour exams, each worth 100 points, and a comprehensive final worth 200 points. There will also be several graded SPICE assignments, done outside of class, worth 100 points. Your final grade will be based on a curve utilizing total points scored with the arithmetic mean corresponding to C+. However, this may be shifted up or down based on the performance of the present class with respect to the degree to which students meet the course objectives. Furthermore, break points between the other letter grades will be determined by the instructor. In addition, a letter grade for each exam will be given. However, these letter grades are only a guide and the final grade is determined by the curve based on the total

points scored on all exams. A grade of C corresponds to meeting the minimum competency required to understand course topics and meet course objectives.

An unexcused absence from a scheduled exam will earn you a zero for that exam. Furthermore, you are expected to do the SPICE design and simulation problems alone. Obtaining outside assistance will be considered a breach of academic integrity as well as the ECE Student Code of Conduct.

In addition to the exams, students must also submit a memo to the instructor discussing a contemporary technical issue related to course material. The memo will be graded on a pass/fail basis. Students who do not receive a passing grade or who do not submit a memo will receive an IN for the course. More information related to this requirement will be supplied in another handout.

9. *Relationship of course to program outcomes*

label	Program Outcomes (A Graduate from the program will:)	Contribution
A	have knowledge of the mathematical and scientific foundation of electrical engineering	Moderate
B	have knowledge of and the ability to apply techniques and technology of electrical engineering	Strong
C	complete a design project sequence, culminating in a capstone project at or near the professional level	Strong
D	understand that acquisition of new knowledge is needed for success in the electrical engineering profession	Strong
E	meet Bradley's general education requirements which are based on the principles of liberal education	NA
F	have experience in communicating technical information and working on teams	Foundational
G	understand the importance of professional and ethical behavior	Moderate

10. *Prepared by*: Brian D. Huggins 6/17/08