EE 233 Spring 2001

Course information &
General introduction

Quarter calendar
- 03-26: first lecture meeting
- 04-30: midterm in class
- 05-28: holiday
- 06-01: last lecture meeting
- 06-06: final exam in class
- Total of 29 lecture meetings

Contents
- Textbook
  - Chapters 10, 11, 13, 14, 16, 17
- See “Class Schedule” on web site for detailed coverage each week
  - Please read materials before lecture
  - Prerequisite: EE 215

Grading policy
- Lab (4 experiments, 1 exam): 20%
  - Work in teams of 3; one lab report per team
  - Individual lab exam at end of quarter
- Homework (weekly): 15%
  - Cooperation and discussion OK
  - Submit one solution per student
  - No late homework accepted
  - Assign Fridays, due next Fridays in class
  - Solution posted on web site on due date
- Exams (in-class, individual, no cooperation)
  - Midterm (one): 25%
  - Final: 40%

Teaching staff
- Instructor: Scott Dunham
- Teaching assistants (lab and quiz):
  - Chun-I Chen
  - Ibrahim Karlagi
- Grader (homework): TBA
- Web URL for all course information:
  - EE home -> Course information -> Class Home Pages -> EE 233
  - http://dunham.ee.washington.edu/ee233/

Lab & Quiz management
- See web site for full details
- NO lab meetings first week of classes
- Quiz sections DO meet first week of classes to organize teams
Learning objectives

- Detailed list on web site
- Analyze more complex circuits with various input signals
  - Sine waves, steps, square waves, etc.
  - More techniques to solve problems: time-domain, frequency-domain. Laplace transform, two-port methods
- Design circuits to meet given specifications
- Use SPICE as a computer tool to verify a design
- Measure & compute basic signal parameters: amplitude, frequency, etc. in hardware experiments

Prerequisite topics (1)

- EE 215
  - KCL, KVL, Ohm’s law, parallel / series combination of R, L, C
  - Thevenin & Norton equivalent circuits
  - Controlled voltage and current sources
  - Linearity and superposition techniques
  - Analyze first- and second-order RLC circuits in time domain
  - Proficiency in circuit analysis

Prerequisite topics (2)

- Math skills
  - Integrate & differentiate common functions
  - Solve first- and second-order differential equations
  - Manipulate complex numbers: add, subtract, multiply, divide, complex conjugate, compute magnitude & phase, etc.
- OK to use calculator (in homework, lab, quiz, exams)

ABET Criteria

- Accreditation Board for Engineering & Technology
  - Sets standards for all EE programs in US
- EE 233 criterion 3 outcomes (what students can do):
  - (a) Apply math, science and engineering knowledge.
  - (b) Conduct experiments, as well as to analyze and interpret data.
  - (c) Design simple RC and opamp circuits to meet desired needs.
  - (d) Function and contribute various individual skills in laboratory teams.
  - (e) Identify, formulate, and solve basic RC and opamp circuit problems.
  - (g) Communicate effectively via written laboratory reports.
  - (h) Use the techniques, skills, and modern engineering tools.

Why teamwork?

- Industry people work in teams
- Sharing ideas and learning from others
- Practicing communication skills
- “I am better than the others in the team”
  - Team only as strong as the weakest person
  - Learn how to explain and communicate
  - Learn patience and people skills

Good team make-up

- Different ideas and perspectives in a team to learn from each other
- Examples:
  - Mixed gender
  - Native and non-native speakers
  - Diverse backgrounds
  - Various age levels
Teamwork in lab

- Various roles in each experiment:
  - analysis of circuits in an experiment
  - simulation (SPICE)
  - building the circuits
  - recording data in the lab
  - data analysis and comparison
  - report writing
- Each student should take on various roles during the quarter

Lab experiments

- First EE course with lab
  - learn how to use lab instruments
- Materials: where from?
  - real-life circuits vs. textbook circuits
  - company interviews of junior EE students for Co-op jobs
  - examples from current industry designs

Using lab & quiz times

- “Pre-lab takes too long”
  - Industry practice (typical chip design)
    - design and simulation: 100-person team over 3 years (pre-lab 300 man-years)
    - product fabrication: 50-person team over 3 months (lab work 150 man-months)
  - Spend time on Pre-lab: it pays off!!!
    - uses quiz section time, work in team
- Quiz time
  - Ask questions about lectures & labs, work extra problems
  - Guaranteed access to TA

Use of computer tools

- “Why should I learn circuits when I can run Matlab, SPICE, Mathcad, etc.?”
- Understanding circuit operations vs. crunching numbers
  - use any tool you want to crunch numbers, plot waveforms, etc.
  - tools are only good to VERIFY ideas and designs.
  - what happens when tools fail?

Techniques vs. numbers

- Emphasis on problem-solving technique, NOT on answer
- Correct technique, correct answer: full credit
- Correct technique, incorrect answer: most of credit
- Incorrect technique, correct answer: little or zero credit

Design real-life circuits

- Given a specification, how to design?
  - many options exist
  - how do you choose which options to explore?
    - need to understand operations
    - need to do quick “back of the envelope” estimates
    - need to select viable options
  - use computer tools to explore the selected options and choose the best option
    - impossible to use tools on all options (too many, too long, too costly)
  - use computer tools to perform detailed analysis, crunch numbers, plot
- “Designer experience” vs. tools
From class to real life
- Extract knowledge of techniques from class and text
  - NOT specific answers and plug-in numbers!
- Apply this knowledge to real-life circuits
- “The circuits in class are not practical” vs. “Practical circuits are too difficult and we don’t have time to do them”

Learning habit
- “Active” vs. “Passive” learning
  - ask questions
  - work in teams
  - use quiz section time effectively
  - do more practice problems
- Think first, get a clear procedure BEFORE jumping into a lab or problem
- The only way to become a good designer is to work

Working problems
- “I want to learn swimming but I don’t like getting wet”
- “I want to learn designing circuits but I don’t like messy equations, don’t like to work on problems, etc.”
- “Genius is 1% inspiration and 99% perspiration” - Thomas Edison

What to do after class today
- Homework:
  - Download and start Homework 0 if you want to drop a homework score.
- Lab:
  - Download Laboratory Manual and Lab 1, and start working
  - Buy lab kit from EE stock room in EE1 137
- Quiz:
  - Go to quiz section to get organized
  - Read sections 10.1, 10.2, 10.3 for lecture on Wednesday
  - Review prerequisite topics in EE 215

Adding EE 233
- EE majors:
  - Contact Helene, Amy or Syliva in EE Advising no later than Wednesday afternoon
  - Preference in overload
- Other students:
  - Will be added on Thursday to reach limit of 90
- Class limit imposed by classroom size and availability (assigned by UW, not by EE)