EE40 and 42/100 COURSE DESCRIPTION
Spring 2007

Course Objectives:

EE40 is intended to teach basic circuit theory and principles of electronic engineering as preparation for subsequent EE courses, whereas EE 42/100 (and EE 43) serve as an introduction to the principles of Electrical Engineering, using electronic devices to communicate, solve problems, and manipulate our environment.

The content of EE40/42/100 has been converging over the last few semesters, and the courses have been using the same textbook and similar syllabi. The main difference now resides on 3-4 lectures. In EE 40, we spend 1~2 more lectures on the physics of diodes and the resulting current-voltage characteristics. In addition, there are two more lectures discussing MOSFET characteristics, the small signal model and its circuit applications. This 3-4 lectures in EE 42/100, on the other hand, are used to discuss logic gates and applications. In this semester, our lectures will follow mostly along the EE40 syllabus, while we will make efficient use of time to cover some of the logic gates.

The discussion sessions will remain separate and used to supplement the materials we cannot cover due to the limitation of class time. Students should regularly attend discussion sessions and should stay with the same session they sign up for.

As appropriate, homework sets, discussion sections, and exams will provide any needed differentiation between classes. Labs will remain separate and a separate grading curve will be used for each class.

Catalog Description:

Fundamental circuit concepts and analysis techniques. Kirchoff's laws, nodal analysis; independent and dependent sources. Thévenin, Norton equivalent circuits. Transient and AC analysis; speed and power. Phasors, Bode plots and transfer function. Filters and Op-Amps. Graphical methods for nonlinear circuits. Gauss's Law and bandgap. Diode and FET characteristics. Diode and MOSFET circuits. Introduction to basic integrated-circuit technology and layout. Digital signals, logic gates, switching.

An electronics laboratory is part of the course. Using and understanding electronics laboratory equipment such as: oscilloscope, power supplies, function generator, multimeter, curve-tracer, and RLC meter. Includes a term project of constructing a circuit with appropriate electromechanical device.

Course Format:

EE 40 and 100: Three hours lecture, three hours laboratory, one hour of discussion [4 Units].

Instructor: Prof. Connie Chang-Hasnain

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Office hour: T 11-12, W 10-11

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Prerequisites:

EE 40: Math 1B and Physics 7B.

EE 42/100: Math 1B

Textbooks and/or other required material:

Hambley, Allan R., *Electrical Engineering: Principles and Applications* (3rd ed.). Upper Saddle River, NJ: Pearson Education, Inc., 2005.

Supplemental notes and reader (available at Copy Central as well as on line for download)

Topics covered:

- Introduction to circuits: currents, and voltages; power and energy; Kirchhoff's Current Law; Kirchhoff's Voltage Law; branches, loops and nodes
- Resistive circuits; Thévenin and Norton equivalent circuits; Node/Mesh/Superposition analysis
- Inductance and capacitance; L and C transients; 1st and 2nd order circuits
- Phasors; Frequency response; Bode plots; Resonance; Transfer function; Filters (1st and 2nd order filters)
- Operational Amplifiers: Ideal operational amplifiers; Inverting and non-inverting amplifiers; Design of simple amplifiers; Op-amp imperfections in the linear range of operation; Integrators and differentiators;
- Diode circuits: Basic concepts; Load-line analysis of diode circuits; Ideal-diode model; Piecewise-linear diode models; Rectifier circuits; voltage doubler
- Semiconductors; n and p doping; bandgap
- Diode physics: Gauss's Law and Poisson Equation; Depletion approximation; IV characteristics
- MOSFET physics: NMOS and PMOS transistors and simple fabrication concepts
- MOSFET circuits: Load-line analysis; Bias circuits; Small-signal equivalent circuits; Common-source amplifiers; Source followers
- Binary logic, truth tables: inversion, NAND and NOR
- Logic circuits: CMOS logic gates; flip-flops, registers, counters, adder

Class/laboratory schedule:

Office Hours, Discussion and Laboratory Sections Begin 1/22/07

Stay with ONE Discussion and Lab session you registered.

Midterm and Final Dates:

- Midterm 1: 6:00 – 7:20 pm on 2/21

EE 40 Location:120 Latimer and 60 Evans
EE 42/100 Location: TBD

- Midterm 2: 6:00 – 7:20 pm on 4/11

EE 40 Location: 145 Dwinelle
EE 42/100 Location: TBD

- **Final: 12:30 – 3:30 pm on 5/17, Exam group 17 (Location TBD)**

Best Final Project Contest for EE 40

- 3-5pm, 5/4 Location TBD
- Students are encouraged to participate.
- Winning projects will be displayed on second floor Cory Hall for 6 months. Winners will receive some awards, details to be announced.

Grading Policy:

EE40 and 42/100 will have some different problems in HWs and exams, when appropriate. The Labs will remain distinct. The students will be graded on separate curves.

Course	HW (12 sets)	Midterm 1	Midterm 2	Final	Labs	Course units
40	12%	20%	20%	33%	15%	4
100	12%	20%	20%	33%	15%	4
42	12%	22%	22%	44%	0	3
43					P/NP	1

- EE40: 11 Labs
    i. 7 structured experiments (7%)
    ii. one 4-week final project (8%)
- EE100: 11 Labs
    i. 9 structured experiments (10%)
    ii. one 2-week final project (5%)

- **No late HW or Lab reports accepted**. Prelabs need to be completed before going to labs.
- **No make-up exams** unless Prof. Chang's approval is obtained at least 24 hours before exam time; proofs of extraneous circumstances are required.

Weekly HW:

- Assignment on the web by 5 pm Wednesdays, starting 1/17/05.
- **Due 5 pm the following Wednesday in the appropriate drop box (EE40, EE100 or EE42) in 240 Cory.**
- On the top page, right top corner, write your name (in the form: Last Name, First Name) with discussion session number.
- Graded homework will be returned one week later in discussion sessions.

Labs

- Complete the prelab section before going to the lab.
- Satisfactory completion of each lab is necessary to pass class.

Classroom Rules:

- Please come to class on time.
- Turn off cell phones, pagers, radio, CD, DVD, etc.
- No food.
- No pets.
- Do not come in and out of classroom.
- Lectures will be recorded and webcasted.