# Teaching Assistant Handbook

University of California, Davis
Department of Electrical and Computer Engineering

Compiled by Prof. Gary E. Ford, September 1999
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# Introduction

Teaching assistants (TAs) in the Department of Electrical and Computer Engineering (ECE) at the University of California Davis play an important role in the process of undergraduate education. It is no exaggeration to say that we could not function without TAs. As a TA you will assist faculty in the instruction, advising, and evaluation of students.

This handbook was written as an introduction to university teaching and as an instructional resource for TAs in ECE. It is intended to complement the excellent *TA Handbook* prepared by the UC Davis Teaching Resources Center (TRC). The TRC TA Handbook is revised annually and made available to TAs during the fall TA orientation program conducted by TRC and required of all new TAs.

Use this handbook as you would any manual. If you are a teacher with previous experience, you might prefer to pick and choose those sections that are most applicable to your needs. If you are a first-time teacher, you might prefer to read the handbook in its entirety, returning later to areas of interest or concern. In either case, this handbook will be valuable to you as a teaching assistant and university educator.

Portions of this handbook were adapted from an earlier, unattributed ECE TA handbook and from the *Teaching Assistant Handbook* (1996 revised edition) by Rosalind Streichler of the Center for Teaching Development at the University of California, San Diego.

## Contact Information

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*Appointment, assignment, and supervision of TAs*

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*Appointment, assignment, and supervision of TAs*

**Chief Administrative Officer (CAO)**
Carole Bustamante
cabustamante@ucdavis.edu
*Management of student services, business office and technology support.*

**Undergraduate Program Coordinator**
Open Position
*Responsible for oversight of the undergraduate program, student advising, teaching assistantship and reader assignments.*

**Graduate Program Coordinator**
Sacksith Ekkaphanh
sekkaphanh@ucdavis.edu
*Assists MS and PhD graduate students with advising issues; resource for questions on program requirements; fellowship/scholarship information; graduate program recruitment; admissions; maintains graduate student records; assists with graduate committees and student groups.*

**Student Services Assistant**
Open Position
*Handles miscellaneous administrative tasks such as issuance of copy cards, keys and conference room reservations, mail, federal express, shipping, lower-division undergraduate student advising, mail, mailboxes, instructional copying, textbook orders, and event planning.*

As a TA, your immediate supervisor is the instructor responsible for the course to which you have been assigned. Should you encounter any problems in your assignments as a TA, you should first contact this instructor. If you are unable to resolve the problem in this way, you should contact the Vice Chair, preferably by email.

# Appointment and Assignment

The ECE philosophy behind the appointment and assignment of teaching assistants is the following:

- A teaching assistantship is an educational opportunity for professional development of graduate students, providing them with training and experience to become effective teachers if they choose to pursue academic careers.
- The teaching assistant is an important contributor to the undergraduate educational programs provided by the department.

This document outlines the policies regarding the appointment of graduate students as Teaching Assistants in the Department of Electrical and Computer Engineering. The department follows the basic regulations in the UCD Policy and Procedure Manual Section 390-24 and the Academic Personnel Manual Section 410, and has established additional policies which are described in this document. For detailed information about the policies and procedures for the appointment of graduate students to academic positions, consult the following:

Academic Appointment of Students and Post-Doctoral Researchers

## General Eligibility Requirements

*Campus Requirements* – There are several campus and departmental requirements that students must meet to be eligible for a Teaching Assistant (TA) position.

- An appointee must be a full-time registered graduate student in good academic standing during the period of appointment. A one-time, one-quarter exception for employment as a TA for a student in non-registered status may be approved by Graduate Studies based on department recommendations.
- An appointee must have a minimum cumulative grade point average of 3.0 in previous graduate work if a continuing student, or in the last two years of upper-division work if a new graduate student.
- The number of quarters for which graduate students may be appointed to academic titles is tied to normal academic progress. Graduate students may be appointed to a maximum of 12 quarters in one or a combination of graduate academic titles prior to advancement to candidacy for the Ph.D. degree. The titles used in this department are: Teaching Assistant, Associate-In, Research Assistant, Student Postgraduate Researcher and Graduate Reader. After advancement, students may be appointed for up to a 15th quarter without an exception request (with approval from Graduate Studies).
- An applicant must demonstrate adequate ability to comprehend, write and speak the English language. Foreign students must satisfactorily pass the SPEAK test, which assesses the student's oral and written communication skills. **The department reserves the right to withdraw TA offers if the graduate student does not satisfactorily pass the SPEAK test.**

*Departmental Requirements* – In addition to the regulations of Graduate Studies, a TA also must meet the criteria of the departmental policy outlined below:

- Students in the Ph.D. Program must take and pass the Departmental Preliminary Evaluation at the first opportunity.
- An applicant must furnish at least three letters from college instructors or other appropriate persons, testifying to his or her qualifications/potential to serve as a Teaching Assistant.
- Eligibility for a Teaching Assistant Appointment
  - Departmental needs
  - Courses requiring TA support
  - Desire to attract outstanding student teachers
- Academic Qualifications
  - GPA from U.S. institutions
  - GRE and TOEFL scores, where required for admission
  - Letters of recommendation from faculty members testifying to candidate's academic promise.
- Teaching Qualifications
  - Prior teaching experience
  - Communication skills
  - Variety of courses and/or specialized courses candidate can TA
  - Letters of recommendation testifying to teaching qualifications
- Other Qualifications of the Candidate
  - Industrial experience
  - Experience in the use of electronic instrumentation
  - Willingness to practice and teach proper safety practices from industrial supervisors
  - Other letters of recommendation
  - Ability to work cooperatively with faculty, staff, and students
- Criteria for Continued Appointment of Teaching Assistants
  - Criteria given in Section III above
  - Appraisal of candidate's performance as a TA from evaluations by faculty, staff and students
  - Appraisal of candidate's progress toward completion of degree requirements

NOTE: The department reserves the right to offer support on a quarter-to-quarter basis and guaranteed reappointment for subsequent quarters is not implied.

- Appeal Process – Candidates who are not satisfied with appointment decisions should follow the appeal process: (a) write to the ECE Vice Chair for Undergraduate Studies and thereafter, if necessary, by (b) writing to the Dean of Graduate Studies.
- Financial Need – Financial need is NOT a criterion in the selection of TAs. It is the department's goal to provide the best possible teaching environment/learning assistance to students in addition to providing assistance to faculty members teaching courses.

## Application and Appointment Procedures

TA applications are submitted on a quarterly basis each academic year. If an application is not submitted, you will not be considered for a TA appointment.

Appointment decisions are made by the TA Appointment Committee, consisting of the Vice Chair for Undergraduate Studies, the Vice Chair for Graduate Studies, and the Student Affairs Officer (SAO).

You will be expected to follow the instructions in your appointment letters and related attachments regarding reporting dates, signing employment papers, hours of work, etc. It is especially important that you acknowledge your TA assignment and send back any forms requested on time. Late submission will result in the loss of your appointment.

## Course Assignment Procedures and Policies

Course assignments for TAs are made on a quarter-to-quarter basis and are the responsibility of the Vice Chair for Undergraduate Studies. Assignments are based on the following considerations

- Course needs
- Faculty requests
- TA preferences
- Past TA experience and evaluations

At about the seventh week of a quarter, prospective TA's will be asked to submit their TA course preferences and the list of courses they will be taking the following quarter. Assignment decisions will be made available by email by about the eighth week of the quarter.

# Teaching Responsibilities

The responsibility of a TA is to assist with instruction in an undergraduate course, under the supervision of the instructor in charge of the course. The TA assists with answering student questions in office hours, preparing problem sets and their solutions, administering examinations and preparing their solutions and grading guides, staffing laboratory sessions, grading laboratory notebooks and reports, and assisting with course administration.

Of equal importance are the elements of instruction that are the responsibility of the faculty instructor rather than the TA. TAs are not responsible for the instructional content of a course, for selection of student assignments, for planning of examinations, or for determining the term grade for students. A TA is not to be assigned responsibility for instructing the entire enrollment of a course or for providing the entire instruction of a group of students enrolled in a course. In ECE, the instructor is responsible for conducting lecture and discussion sessions, although the TA may be asked to assist with discussion sessions.

In certain courses, an undergraduate or graduate student will be appointed to serve as a reader. The reader, who may be supervised by a TA, is typically responsible for grading weekly problem assignments, using solutions and grading guides prepared by the TA or instructor. In some cases, the reader will assist with the grading of examinations or laboratory notebooks, but only under the direct and close supervision of a teaching assistant or the instructor.

The following is a list and short description of the types of responsibilities that will be expected of an ECE TA. More detailed information on handling these responsibilities is given elsewhere in this document.

- Office hours: regularly scheduled times for students to ask questions regarding lecture, laboratory, or discussion material, problem sets, examinations, or other course projects.
- Problem sets: preparation of assignments, their solutions and grading guides.
- Readers: supervising their grading of problem sets.
- Laboratory: preparation of assignments, staffing laboratory sessions, grading notebooks and reports.
- Course administration: preparation and management of course web materials; management of student records.

## Time Commitment and Expectations

A 0.50 FTE (50%) Teaching Assistant assignment is considered to entail an average time commitment of approximately 20 hours per week. [The acronym "FTE" is used throughout the campus for "full time equivalent". It is an accounting unit of measure, and 1 FTE is equivalent to one person working a 40-hour week.]

On average, you should work the number of hours for which you are being paid. However, from one week to the next, the time required may vary. For example, during the first week of classes, there may not be a lab or discussion section, and students often do not show up at office hours since homework is modest. On the other hand, during the week a midterm is given you may be asked to help evaluate exams as well as perform the usual laboratory duties.

Typically, you will need to spend time preparing for both the laboratory and/or discussion. You will also be asked to grade laboratory assignments and some of the examinations. The actual time commitment will vary with factors such as enrollment, number and type of examinations to be graded, voluntary review sessions before exams, number and type of laboratory reports to be graded, number and type of homework sets to be graded, and instructor expectations.

If your own understanding of the material being covered is not as complete as can reasonably be expected based on your background, then you might also need to spend time reviewing the material yourself. This extra review time is NOT part of your job and should not be counted in the hours you work.

## Standards of Conduct

Teaching assistants are held to the same standards of conduct as faculty members. Unacceptable conduct includes denial of access to instruction, significant intrusion of unrelated material, evaluation of students by criteria not reflective of performance, undue and unexcused delay in evaluation, and failure to hold class, office hours, or examinations as scheduled. Any use of your position to coerce or cause harm to a student and any form of discrimination for arbitrary or personal reasons is deemed unacceptable. Also, you may not participate in or deliberately abet disruption, interference, or intimidation in the classroom. Finally, you should follow the instructions given to you by the faculty member in charge of the course. In the event of a grievance, there is a procedure which should be followed. The first step, of course, is to speak to the faculty member in charge of the course. If that does not resolve the difficulty, you should speak to the Vice Chair for Undergraduate Studies. If the matter is still unresolved, you should speak to the department chair and if that fails you should consult the Dean of Graduate Studies.

As a teaching assistant you are also responsible for some things not listed in any university policy statement. You are the human link between the student and the university. You are an advocate for the students and as such you are trusted by them. Because you are both a student and a teacher, you are in a unique position. You are the one in the middle — the conduit through which information and responses flow. As such you hold the trust of the students and the ear of the professor. This is, perhaps, one of the most important roles you will play.

# Appointment Policies and Job Descriptions

## Teaching Assistant Appointment Policies

### A. General Policies and Regulations

This document outlines the policies regarding the appointment of graduate students as Teaching Assistants in the Department of Electrical and Computer Engineering. The department follows the basic regulations in the UCD Policy and Procedure Manual Section 390-24 and the Academic Personnel Manual Section 410, and has established additional policies which are described in this document.

### B. Eligibility for a Teaching Assistant Appointment

- An appointee must be a full-time registered graduate student in good academic standing during the period of appointment.
- An appointee must have a minimum cumulative grade point average of 3.0 in previous graduate work if a continuing student, or in the last two years of upper- division work if a new graduate student.
- An appointee must demonstrate adequate ability to comprehend, write, and speak the English language.
- An appointee must be willing and able to work 20 hours a week (50%) or 10 hours a week (25%) during the following time periods: 7 a.m. – 11 p.m. Monday through Friday and Saturdays 8 a.m. -4 p.m.
- An appointee must be available for work from the first day through the last day of the quarter.
- An appointee must be willing and able to teach at least two courses from each of the priority lists from the “Teaching Assistant” application.

### C. Criteria for Initial Appointment of Teaching Assistants

- Departmental Needs.
    1. Courses requiring TA support
    2. Desire to attract outstanding student teachers
- Academic Qualifications
    1. GPA from U.S. institutions
    2. GRE and TOEFL scores, where required for admission
- Teaching Qualifications
    1. Prior teaching experience
    2. Communication skills
    3. Variety of courses and/or specialized courses candidate can TA
- Other Qualifications of the Candidate
    1. Industrial experience
    2. Experience in the use of electronic instrumentation
    3. Willingness to practice and teach proper safety practices from industrial supervisors

4. Ability to work cooperatively with faculty, staff, and students

**D. Criteria for Continued Appointment of Teaching Assistants**

- Criteria given in Section C above
- Appraisal of performance as a TA from evaluations by faculty, staff and students
- Appraisal of progress toward completion of degree requirements

*NOTE: The department reserves the right to offer support on a quarter-to-quarter basis and guaranteed support for subsequent quarters is not implied.*

**E. Appeal Process**

Candidates who are not satisfied with appointment decisions should follow the appeal process: (a) write to the Vice Chair of the department and thereafter, if necessary, by (b) writing to the Dean of Graduate Studies.

**F. Financial Need**

Financial need is NOT a criterion in the selection of TAs. It is the Departmental goal to provide the best possible teaching environment/learning assistance to students in addition to providing assistance to faculty members teaching courses.

STUDENTS WITH FINANCIAL PROBLEMS SHOULD SEEK ADVICE FROM:

- Professor Khaled Abdel-Ghaffar, Vice Chair for Graduate Study
- Financial Aid Office
- Services for International Students and Scholars
- Graduate Division

## TEACHING ASSISTANT JOB DESCRIPTIONS

*Note: To view long description form, click on title of the course)*

### ENG6 – Engineering Problem Solving

Methodology for solving engineering problems. Engineering computing and visualization based on MATLAB. Engineering examples and applications.

4 units; Lecture 3 hours, Lab/discussion 1 hour

Fall, Winter, Spring Quarters

**Required Knowledge / Skills**

- Knowledge of engineering problem solving methods
- Knowledge of programming principles
- Familiarity and experience with Matlab

**General Tasks and Responsibilities**

Office hours, conduct laboratory session, pre-lab preparation, lab project grading, exam grading, attend TA/reader meetings.

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### ENG17 – Circuits I

Basic electric circuit analysis techniques, including electrical quantities and elements, resistive circuits, transient and steady-state responses of RLC circuits, sinusoidal excitation and phasors, and complex frequency and network functions.

4 units

Fall, Winter and Spring Quarters

**Required Knowledge / Skills**

- Good understanding of introductory circuit analysis covered.

**General Tasks and Responsibilities**

Office hours, problem set solutions, exam grading, attend TA/reader meetings.

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**ENG100 – Electronic Circuits and Systems** Introduction to theory and applications of analog and digital circuits and systems.

3 units

Winter, Spring Quarters

**Required Knowledge / Skills**

- Solid knowledge and some hands-on experience of basic analog and digital electronics
- Working knowledge of electronic lab equipment (oscilloscopes and function generators)
- Working knowledge of SPICE circuit simulation software
- Good language and communications skills (particularly important in a lab course)

**General Tasks and Responsibilities**

Laboratory teaching and notebook grading, office hours, exam grading, attend TA/reader meetings.

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## EEC70 – Computer Structure And Assembly Language

Introduction to computer architecture; machine language; assembly language; macros and conditional macros; subroutine/ parameter passing; input/output programming, interrupt and trap; direct-memory access; absolute and relocatable code; re-entrant code; program development in an operating system.

4 units; Lecture 3 hours, Workshop 3 hours

Fall, Winter Quarters

**Required Knowledge / Skills**

- Knowledge of basic computer architecture
- Ability to program in an assembly language
- The course currently uses the SPIMSAL simulator for the MIPS RISC architecture. Past experience with SPIMSAL or MIPS is useful, but not required.

**General Tasks and Responsibilities**

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## EEC100 – Circuits II

Introduction to the theory and application of analog circuits. Students who have completed Engineering 100 may receive only 3.5 units of credit.

5 units; Lecture 3 hours, Laboratory 3 hours, Discussion 1 hour

Fall, Winter Quarters

**Required Knowledge / Skills**

- Required
    1. E17 and EEC100 (or equivalent)
    2. Analog electronic laboratory skills (working knowledge of oscilloscopes and function generators).
    3. Familiarity with SPICE
    4. Familiarity with UNIX
- Recommended:
    1. EEC110 A,B
    2. Familiarity with HSPICE

**General Tasks and Responsibilities**

Laboratory teaching, laboratory notebook grading, exam grading, office hours, pre-class or pre-lab preparation, attend TA/reader meetings.

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**EEC110A – Electronic Circuits I**

Applications of operational amplifiers, modeling of active devices, design of small-signal linear amplifiers, design of basic logic gates.

4 units; Lecture 3 hours, Discussion 1 hour

Winter Quarter

**EEC110B – Electronic Circuits II**

Analysis and design of amplifier output stages, analysis of frequency response of amplifiers, analysis and design of multistage and feedback amplifiers, stability and compensation of feedback systems, oscillators, introduction to analog-to-digital and digital-to-analog converters.

4 units; Lecture 3 hours, Discussion 1 hour

Spring Quarter

**Required Knowledge / Skills**

- Use of SPICE on the department's computers
- Familiarity with Unix, editors, windowing system
- Knowledge of ECE CAD tools
- Preference is given to students who have taken the following course – or their equivalent: EEC112, EEC 114, EEC 118 – and received a grade of B+ or better.

**General Tasks and Responsibilities**

Pre-class or pre-lab preparation, exam grading, office hours, attend TA/reader meetings.

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## EEC112 – Communication Electronics

Electronic circuits for analog and digital communications, including oscillators, mixers, tuned amplifiers, modulators, demodulators, and phase-locked loops. Circuits for amplitude modulation (AM) and frequency modulation (FM) are emphasized.

4 units; Lecture 3 hours, Laboratory 3 hours

Winter Quarter

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## EEC118 – Digital Integrated Circuits

Analysis and design of digital integrated circuits. Emphasis is on MOS logic circuit families. Logic gate construction, voltage transfer characteristics, and propagation delay. Regenerative circuits, RAMs, ROMs, and PLAs.

3 units; Lecture 2 hours, Laboratory 3 hours

Spring Quarter

**needed for only one TA per quarter

**Required Knowledge / Skills**

- 114
    - Use of oscilloscopes
    - Understanding of bipolar-transistor circuits at the level of the first half of Gray and Meyer's text, "Analysis and Design of Analog Integrated Circuits", especially differential pairs and current mirrors
- 118
    - Experience with Bipolar & MOS transistors.
    - Experience with **LOGIC** circuits.

- Experience with test equipment (scope, signal gen., etc.).
- Experience with SPICE.
- ** Experience with IC layout (as taught in 218A). **

**General Tasks and Responsibilities**

Laboratory teaching, laboratory notebook grading, attend TA/reader meetings, pre-class or pre-lab preparation, office hours, exam grading.

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**EEC130A – Introductory Electromagnetics I**

Basics of static electric and magnetic fields and fields in materials. Work and scalar potential. Maxwell's equations in integral and differential form. Plane waves in lossless media. Lossless transmission lines.

4 units; Lecture 3 hours, Discussion 1 hour

Fall, Winter Quarters

**EEC130B – Introductory Electromagnetics II**

Plane wave propagation in lossy media, reflections, guided waves, simple modulated waves and dispersion, and basic antennas.

4 units; Lecture 3 hours, Discussion 1 hour

Spring Quarter

**Required Knowledge / Skills**

- Advanced undergraduate background in electromagnetics.

**General Tasks and Responsibilities**

Pre-class or pre-lab preparation, office hours, exam grading, attend TA/reader meetings, conduct problem session.

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**EEC136 – Opto-Electronics and Fiber-Optics Laboratory**

Characteristics and applications of state-of-the-art optoelectronic components (semiconductor lasers, semiconductor detectors, optical modulators and optical fibers), and fiber-optic communication systems.

3 units; Lecture 3 hours, Laboratory 3 hours

Spring Quarter

**Required Knowledge**

- Laboratory background and experience with optoelectronic components (EEC136 preferred).

**General Tasks and Responsibilities**

Pre-lab preparation, laboratory teaching and report grading, exam grading, office hours.

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**EEC132A – High-Frequency Systems, Circuits and Devices**

Application of electromagnetic theory to analysis and design of practical devices, circuits and systems operating at radio frequencies. Energy transfer at high frequencies, transmission lines, microwave integrated circuits, circuit analysis of electromagnetic energy transfer systems, the scattering parameters.

5 units; Lecture 3 hours, Laboratory 3 hours, Discussion 1 hour

Fall Quarter

**EEC132B – High-Frequency Systems, Circuits and Devices**

Passive high frequency device analysis, design. Microwave circuit and filter design. Introduction to analysis and design of microwave transistor and tunnel diode amplifiers.

5 units; Lecture 3 hours, Laboratory 3 hours, Discussion 1 hour

Winter Quarter

**EEC132C – RF Amplifiers, Oscillators, Mixers and Antennas**

Microwave amplifier theory and design, including transistor circuit models, stability considerations, noise models and low noise design. Theory and design of microwave transistor oscillators and mixers. Analysis and design of linear, loop, waveguide and horn radiators.

5 units; Lecture 3 hours, Laboratory 3 hours, Discussion 1 hour

Spring Quarter

**Required Knowledge / Skills**

- Coursework background in microwaves and high-frequency systems (EEC132A-C strongly preferred).
- Extensive background and experience in microwave hardware and instrumentation.
- Analog electronics background at the advanced undergraduate level.

**General Tasks and Responsibilities**

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## EEC140A – Principles of Device Physics I

Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, density of states, electrons and holes, p-n junctions, Schottky junctions, and junction field effect transistors.

4 units; Lecture 3 hours, Discussion 1 hour

Fall, Winter Quarters

## EEC140B – Principles of Device Physics II

Electrical properties, design, and models for Bipolar and MOS devices.

4 units; Lecture 3 hours, Discussion 1 hour

Spring Quarter

**Required Knowledge / Skills**

- MUST have had at least EEC 140A AND EEC 140B, or EEC 240 or equivalent within 3 years.
- Prefer students whose emphasis is in solid state (including circuits or optics).
- No programming skills are required, but should feel comfortable with internet and maintaining websites.

**General Tasks and Responsibilities**

Pre-class or pre-lab preparation, office hours, exam grading, conduct problem session, attend TA/reader meetings.

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## EEC146A – Integrated Circuits Fabrication

Basic fabrication processes for metal oxide semiconductor (MOS) integrated circuits. Laboratory assignments covering oxidation, photolithography, impurity diffusion, metallization, wet chemical etching, and characterization work together in producing meta l-gate PMOS test chips which will undergo parametric and functional testing.

3 units; Lecture 2 hours, Laboratory 3 hours

Fall Quarter

### EEC146B – Advanced Integrated Circuits Fabrication

Fabrication processes for CMOS VLSI. Lab projects examine deposition of thin films, ion implantation, process simulation, anisotropic plasma etching, sputter metallization, and C-V analysis. Topics include isolation, projection alignment, epilayer growth, thin gate oxidation, and rapid thermal annealing.

3 units; Lecture 2 hours, Laboratory 3 hours

Winter Quarter

**Required Knowledge / Skills**

- Experience with CMOS microfabrication (EEC146A-B strongly preferred).

**General Tasks and Responsibilities**

Pre-class or pre-lab preparation, laboratory teaching and report grading, office hours, exam grading, attend TA/reader meetings.

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### EEC150A – Introduction to Signals and Systems I

Characterization and analysis of continuous-time linear systems. Fourier series and transforms with applications. Introduction to communication systems. Transfer functions and block diagrams. Elements of feedback systems. Stability of linear systems.

4 units; Lecture 4 hours

Winter, Spring Quarters

### EEC150B – Introduction to Signals and Systems II

Characterization and analysis of discrete time systems. Difference equation models. Z-transform analysis methods. Discrete and fast Fourier transforms. Introduction to digital filter design.

4 units; Lecture 3 hours, Discussion 1 hour

Fall Quarter

**Required Knowledge / Skills**

- 150A
  - Thorough knowledge of convolution, Laplace transform, and Fourier series and transform, with application to continuous time system analysis.
  - Ability to prepare problem set solutions, consult with students, and grade examinations on this material.
- 150B
  - Knowledge of Discrete-Time Systems — must have taken EEC150B or an equivalent course, and obtained a grade of B or better.
  - Working knowledge of MATLAB as applied to signal processing.

**General Tasks and Responsibilities**

Exam grading, office hours, pre-class or pre-lab preparation, attend TA/reader meetings.

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## EEC157A – Control Systems

Analysis and design of feedback control systems. Examples are drawn from electrical and mechanical systems as well as other engineering fields. Mathematical modeling of systems, stability criteria, root-locus and frequency domain design methods.

4 units; Lecture 3 hours, Laboratory 3 hours

Fall Quarter

## EEC157B – Control Systems

Control system optimization and compensation techniques, digital control theory. Laboratory includes Servo system experiments and computer simulation studies.

3 units; Lecture 3 hours, Laboratory 2 hours

Winter Quarter

**Required Knowledge / Skills**

- Knowledge of
  - Classical control system design
  - Computer-aided control system design (using MATLAB)

**General Tasks and Responsibilities**

Exam grading, laboratory teaching, office hours, attend TA/reader meetings.

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## [EEC170 – Introduction to Computer Architecture]

Introduces basic aspects of computer architecture, including computer performance measurement, instruction set design, computer arithmetic, pipelined/non-pipelined implementation, and memory hierarchies (cache and virtual memory). Presents a simplified Reduced Instruction Set Computer using logic design methods from the prerequisite course.

4 units; Lecture 3 hours, Discussion 1 hour

Fall Quarter

**General Tasks and Responsibilities**

Office hours, problem set preparation, exam grading, pre-class or pre-lab preparation, attend TA/reader meetings.

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## [EEC172 – Microcomputer-Based System Design]

Study of microprocessor architecture and its software conventions. I/O interface design with emphasis on devices such as transceivers, A-D/D-A converters and timers. Peripheral polling and interrupt-driven system design will be studied and contrasted. The course will involve programming in both assembly and high-level languages.

4 units; Lecture 2 hours, Laboratory 6 hours

Fall, Winter Quarters

**Required Knowledge / Skills**

- Experience interfacing hardware components to a microprocessor.
- Experience in hardware design and debugging (trouble-shooting).
- Proficiency in C language.
- Familiarity with typical microprocessor support chips such as the Intel 8254 timer, UARTS, analog-to-digital converters, digital-to-analog converters, latches and buffers.
- Familiarity with assembly language and the MIPS R3000 assembly language.
- Familiarity with the MIPS R3000 family architecture.
- Familiarity with MIPS exception handling.

**General Tasks and Responsibilities**

Laboratory teaching and notebook grading, office hours, exam grading.

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## EEC180A – Digital Systems I

Introduction to digital system design including combinational logic design, sequential and asynchronous circuits, computer arithmetic, memory systems and algorithmic state machine design; computer-aided design (CAD) methodologies and tools.

5 units; Lecture 3 hours, Laboratory 6 hours

Fall, Winter, Spring Quarters

**Required Knowledge / Skills**

- Experience with Transient or time/pulse responses of R-C circuits, R-L circuits, and R-L-C circuits.
- Experience with digital logic, i.e., TTL, CMOS, LSI, MSI, and system design issues.
- Experience with DRAM, SRAM, ROM subsystem design with multiple IC chips.
- Experience with design tools such as Design Works, Power View, VHDL or others.
- Experience with simulation.
- Experience with sequential machine design.
- Experience with sequential machine design using FPGA, E-FPGA or PAL/PLA/ROM, and computer-aided design tools such as Xilinx, Synopsys.

**General Tasks and Responsibilities**

Laboratory teaching, laboratory notebook grading, pre-class or pre-lab preparation, exam grading, attend TA/reader meetings.

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## EEC180B – Digital Systems II

Prerequisite: courses 110A and 180A. Multi-input/output sequential digital systems; timing/pulse circuits: TTL, CMOS, ECL logic elements; analog switch; sample/hold; A-D-A converter design; system noise: grounding, shielding, cross-talk; reflection; memory systems; CAD with PLD/PAL; CAD with Xilinx FPGA.

5 units; Lecture 3 hours, Laboratory 6 hours

Fall, Spring Quarters

**Required Knowledge / Skills**

- Experience in the following areas is necessary:
    1. digital logic design: combinational logic, PLAs, flip-flops adders, finite-state machine design, ROM, RAM
    2. CAD Tools: Powerview (Viewsim, Viewdraw) Xilinx (XACT)
- Experience in the following areas is desirable.
    1. Computer Architecture
    2. Field-Programmable Gate Arrays
    3. Hardware description languages such as Verilog or VHDL.

**General Tasks and Responsibilities**

Laboratory teaching, pre-class or pre-lab preparation, exam grading, office hours, conduct problem session, attend TA/reader meetings.

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**Matlab TA – Required Knowledge / Skills**

- Coursework background in signal processing (EEC150A-B, EEC201 preferred).
- Experience in the use of Matlab for signal processing analysis and design.
- Experience in the use of HP-UX operating system.

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**Computer Aided Design (CAD) (FWS) – Required Knowledge / Skills**

- Experience with HSPICE.
- Taken EEC100 or equivalent.
- Experience with the HP-UX operating system.

Computer Aided Design (CAD) (F only)

- Experience with hspice, MAGIC, PowerView, WORKVIEW (or other schematic capture programs), IC layout programs, Logic simulators like VIEWSIM, Synopsis, Cadence, or others Block diagram level simulators like SIMULAB and MATLAB.
- Experience with the HP-UX operating system.
- Taken EEC218A

# Orientation and Training

## Campus TA Orientation

All new Teaching Assistants, and all TAs new to the Davis campus are required by the Office of Graduate Studies to take part in the campus-wide TA orientation prior to beginning their teaching duties. Experienced TAs who have yet to attend an orientation also should plan on attending. Those graduate students who may not be serving as TAs until winter or spring quarters are welcome to attend the fall program. The program provides graduate students with an introduction to the important roles teaching assistants play in undergraduate instruction and to value of the experience as an integral part of their graduate education. This orientation program begins with a general assembly during the first week of the Fall Quarter and is followed by a variety of TA Training Workshops. During the Winter quarter, there may be additional workshops offered.

The Fall 2008 Orientation will be held on *TBD*. New TA's must register online prior to the orientations at http://cetl.ucdavis.edu to receive an email reply which serves as their entry ticket. TA's who are international students (including international students from English-speaking countries), or for whom English is not their first language should attend an additional session: Monday, September 26 at 9:30-10:50am or Tuesday, September 27 at 9:30-10:50. These sessions will be held in 226 Wellman Hall. Please contact Nancy Davis if you are unable to attend the orientation.

## International Student SPEAK Test

To assist departments in making informed TA appointment decisions, and to help better prepare international students who may be eligible to serve as Teaching Assistants, the University requires that all international graduate students take the SPEAK Test for spoken English proficiency prior to beginning duties as Teaching Assistants. [Note: International TAs from English-speaking countries may be granted waivers from this requirement upon written request from their department chair to the Office of Graduate Studies.] For more information and the testing schedule, follow the link below:

SPEAK Test

If you have any questions about either the Fall TA Orientation or the SPEAK Test Program, please contact the Teaching Resources Center by phone at 752-6050 or by email trc@ucdavis.edu.

## Course Orientation

When you received your course assignment for a quarter, you will be directed to contact the faculty member in charge of the course. You should make this contact as soon as possible to receive an orientation to the course and your responsibilities. In meeting with the instructor, the following topics should be discussed:

- Your general responsibilities in assisting with the course.
- Whether or not you will be expected to attend lecture or discussion sessions.
- Your assignment and schedule for staffing a laboratory section.
- Your responsibilities for preparing laboratory materials.
- Your responsibilities and schedule for preparing problem sets, their solutions, and grading guides.
- Your responsibilities in supervising an undergraduate reader.
- Your responsibilities and schedule for administering and grading examinations.
- Your responsibilities for course administration, including management of student records and the course web materials.
- Your office hours and location.
- The time and location of meeting with the instructor and the TAs assigned to the course.
- An estimate of your time required each week to meet the assigned responsibilities.
- Procedures for evaluating your performance.

## ECE TA Training Course

The ECE TA training course (EEC390) will be offered in the Fall. It is required of all ECE TAs who have not previously taken the course. It is open to all other interested students.

# Student Interaction

## Student Interaction

Many of the responsibilities of a TA involve close interaction with students. In these interactions, the students will ultimately benefit if you are a teacher who recognizes that there is a great deal of diversity in the classroom and who affirms and validates that diversity with sensitivity and understanding. The policies and standards for these interactions are presented in this section. Additional information is available through the following links:

UC Davis Principles of Community
Code of Academic Conduct

## Rapport

Possibly the most important aspect of the in-class teaching experience, and the one that will dictate the way you deal with problems, is the establishment of good rapport with the students. This is often easier for TAs to achieve than for professors because you are closer to your students in age and experience. You are still a student, you were recently an undergraduate, and you can better understand student concerns. As such you are often more of an "experienced peer" than an authority figure, thus making one part of your job easier and the other part more difficult. In the first case, you can talk to students on a similar level, thus making communication more comfortable and productive, and keeping you more accessible. However, as a peer you may have difficulty maintaining direction and discipline. But in both cases, establishing a sense of rapport will help.

Rapport refers to the kind of interaction you have with your students. How friendly are you in class and out of class? What subjects are open for discussion? Do you treat your students as individuals, as adults? How would you like them to see you in your role as teacher? All of these questions and many more make up what we know as rapport. It is the relationship you establish with your students, whether that relationship is comfortable and open, or detached and distant. Generally, the more comfortable the atmosphere in the classroom, the better the learning; a cold or detached relationship tends to alienate students and become a barrier to learning.

In the final analysis, of course, this is all up to you. The important thing is to find a level of rapport that is comfortable and workable.

## Ethics

TAs are also expected to uphold an acceptable level of ethical conduct. You should encourage learning, hold before the students the best of scholarly standards, demonstrate respect for the students, and act appropriately in your role as a teacher. You must foster honesty, assure accuracy in evaluation, respect the confidential nature of the teacher/student relationship, avoid any exploitation of students, and protect their academic freedom. Types of unacceptable conduct include:

- Failure to meet the responsibilities of instruction regarding your appointment.
- Discrimination against a student on political grounds, or for reasons of race, religion, culture, sex, or any other arbitrary personal reason.
- Use of your position of power as a TA to coerce the judgment or conscience of a student or to cause harm to a student for any arbitrary or personal reason.

## Students with Disabilities

The following are guidelines for accommodating students with disabilities, suggested by B. G. Davis in *Tools for Teaching* (San Francisco: Jossey-Bass, 1993).

- Ask your students to clarify any special needs.
- Remember that disabled students are students first, disabled second.
- Be sensitive to nonvisible disabilities.
- Understand that learning disabled students have average or above-average intelligence and may have perceptual deficits which hinder information processing and may need more time for exams.
- Check with the Disability Resource Center.
- Ensure classroom access.
- Observe seating needs.
- Ensure access to out-of-class activities.
- Follow good teaching practices.
- Be aware of cassette recorders–speak clearly.
- Face the class when you are speaking.
- Hand out written lists of technical terms.
- Make reading lists available in advance if possible.
- In conversation, directly address the student, not an aide or interpreter.
- Repeat questions as necessary.
- Listen attentively when a student with a speech disability is speaking.
- Do not interrupt.
- Make computer disks available to students if necessary.
- Provide appropriate test-taking conditions. (Consult your professor.)
- If necessary, select close captioned films and videos.

## Ethnic, Gender, Cultural Diversity

Davis also provides guidelines for responding to ethnic, gender, and cultural diversity that should be considered by all TAs as well as instructors.

- Recognize any biases or stereotypes you may have absorbed.
- Treat each student as an individual with respect.
- Be sensitive to terminology.
- Become more informed about the history and culture of groups other than your own.
- Convey the same level of respect and confidence in the abilities of all your students.
- Don’t try to *protect* any group of students.
- Be evenhanded in how you acknowledge students’ good work.

- Recognize the complexity of diversity.
- Make it clear that you value all comments.
- Monitor your own behavior in responding to students.
- Speak up promptly if a student makes a distasteful remark, even jokingly.
- Avoid singling out students as spokespersons for groups.
- Be sensitive to students whose first language is not English.
- Assign group work and collaborative learning activities.
- Encourage all students to come to office hours.
- Provide opportunities for all students to get to know one another.
- Find a comfortable alternative to using generic masculine terms such as "he" and "man," as they tend to evoke masculine images, and render women invisible or peripheral.
- In asking questions during office hours or laboratory, call on men and women equally.
- Do not allow others to interrupt women more often than men.
- Respond equally to comments made by both men and women.

Most of the above are common-sense guidelines and are relevant to all good teaching. Similarly, dealing with diverse student learning styles and information processing strategies calls for using a variety of teaching styles and opportunities.

## Sexual Harassment

The University of California defines sexual harassment as unwelcome sexual advances, requests for sexual favor, and other verbal or physical conduct of a sexual nature when:

- Submission to such conduct is made either explicitly or implicitly a term of condition of instruction, employment, or participation in any University activity.
- Submission to or rejection of such conduct by an individual is used as a basis for evaluation in making academic or personnel decisions affecting an individual. or
- Such conduct has the purpose or effect or unreasonably interfering with an individual's performance or creating an intimidating, hostile, or offensive university environment.

In determining whether conduct constitutes sexual harassment, consideration must be given to the totality of circumstances, including the nature and frequency of the conduct and the context in which the incidents occurred.

The University of California has developed a **Faculty Code of Academic Conduct** which applies equally to TAs. Faculty are to be held to the principle that "*As teachers, professors . . . demonstrate respect for the student as an individual, and adhere to their proper role as intellectual guides and counselors… They avoid any exploitation of students for their private advantage…*" Among the types of unacceptable faculty behavior is the "*Use of the position of powers of a faculty member to coerce the judgment or conscience of a student or to cause harm to a student for arbitrary or personal reasons*.

A resolution of the Academic Assembly of the University concludes, in part, that "*a single and even mutually welcomed advance to a student by an instructor must be regarded by the academic community as a serious breach of professional ethics and proper standards of professional* *behavior.*" Although the resolution is limited to instructor relationships with current students, instructors should note that relationships initiated after the class or other academic role has ended may result in many of the same problems as would occur with current students. Instructors should be aware that relationships with students which appear to be consensual may, in fact be unwelcome. In addition, even in cases of truly consensual relationships, other students may feel that they are disadvantaged or otherwise negatively affected by an instructor/student relationship. These "third party" sexual harassment complaints are recognized in the law.

Instructors may be misusing their power if they:

- Make personal jokes or comments about students.
- Pressure a student to spend time with them outside the academic setting, including urging a student to get romantically and/or sexually involved.
- Ask a student personal questions which make the student uncomfortable.
- Touch a student when and where the student doesn't want to be touched. This could include hugging, grabbing, brushing against him or her, sitting or standing too close, and more.
- Ask a student for sexual favors in exchange for a better grades, recommendation or other academic benefit.

If you encounter a problem or situation that could be interpreted as sexual harassment, you should inform the instructor of the course or the Vice Chair for Undergraduate Studies or call 2-2255 to consult with the campus Sexual Harassment Education Program.

## Disclosure of Student Information

Campus policy and procedure (UCD Policy and Procedure Manual Section 320-21) regarding privacy of and access to information contained in student records is guided legally by the Federal Family Educational Rights and Privacy Act and when the law is silent, it is guided by two principles: (1) the privacy of an individual is of great weight, and (2) the information in a student's file should be disclosed to the student on request.

With regard to the disclosure of grades, graded papers, or examinations, the following procedures may be followed without signed consent of the student involved:

- Grades may be posted using an identifier known only to the instructor and the student (an exam number or the last 6 digits of the student's ID number).
- Papers may be distributed in class, folded or arranged so that the grade or score is not readily visible.
- Students may be requested (not required) to provide stamped self-addressed postcards for grades.
- The student's individual grade may be distributed to the student's individual email account.

All other procedures for posting grades or distributing examinations require the use of a consent form. Responsibility for preparing the consent form rests with the instructor of the course.

## Academic Dishonesty

UC Davis has an Academic Code of Conduct. This means that students are to police themselves and to officially report any instances of academic dishonesty to the Office of Student Judicial Affairs and the Campus Judicial Board. Penalties can range from a written letter placed in the student's file to complete expulsion from the university.

Most instructors take certain precautions to limit dishonesty, especially with respect to examinations. You should discuss this issue with the instructor in charge of the course for which you are a TA. You have the responsibility to inform the faculty in charge of any instances of academic dishonesty that you become aware of.

Student Judicial Affairs
Academic Code of Conduct

## Challenge to Authority

Often when a disruption occurs in class you must decide whether to deal with it immediately or defer it to office hours. There are no hard and fast rules in this situation, and often you have only a split-second to decide. This is where your knowledge of the class and your plans for the section come in handy. If the issue in question is clear-cut and can be dealt with immediately, then by all means do so. However, problems often arise that must be taken out of the classroom to office hours.

The most difficult situation to deal with is a challenge of authority; as when a student is making demands or trying to intimidate you in front of the class. In such a situation, someone will have to lose, but you cannot afford to lose and neither can the student. When one-to-one conflicts occur, they can easily expand to fill the silence which ensues, thus growing to a size which is unmanageable. The key is to defuse such situations by taking them outside the classroom. A simple phrase like "Let's deal with this in office hours" or "I don't think we need to take up class time for this, let's talk about it afterwards" can serve to relieve the tension of the situation and defer it to a more productive and less threatening forum. This also lets the student in question know that the issue will be dealt with at a specific time, thus saving egos on both sides.

Knowing when to defer and when to deal with a situation comes only with time and experience. In general, the rule of thumb is to defer all major conflicts and antagonisms, and deal in class with simple disruptions. In the case of more difficult problems, such as academic dishonesty, it is vital to let the class know how you intend to deal with the situation before it arises. Be consistent, then deal with the actual incident outside of class. This will retain your authority, strengthen your contract with the students, and allow you to deal with the problem on a one-to-one basis.

Dealing with Disruptive Students

## Assisting Students

The most important function and responsibility of a TA is to assist students to learn the material presented in the course, primarily through answering their questions in office hours or laboratory sessions. The key is to assist their learning, as opposed to doing their assigned work for them. While this may sound like a clear distinction, you will find that this is not always the case. In this section, an attempt is made to clarify the role of the TA.

To effectively educate future engineers, the academic environment should emulate an industrial environment to the extent possible. The TA should function as a senior engineer, who has worked on problems or projects similar to those of the students (junior engineers), but who is not actively working on their problem or project. Thus, the TA should provide advice as to the approach that should be taken, mention key elements that should be considered, but should not provide details of the problem solution or project development. This will often be a frustrating process for the TA, who will often know the answer to the problem, or the best approach to a project design, but must allow the student to discover this answer or approach on his/her own.

An important element of engineering education is to encourage students to become independent learners. Electrical engineering and computer engineering are disciplines that are changing and evolving rapidly, requiring engineers to continually learn new concepts, approaches, and technology. For many of our students, this is a significant change in approach to education and learning, as they are accustomed to receiving a substantial amount of detailed guidance in high school or community college.

One objective of an engineering educational program is to teach students to "think critically". A "critical thinker" is one who is proficient at assessing and analyzing facts, approaches, and concepts, and uses this ability to solve complex problems. The problems often require a significant level of synthesis of related material. Many researchers believe that critical thinking can be taught. Although a thorough discussion cannot be given here, a few comments are provided. It is hoped that you might become interested and investigate further.

Encourage students to take time to struggle; it is an important part of learning to think critically. When questions are asked, require that they be precise. Students have a natural tendency to look for a quick answer, to find an appropriate question and blindly plug numbers into it. Discourage their belief that your job is merely to "spoon-feed" them all the necessary facts they need to be engineers and that their task is to simply regurgitate that information during exams. Engineers must have critical thinking skills. It is insufficient to merely find an appropriate equation and have a calculator or computer handy.

Closely related to critical thinking is "learning strategy." Encourage students to analyze their strategy. The following points are suggested:

- Many students pack away information as one would put eggs in a carton: each item carefully packed in its own isolated compartment. This is an unproductive way to learn. Encourage students to build as many connections as possible between the pieces of information they learn. Learning is easier if you integrate the facts into a framework as you go.

- Information is recalled more easily if all the facts are stored as part of a system of ideas.
- Problem solving mostly consists of stringing ideas together in new combinations. Thus, practice in finding connections between ideas can be a big help when confronting a new problem.

## Teaching Problem Solving

One of the most important and difficult tasks of an ECE TA involves assisting students with problem solving. We often assume that a person who is good at solving problems will be a good problem solving teacher. Unfortunately, this is not always the case. Knowing how to do a problem yourself is very different from teaching others how to solve a particular class of problems. The reasons for this can be found in an examination of the skills involved. When presenting a problem solution, problem solvers tend to aim for neatness, precision, elegance, etc. But such an approach actually hinders teaching because all the mental steps which go into the examination and solution of the problem are essentially concealed in favor of elegance and impression. Therefore, it is important to shift your emphasis. As a teacher, your goal is to make problem steps as obvious as possible, thus, enabling the students to see every step along the way to the solution. You should also avoid taking anything for granted, because a computation or explanation you consider to be obvious is often quite alien to your class. The key is to clarify all of the steps needed to solve the problem.

The following is a list of suggestions for becoming a good problem solver:

- Read the problem assignment carefully and write out all the information given (concentrate on meaning).
- Figure out which information is relevant and which is unnecessary.
- Don't start to work the problem before reading all the material.
- Use prior knowledge and experience to clarify confusing ideas.
- Understand the problem in terms of what is being asked and what you are looking for.
- Systematize problem steps; make a flow chart.
- Work backwards from the problem goal to highlight intermediate steps.
- Determine whether the procedure you are following will actually help reach the goal.
- Use diagrams.
- Translate word problems into equations or vice versa for clarity.
- Decide what aspects of a theory you are likely to need.
- Break problems into their component parts.
- Do easier and more obvious steps first and look for clues to solving the rest of the problem.
- Restate the problem in terms of models or types of problems that are already familiar and hence more accessible.
- Determine whether the answer you derive is reasonable in terms of the problem.
- Make a rough estimate of what the solution might look like, and use it to check progress.
- Re-check the accuracy of all derivations and calculations.
- Solve the problem in more than one way and compare the answers obtained.

- Develop a list of assumptions about the problem and determine whether they are reasonable.
- Once you have developed a procedure for solving a problem, try the procedure on another similar problem to determine whether it is consistently useful.
- Maintain a positive attitude about solving the problem.
- Be persistent in pursuing the solution.
- Take periodic breaks to let your unconscious mind process the information.
- Write down all steps in solving the problem so that you can check your procedure completely.
- Explain the problem to someone else to clarify thinking processes and assumptions.
- Analyze difficult points as keys to solving the problem.
- Keep a record of difficult problems and use it to determine consistent problem solving weaknesses.
- Summarize the solution after finishing a problem to help in retaining the process, thus preparing for similar problems.

Here are some suggestions for helping students with their problem solving:

- Ask students to think aloud.
- Ask specific questions about their approach:
- What do you know about this problem?
- Can you break the problem into smaller steps?
- What are some strategies you could use to solve the problem?
- Why did you do that?
- How did you get from step 1 to step 2?
- Will you please explain your reasoning behind that step?
- Is there a simpler or alternative method?

## Office Hours

In many courses, the TA will be asked to schedule regular office hours to answer student questions about all aspects of the material presented in the course. It is generally best to invite all students into your office together and to allow all of them to hear the questions and your responses. For two or three students, you can meet around a table and answers can be sketched out on paper. If more students are in attendance, it is better to stand at a white board to present your responses.

During office hours, the TA must respond to numerous questions from students about problem assignments and it is important to develop a strategy for responding to these questions before meeting with the students. Review the problem assignment and the solutions if they are available, or think through the approach to the problems if the solutions are not yet available.

Before the problem assignments are due, you should only clarify the problem assignment and resist answering detailed questions about problem solutions. You might discuss examples of solutions to related problems, but these should not be so similar to the assignments as to reveal the solutions. Respond to many questions with questions of your own. Ask what approaches they have considered, what mathematical, analytical, or design tools could be employed. You can suggest a general approach, but do not provide the details of the approach. Resist commenting if the students ask you if they have taken the best approach, or if they have gotten the correct answer to a problem. Encourage students to question and guess. Students learn best when they formulate questions and attempt to devise their own answers. They should be strongly encouraged to think first and to ask later. Some students will come to office hours with the thought that you will jointly work out the problem solutions. You must firmly explain that this is not the purpose of office hours and that the student is expected to solve the problems independently.

You should attempt to spend the majority of your office hours explaining solutions to problem assignments that have already been submitted by the students. At this point, you are free to discuss all aspects of the problems and to discuss solution techniques in great detail.

Attendance at office hours will increase significantly immediately prior to an examination. You should be prepared to review all material to be covered on the examination. You should allow students to guide the session by asking questions, but if they run out of questions, you should be ready to discuss some relevant examples. If you have reviewed the examination prior to the office hour, you should be careful not to divulge the questions on the exam. However, if a student asks you to solve a problem that happens to be very similar to a problem on the exam, you should answer in as much detail as necessary.

# Problem Sets

Problem sets are assigned in most of the undergraduate ECE courses and TAs usually have responsibilities for assisting in preparing the assignments, solutions, and grading guides. If a reader is assigned to the course, the TA is usually asked to supervise the grading of the problem sets by the reader.

## Preparation of Assignments

Problem set assignments are usually prepared by the instructor, but the TA may be asked to assist. The TA may be asked to make minor changes to assignments that were used in the course previously and to prepare the assignment as a paper or web document.

## Preparation of Solutions

The TA is usually asked to prepare solutions for the problem assignments. If the assignments have been used in the course previously, this may only involve modifying previously prepared solutions. The solutions should be prepared soon after the assignment has been completed, so that they will be available to the instructor and TAs prior to office hours.

Solutions should be very neat, to encourage neatness by the students. Give full explanations of all difficult steps. Give different forms of the answer if there are any. Give alternative solution methods if these are important.

The solutions should be made readily available to the students, which may include scanning them to place them on the course web pages and/or taking a master copy to one of the copy shops on or near campus (confer with the course instructor to see what they want done).

## Preparation of Grading Guide

A grading guide should be prepared by the TA for use by the reader. It is often not worth the effort to prepare a guide for each problem, as a general guide is adequate. The following is a suggested guide (you should always discuss the grading procedures with the instructor)

Each problem on a problem set is worth 5 points, with points allocated as follows:

> Problem solution: 4 points
> Attempted: 1
> Major errors: 2
> Minor errors: 3
> Correct: 4
> Neatness: 1 point

Comments can be provided about neatness for the first couple of weeks and then points can be deducted.

Late problem sets can be given 2 points per problem unless the problem set has been initialed by the instructor, in which case it should be graded for full credit.

## Collecting and Returning Problem Sets

Problem sets can be collected in class or the students can turn them into a problem set box. If they are collected in class, the instructor can make arrangements to pass them to a TA or reader. The preferred method is to use a problem set box in 2131 Kemper Hall. Box assignments and keys are available from the Advising Assistance, Maria Parker, in the ECE Office. A TA should obtain a box assignment, pass the key to the reader, and place a label on the assigned box. Students can then be directed to turn their problem sets into the box by an announced deadline. Graded problem sets are usually returned in a lecture, discussion, or laboratory session, but they may be placed in a publicly accessible location for the students to pick them up IF the students have signed a permission form.

## Supervision of Readers

A TA is usually assigned the responsibility of supervising the reader in a course. This task includes making the arrangements to deliver problem sets to the reader along with the solutions and grading guide, providing general instructions on grading, and explaining how to record the scores and when and where to return the problem sets.

The following are suggestions on grading to be passed to the reader:

- Give constructive criticism to the students and refrain from writing comments that would upset them.
- Look at more than just the answers and be careful to check whether the answer has several forms. Try to find and point out errors if you have enough time.
- Write the student's score on the outside of the problem set, in the form X/Y, where X is the score and Y is the maximum number of points possible.
- Record all scores by hand, to be later entered into a computer database.
- If many students make the same mistake on a problem set, relay this information to the instructor so that clarifications can be made in class.
- All requests for regrading should be forwarded to the supervising TA.

## Regrading Problem Sets

A TA is normally responsible for handling complaints about problem set grading. The instructor should ask students with complaints to resubmit the problem set with *written* complaints. These will be passed to the TA for regrading. Regraded problem sets should be returned to the instructor to hand back to the students in class. If the students still have complaints, the instructor should handle them.

## Examinations

TAs often have major responsibilities in grading examinations and in many cases they are involved in preparation of the exam and solutions, and in administering the exam.

### Preparation

The faculty member in charge of the course is responsible for the planning and preparation of examinations, but the TA may be asked to assist.

A TA is often asked for ideas for exam problems, which can be expanded upon by the instructor. A TA's contact with students in office hour or laboratory gives him/her a clearer idea of the concepts and material that students should understand but have difficulty with. Furthermore, a TA would be expected to have recently taken a similar course and should recall key topics that should be addressed on an examination. Give serious thought to possible problems and provide these to the instructor, even if you haven't fully developed the ideas.

A TA may also be asked to do the word processing for an examination from rough notes provided by the instructor. Complete this task well before the scheduled examination to allow the instructor time to review the examination.

Copies of the examination can be requested from Roberta Schreiner in the ECE Office. Originals should be provided 24 hours prior to the examination.

### Solutions and Grading Guide

A TA is often asked to prepare solutions for the examination problems. Preferably, these solutions should be prepared before the exam is given, so that any errors can be found and corrected. The solutions are prepared both to aid in exam grading and to distribute to students after the exam has been graded and returned.

The solutions should be very neat, to encourage neatness by the students. All of the steps in a solution should be detailed. Different forms of the answer should be given if there are any. Alternative solution methods should be given if these are important.

In consultation with the instructor, a grading guide should be prepared. Points should be allocated for each problem and section of a problem. Deductions for anticipated errors should be specified.

### Administration

TAs may be asked to administer examinations, a task that requires more preparation than might be expected. This preparation ideally should begin when the exam is in draft form. Review the exam in detail, preferably preparing full solutions. Discuss with the instructor any errors or questions that could be misconstrued by the students. If the exam has already been prepared and copied, discuss with the instructor any problems you encountered and agree on how these problems should be addressed at the time you administer the exam. Also discuss with the instructor the questions the students might be expected to ask during the examination and how you should respond to these questions. Ask about the rules that have been established as to the materials the students may use during the examination (books, notes, calculators, etc.) Complete your preparation by making sure you know the time and location of the examination and by ensuring that the exam will be copied and delivered to you in time.

Plan to arrive early at the exam location to prepare to administer the examination. If possible, arrange the chairs in the room to separate the students. Answer any last minute questions the students may have. Provide oral and written instructions concerning *allowed* or *not allowed* materials to be used during the exam and see that these instructions have been followed. Explain the time limit on the exam and the procedures you will use to retrieve the exams at the end of the exam period. Announce the number of pages and problems on the examination. Pass out the exam copies, asking students to leave them face down until all exams have been distributed. When you are certain that all students have received an exam and you have retrieved the extra exams, announce that the students can begin work.

During the exam, you can expect students to ask questions, which must be answered very carefully. You should only answer questions to clarify the questions being asked on the examination. If a student has discovered an error on the examination, this should be corrected with an announcement and a note on the board. If several students have asked about the same clarification, this should also be announced and explained on the board. Some students will invariably “fish” for more information and you must not give them an unfair advantage. You should not provide confirmation if they ask if they have taken the correct approach to the solution of a problem.

If there is no clock in the room, write the time on the board every 10 minutes. Count the number of people taking the examination.

Remain in the room during the entire exam period to proctor the exam. Scan the room occasionally to detect and guard against academic dishonesty.

The following are strategies for confronting possible academic dishonesty during the exam:

- Announce that all work is individual–no looking at other papers.
- Announce that no talking is permitted during exams or quietly ask *talking students* to stop.
- If a student is using notes or has notes visible that are not allowed to be used during the exam, discreetly confiscate the notes or ask student to put them away.
- Do not stop a student from completing the exam, even if you believe that there is cheating instead, interrupt the misconduct as described above.
- Identify those involved by setting their exams aside and recording their names.

For further information on preventing and/or reporting academic dishonesty, refer to:

Student Judicial Affairs
Academic Code of Conduct

It can be a difficult process to get students to turn in their examinations at the end of the period and you should be well prepared for this process. If there are more than about 60 students in the class, it helps considerably to have a second person to assist with this process. At the end of the period, declare the exam over and give students two minutes to complete their work and to write their names on their exams. At the end of the two minute period, tell students to drop their pencils and turn their exams over. It is often best to ask the students to remain in their seats and to pass their exams to the end of the aisles where you can retrieve them. As one person retrieves the exams, the second person should pick up exams of those students who have not followed the instructions to stop working. It may be necessary to penalize those students who don't follow instructions, but if this approach is taken, it must be announced at the beginning of the exam session.

Upon return to your office, staple exams as needed, then count and record the names of students who submitted an examination.

## Grading

TAs are typically responsible for a substantial portion of the effort in grading exams. If there will be more than one person involved in the process, such as a TA and the instructor, or several TAs, the first decision to be made is how to divide the work and how to carry out the process. The grading is invariably more consistent if each problem is graded by one person. If this recommended method is chosen, a decision must then be made to either grade the exam as a group, or to pass the exams around and to do the grading individually. The group approach is recommended if any of the graders is inexperienced and needs close supervision, such as the use of an undergraduate reader as an exam grader. The group approach also gets the job done faster and may be necessary in the case of the final exam. If the exams are to be passed around, a secure method of transfer must be decided upon. The boxes in 2131 Kemper Hall or lockers in the instructional labs can be used for this purpose.

As you begin grading, you should first carefully review the problem statement, solutions, and grading guide. It is often advantageous to quickly scan the solutions of several students to see if the approaches they have taken fit the grading guide. If not, the grading guide should be modified to accommodate their approaches.

You should develop a consistent and readily understandable method of marking the exam problems. It is suggested that you indicate errors with a cross (X) and correct responses with a check. Circle or underline errors and provide concise explanations. Give constructive criticism only, as attempts at humor or sarcasm are inappropriate on exams.

Allocation of points can be made in two ways. If the solution is mostly correct, the points deducted for each error can be indicated in the margin. Total the deductions and mark the score near the beginning of the problem solution in the form X/Y, where X is the assigned score and Y is the maximum possible score for the problem. If the solution is mostly incorrect, it is best to simply make a judgment call as to the assigned score and to simply mark it in the form X/Y, making no attempt to indicate deductions in detail. The score should then be carried forward to be recorded in a table to be prepared on the back side of the first page of the exam booklet. List the problem numbers in the first column and the scores in the second column. By recording the scores on the back of the page, the exams can be distributed without revealing the scores to other students, preserving privacy.

As you encounter errors in the students' work and make decisions about point deductions for these errors, record notes on the deductions on your grading guide to help maintain consistency in your grading. If a student has taken an approach to a problem that differs significantly from those in your grading guide, you may need to develop a detailed solution and grading guide based on the approach.

Each exam should be marked to indicate the extent of the student's work. Strike a diagonal line across unused pages. Record a note on the exam if no work was found for a problem. If very little work appears for a problem, strike a diagonal line through the remainder of the page. These actions will help to prevent students, after the exam has been returned, from altering their work and claiming that you failed to grade some of it, and asking for a regrade.

Don't be concerned if your grading goes very slowly at first. After you have graded a substantial number of exams, you will have encountered most of the errors the students will make and you will have memorized the point deductions, so your work will go much faster. Do the grading slowly and steadily, taking frequent breaks, so that your work will be accurate. In some cases, you will encounter an approach that you either don't understand or which doesn't fit your grading guide. Set it aside and return to it later when you have more experience with the exam. If it still doesn't make sense to you, refer the problem to the instructor.

## Regrading

In consultation with the instructor, procedures should be established to review the grading of exams, if requested by the students. A good way to handle this is to require the student to resubmit his or her exam with written statements as to what was missed or unfairly graded on the exam. These requests should be reviewed by the instructor or TA who originally graded the problem in question. Adjustments in grading should be made, following the original grading guide, if this is justified. An explanation should be given if no change in the grading is to be made. The regraded examination should be returned to the student in a class session. If the student is still unsatisfied with the grading, the student should then be directed to meet with a TA, or preferably, with the instructor.

# Laboratory Instruction

Another important function of the TA is assisting with laboratory instruction. In the laboratory, as in other teaching situations, you may be asked to prepare the assignment and set up the learning environment. You will certainly be responsible for staffing the laboratory and grading laboratory notebooks or reports. However, teaching in the lab does have elements which differ from other teaching

## Preparation

If you are asked to assist with the preparation of laboratory assignments, you should work closely with the instructor to develop materials that meet the objectives of the course and which are well coordinated with the lecture presentations.

If you didn't assist in the preparation of the laboratory assignments, you should familiarize yourself with these assignments. Discuss the assignment with the instructor and experienced TAs. With this preparation, you will be able to anticipate student questions and problems.

Study and be familiar with the relevance of the lab and the theory on which the experiment is based. A lab is only a practical performance of a theoretical premise. To truly understand a lab you must understand the theory behind it. This will also prepare you to respond more effectively to student questions. You also need to be familiar with other applications of this theory to "real world" problems, thus demonstrating that the experiment has a wider application.

Be in control of all materials necessary to complete the experiment. Know what instruments and equipment are be required, where to get them, how to operate them, and how to make adjustments (only in cases of minor malfunction). Know what other materials (breadboards, electronic components, etc.) are needed, where they are stored, and how they are to be handled. You can make these arrangements for electronics labs by working with the Laboratory Assistant, Jim Gage 2136 Kemper Hall. Above all, be aware of any dangers involved in the use of these materials and make sure the students understand how to use them and know about other relevant safety procedures as well.

If you are not familiar with a lab project, you should complete the project yourself in advance. Just because the manual states that an experiment can be performed in a certain way, there is no guarantee that it will work for you. It is therefore important to complete each project yourself before students encounter it in the lab. In this way you will be familiar with the procedure, the problems, and the short cuts involved. You can alert the students to potentially difficult areas and possible responses, and estimate the amount of material needed for the class. Pre-performance is the best way to avoid the unexpected and prepare yourself for the many problems that can occur in a laboratory.

Plan the best way to introduce the project. It is usually helpful to make a short statement about the lab before allowing the students to begin work. Decide beforehand what needs to be demonstrated and what can simply be explained. Is the manual enough or will you need an extra handout? If there are formulas the students will have to access, you might consider writing them on a handout or on the board. Should the students work in pairs or is there enough of everything to go around? Determine how much theory is needed before they can proceed and how best to communicate the material. Finally, are there short cuts that will enable the class to finish on time; are there pitfalls they may encounter? All of this must be decided before you enter the laboratory.

Visualize each class meeting and try to understand exactly what will transpire. Develop a plan for how to use the time and decide how to handle different situations that may arise. The instructor in charge will have given you explicit instructions. Use these directions and make notes to yourself so that you can run the meeting efficiently.

## Conducting the Lab Session

In most classes having laboratory sessions, the TAs are fully responsible for conducting the sessions. Each TA will typically be responsible for about 20 students in each 3-hour lab session.

Throughout the term, you should arrive early and start promptly. By starting promptly, you let the students know that they must arrive on time to get the full benefit of the pre-laboratory discussion.

At the beginning of the first lab session, write pertinent information such as your name, the course name, number, and section on the whiteboard. Discuss the text materials that will be used in the course. Give your office hours and location. Take roll to learn names and to learn who is present. If students are to work in groups, form the groups as directed by the instructor. Assign groups to lab benches and record their locations.

Set and maintain the proper tone for the laboratory. The students should understand that you plan to be prepared for each laboratory and that, in the future, they should be prepared as well. The best way to do this is to be as organized as possible. This is where you will, in a real sense, set the ground rules even though you may not actually list them. Generally, what you do this first day will affect how the entire quarter proceeds. For example, do not allow students to talk when you are speaking. Be businesslike when you speak so the students will know that you are serious about your role as a Teaching Assistant. You must have the respect of your students in order to be an effective teacher and this comes from being prepared, organized, confident, honest, enthusiastic, and willing to help.

Explain your role as a Teaching Assistant. Explain your goals and how you plan to attain them. Explain how you plan to lead the laboratory. Explain the importance of the pre-laboratory discussion and that students must arrive on time. Stress the importance of each student reading the assignment carefully before entering the laboratory.

At the beginning of subsequent lab sessions, you should address the students for a short time, outlining the work that they are expected to complete during the session, and answering any questions they may have. Announce relevant completion deadlines.

Assess the level of student preparation before beginning the lab. If a project has been planned based on a certain level of understanding on the part of the students, it is important to confirm that assumption before continuing. This is especially important if extra reading or research has been assigned. Such assessment can be accomplished by reviewing the preparation recorded in the laboratory notebooks, asking questions, offering a review of problem points, or calling for quick summaries from several students. The information you obtain about the students' level of preparation will dictate the continuation of the lab experience. If everyone is ready, go on as planned. If some are unprepared, make a note of those students because they will inevitably need extra help. If no one is prepared, consider how best to deal with the information that is missing and what your alternatives are as far as the lab is concerned.

During the lab session, circulate among the students in order to check their progress, answer questions and provide assistance. One of the best aspects of teaching in the lab is the level of contact you have with your students. Rather than a separation between teacher and student, the lab setting encourages involvement. Don't wait for questions or problems, be alert to what the students are doing so you can spot difficulties before they happen. Ask questions that can help lead them forward. Be mobile, moving around so as not to alienate students in the corners, but be careful not to hover or interfere with their work. The key is to be reasonable, friendly and accessible. You should be careful to guide the students in their work, rather than doing their work for them.

In a circuits laboratory, you should resist the temptation to operate instruments or modify the wiring on a breadboard. If students ask you to solve problems with a circuit, you should guide them in solving the problems themselves. Ask how they know that a circuit isn't working properly and what measurements they have made. Be VERY careful to observe their measurements, one of the most common errors students make is to improperly measure something and have the incorrect measurement result lead them astray. Be especially careful with the "auto setup" button on the digital oscilloscopes. It will frequently lock onto the wrong signal; have them check the horizontal and vertical scales and tell you if they are reasonable for the signal being examined. Suggest other measurements that they could make. Suggest isolating and testing subcircuits individually in order to identify problems. Give them time to work on the problem, returning to see that they have made progress. If they are still encountering problems, give them additional hints and suggestions.

In a computer laboratory, you should resist the temptation to take over the keyboard and execute commands to solve a problem presented by the students. Ask the students to explain the problem they have encountered and suggest possible approaches to its solution. Rather than monitoring their progress in detail, continue to circulate around the laboratory and return later to see that they have made progress on their problem.

At the end of the lab session, remind the students of completion deadlines and the assignment for the next lab session. Be sure that students have carefully cleaned their work areas before they leave.

## Evaluation

TAs are typically responsible for the grading of lab notebooks or reports. The TA should first discuss grading standards and expectations with the instructor. If a lab project has been used in a previous offering of the course, a grading guide or examples of graded notebooks may be available. From this information, prepare a grading guide for the assignment to be graded. In many cases, it is adequate to develop a general guide, in which points are allocated only for major topics that are expected to be covered in the notebook or report. If you are a TA for a course which has multiple TAs, special effort must be made to ensure that all TAs are grading as uniformly as possible. Clearly, one set of students should not be arbitrarily penalized because their TA has higher standards than another TA in another section of the same course. Two possibilities exist to normalize grading. First, all TAs for a given course can discuss grading strategy for each assignment or laboratory. As an alternative, the overall scores can be normalized at the end of the quarter. Discuss this issue with the instructor in charge of the course and develop a strategy.

## Safety

The ECE laboratories provide safe environments which TA's have an educational and legal responsibility to maintain. The following are general policies and guidelines;

- A TA is responsible for notifying the instructor/faculty supervisor or the department Vice Chair for Undergraduate Studies immediately of any unsafe or unhealthy conditions. Correct these conditions or activities where possible. If you are unable to locate either of these people, contact Carlene Blaylock, in the ECE Main Office (752-0583).
- If a personal injury occurs, the injured person must be taken to the Student Health Center (by ambulance if necessary). Paperwork must be completed within 24 hours (available in the ECE Office).
- No student is to be in the teaching labs at any time except under the supervision of department staff (TAs are department staff).
- No casual traffic through the teaching labs is permitted.
- No equipment is to be moved from the teaching labs, or moved from one bench to another.
- No equipment is to be opened or calibrated by anyone except Electronics General Services staff.
- Test cables, patch cords, or adapters are not be cut or modified.
- Bare feet are not permitted in any laboratory.
- Bicycles are not permitted in any laboratory.
- No food or beverages are allowed in any laboratory.
- Separate policies and guidelines apply and should be consulted for the IC Fabrication Facility, supporting EEC146A and EEC146B.

## Security

TAs are responsible for security and proper treatment and use of the equipment and instruments in the laboratories.

- Do not allow students to move instruments from one bench to another in the laboratories.
- Ask students to report instrument malfunctions to you. Verify that there is a problem, as many of the reported problems are simply operator error. Report confirmed problems to Jim Gage in 2136 Kemper Hall who will often be able to replace the instrument before the end of the lab period.

# Laboratory Notebooks

Students in many lab courses are required to prepare and maintain laboratory notebooks. TAs are expected to guide students in the preparation of these notebooks and to grade them. This section provides some guidelines for accomplishing these tasks.

A complete record of a student's work in the laboratory is to be maintained in an engineering notebook. Before explaining what is to be recorded in the notebook, it is necessary to differentiate between a notebook and an engineering report.

The notebook is a working document used to record all of the details of the work done in the laboratory. In an industrial setting, the notebook is primarily a record for your own use, although if you are working in a project group, other group members may refer to it occasionally. It has no rigid format, although some guidelines should be followed and are presented below. It should be neat and readable, although it is often written in outline form as a collection of short phrases instead of complete sentences. The important objective is to provide yourself with enough information to be able to recall exactly what work you have done on your project.

The engineering report is a formal document written to summarize the work completed on a project. It is often written at the conclusion of the project, but in the case of long projects, interim reports or progress reports are also required. This document is primarily intended for your supervisor, the project leader, or for other project managers. For example, for an electronic circuit, a description of the design, implementation, test, evaluation and performance would be included, but the day-to-day details would be left out.

In many courses, students are required to maintain an engineering notebook, but may not be asked to prepare any engineering reports. They must have their notebooks open on their lab benches at all times, ready for use in recording all of their measurements and observations. A problem with many laboratory courses is that the grading standards applied to the laboratory notebooks are so severe that students feel that they are required instead to write formal engineering reports. They begin to record their observations and measurements in the lab on scratch paper and then go home and edit the information before recording it very carefully in their notebooks. This is unfortunate because they then do not learn how to properly maintain a working notebook and they also view this as such a painful process that they may avoid it altogether when they begin working in industry. As a TA you should do your best to avoid this problem and help the students prepare and maintain a working notebook.

A lab notebook is a diary of activity on laboratory projects. It should be a continuous chronological account of exactly what was done, when it was done, and why. It should be complete enough that an engineer, using only the recorded material, could repeat any measurement, check any result, duplicate any set-up or even reconstruct the entire development.

A well-kept notebook provides a great help to an engineer in many ways, including the following:

1. **As a compact, handy, orderly reference book.** When you want a piece of early data, you can avoid digging through piles of stray sheets of paper on your desk or in your files by simply opening your notebook to the right page.
2. **As evidence of diligence.** Sometimes lack of progress is not due to lack of effort. But unless you can point to the record of your efforts in your notebook, wrong conclusions may be drawn.
3. **In avoiding repetition.** Lost, misplaced, or forgotten data often must be taken all over again. You won't have to go through this wasted effort if you keep good records.
4. **As a record of priority.** One of your sources of recognition is the designs you produce. Unless your notebook clearly shows the date of conception, the full description of the design, and the record of your subsequent efforts at reduction to practice, your position is weak and you may lose credit for what is really yours. This record is especially important when patents are involved. Whenever you have an idea that may be patentable, you should have the appropriate pages in your lab notebook witnessed (read, signed as having been read and understood, and dated) by at least one of your co-workers.
5. **As a guide to your thinking.** The ready accessibility of all data concerning your job facilitates review, helps you see where you are; what's been tried and what hasn't, points the way by revealing the best solutions to date. Even the time spent making entries is not wasted, as it forces careful consideration of your work and this often reveals errors or points overlooked.

As mentioned above, there is no rigid format for writing a lab notebook, but it is easier to follow later if a standard format is adopted. Again, the most important thing is to include all of the information that allows the writer or another engineer to understand all the work that has been done on the project and to be able to repeat any of the work to verify the results, if that is needed at a later date. The notebook must be neat and well-enough organized that needed information can be found when it is wanted. With these guidelines in mind, here is a general outline for documenting a lab project (it is assumed in the following that the project involves circuit design, but it applies equally to other projects):

1. **Objectives.** Briefly describe the objectives of the project: the circuit to be designed, implemented, and tested, and its intended use.
2. **Specifications.** Describe the technical and performance specifications that must be met by the circuit or system that is to be designed. It is perfectly acceptable to refer to published documents here rather than repeating them if they are lengthy. It is, however, wise to record whatever data you need while you are working.
3. **Design methodology.** Describe the procedures you followed in designing the circuit. Explain design decisions and write down all equations used and calculations made. Sketch rough schematics of the circuits, with nodes labeled for SPICE analysis. Include SPICE input commands and graphical outputs. It is perfectly acceptable to paste or tape into your notebook copies of printouts, photographs, plots and other items.
4. **Implementation.** Draw detailed schematics of all circuits built. These should be very complete, using functional schematics of integrated circuits instead of the pin-out schematics given in the data books. Label each terminal with its function were appropriate and give the pin number to help with troubleshooting. Measure the values of resistors and capacitors when they are critical to performance.

5. **Troubleshooting.** Describe the procedures followed in troubleshooting the circuits. Don't simply write "we tried it and it worked," but instead describe the test configuration, test signals applied, and measurements taken. Discuss how you concluded that it was working correctly. If it did not work properly, explain the problem and how you solved it. Discuss any redesign that was required. Keep a list of the equipment used. Since this list will not change often, list your equipment in the front of your notebook, and then list any changes as they occur. Give the manufacturer, model number, and serial number.
6. **Test and evaluation.** Explain the test set-ups and the measurements taken. Provide clear, organized graphs, performance tables and observations. Graphs should be drawn as the measurements are taken. In this way, you can visually detect anomalous values and quickly check these measurements to verify their accuracy. Explain what the data means by explaining how it agrees with the corresponding mathematical model. Your report should be more than just a collection of tables, graphs, and equations. Your interpretations and explanations of this material is the most important part of the report. If you realize that your data is not in agreement with theory, then explain why you think it is in error and what data you expected to record.
7. **Conclusion.** Summarize the work accomplished. Discuss any critical design factors. Compare the actual performance with the theoretical performance. Discuss alternative approaches.

As a TA you should strongly suggest that students use an 8 1/2-inch by 11-inch spiral ring gridded paper lab book to record their observations. The large size allows them to insert copies of application notes, and SPICE inputs and graphical output. The gridded paper makes it easier to draw schematics, graphs, and tables.

It is not necessary to record all information while working in the lab. Items 1,2,7 and parts of 3 and 4 above can be entered at home when students are preparing for the lab. This is similar to the common practice in industry, where engineers work out their paper designs at their desk, and then move to their lab benches to do the experimental work.

Other guidelines regarding a notebook include the following:

- All entries should be clearly legible, preferably in ink. The entries MUST be in ink if you want to use the notebook to help support a patent.
- The first entry should be dated at the beginning of each work period, whether in lab or outside of lab. Many notebooks and companies require you to sign and date EACH page.
- Make entries in chronological order. Do NOT leave blank pages (At the very least, this leaves the impression that you want to be able to go back and add something so that it will appear to have been your idea or will appear to have been done sooner than it was. Either way, the impression is bad and the actual practice is unethical at best and illegal at worst). If you are working on more than one project at a time, just interleave them in the notebook. You can put at the bottom of each page the page number of the next page relevant to that project (i.e., at the bottom of page 12, your book may say "go to page 34" if pages 13-33 do not apply to the project on page 12). You may also be allowed to keep different notebooks, one for each project.

- Cross out, but do not erase superseded entries. Leave them legible. NEVER tear out or obliterate pages.
- Include adequate topic headings to facilitate later search and indexing. Use explanatory text freely.
- Show schematics with element values of all tested circuits. Show block diagrams of test setups. Include instrument numbers. Indicate clearly where readings comprising recorded data were observed.
- Adequately label and reference all curves and coordinate axes. Graph sheets should be securely pasted in place.
- Intermediate calculations, if of no interest in themselves, may be made on scratch paper, but all premises and factors involved in the calculations and all results should be recorded.
- Many engineers get in the habit of recording almost everything in their lab notebooks, which is a good idea. Notes on telephone conversations with vendors and customers, lists of things that need to be done, ideas that are only tangentially related to the present project, all of these can be put in the lab notebook. When it used in that way, it becomes a nice chronological record of your work.
- Finally, a good table of contents is useful. Some lab notebooks have one at the front, if yours does not, you CAN label the top of the first couple of pages as a Table of Contents (label in ink) and then fill it in as you use the book.

# Course Administration

TAs often are assigned responsibilities for the administrative aspects of a course, such as maintaining student records and preparing and maintaining web materials.

## Enrollment

Enrollment in ECE courses is managed through the campus SISWEB registration system. Instructors and TAs are not able to add or drop students from a course or any of its discussion or laboratory sections. Students having problems with enrollment should be referred to the ECE undergraduate advisors.

## Student Records

TAs are often asked to maintain student enrollment and grade records. Instructors will need to grant proxy access to TA's in my.ucdavis.edu to perform this task.

Under the Federal Privacy Act, course scores and grades are not to be posted or otherwise made freely available. It is generally accepted on campus that these records may be posted if students are referenced only by the last six digits of their student ID. A better approach is to post records only for those students who have signed an authorization form. This issue should be discussed with the course instructor.

## Web Materials

For information on publishing course material on the web, follow the link below:

# Facilities, Materials, and Teaching Aids

## Instructional Laboratories

The following are the primary undergraduate instructional laboratories in ECE:

| Room | Positions | Equipment | Courses Supported |
| --- | --- | --- | --- |
| 1101 | 19 | HP Workstations | ENG6, EEC73, EEC100, EEC106, EEC110B |
| 1105 | 21 | HP Workstations | ENG6, EEC73, EEC100, EEC106, EEC110B |
| 2107 | 27 | HP Workstations | EEC180A-B |
| 2110 | 21 | Instruments, PCs | EEC70, EEC180A-B |
| 2112 | 11 | Instruments, PCs | EEC172 |
| 2147 | 10 | Instruments | EEC195A-C |
| 2151 | 6 | Instruments | EEC194A-C |
| 2155 | 13 | Instruments | EEC112 |
| 2157 | 11 | Instruments | ENG100, EEC100, EEC114, EEC118 |
| 2161 | 11 | Instruments | ENG100, EEC100, EEC114, EEC118 |

***Instruments* refers to electronic instruments, which in most labs consist of an HP 54600B digital oscilloscope, an HP33120A function generator, an HP8013 pulse generator, an HP6237 power supply, and a Fluke 8010 digital multi-meter. In 2155, the pulse generator is an HP8112 and the power supply is an HP3630A.

## Instrument Manuals and Tutorials:

- HP54600 Digital Oscilloscope (412K PDF file)
- HP33120A Waveform Generator (206K PDF file)
- HP6237B Power Supply (206K PDF file)
- Fluke 8010A Digital Multimeter (721K PDF file)
- Phillips 6303 RCL Meter (58K PDF file)

## Computer Facilities and Support

For information regarding ECE computer facilities and support, including news, computer labs, ECE computer accounts, software packages, tutorials, documentation, and FAQs, follow the link:

http://www.ece.ucdavis.edu/support/index.html

## Photocopying

A copy machine available to Teaching Assistants is located outside Room 2030 Kemper Hall. This machine is to be used only for copying course work, research, or departmental business. The copier is operated using an auditizer card, to be checked out from the ECE Office. To use the card, list your name, course number, and copy card number on the log sheet. Return the card promptly and record the number of copies made on the log sheet. It is necessary that the card be returned immediately so that other students have access to it.

If you are asked to prepare copies of exams or other handouts for a class, submit a copy request in the ECE office by filling out a form, attaching the originals to be copied, and placing these in the "Copy Box" on the reception desk. Note that a minimum of 24 hours is needed for these requests.

## Office Hours

If you need space to hold office hours, please make arrangements with Maria Parker in the ECE Office. She will assist you with reserving suitable space.

# Evaluation

## TA Evaluations

At the end of each quarter, your performance as a TA will be evaluated by both the students and the faculty in charge. You are encouraged to review your student evaluations as a means for improvement and to become a more effective teacher. It is important to read these evaluations with a positive attitude and use this information constructively. Do not take any criticism personally; rather, review the forms objectively. Even the most seasoned professors receive comments that can foster improvement.

## Student Evaluations

The department requires instructors to administer instructional evaluations of the teaching assistants by the students. The evaluation forms contain the following statement:

"Please rate the teaching assistants for this course on the basis of their overall effectiveness, particularly in terms of their knowledge of the subject matter, helpfulness and ability to give clear explanations. In making your recommendation, keep in mind that the TA's have been instructed not to solve the problems you encounter in lab, but rather to help you learn to solve them yourself."

Students are asked to rate each TA in the course on a scale of 1 to 10, where 1 is indicated as an "exceptionally negative evaluation" and 10 is an "exceptionally positive evaluation." Students are asked to add any comments that they feel would be helpful in evaluating the teaching assistants.

## Faculty Evaluations

The instructor in charge will evaluate your performance. Faculty evaluation of TA performance is generally expressed verbally with the Teaching Assistant and also by completing the "Instructor's Evaluation of Teaching Assistants" form. You are encouraged to discuss your performance with the instructor in charge.

## Availability of Evaluations

After the grades have been filed for the course for which you have served as the TA, you may review the evaluations by contacting the undergraduate student affairs officer, in ECE Main Office.

# Assistance and Support

## Assistance and Support

As a TA, your first resource for assistance and support is the instructor(s) in charge of the course(s) to which you have been assigned. Make arrangements for scheduled meetings with the instructor(s) and bring to these meetings any questions or problems you have encountered in your TA assignments.

The ECE TA supervisor is the ECE Vice Chair for Undergraduate Studies. They should be contacted if you have any problems or concerns about your responsibilities as a TA, or if you need further assistance with your teaching.

Other teaching assistance is also available through the ECE department. Experienced teachers are often willing to help their less experienced colleagues, and many are willing to serve as mentors. Teachers who have received special recognition are particularly helpful in providing information about good teaching. One other resource which is often overlooked is the students. They can often tell you what works and what doesn't work.

## Teaching Resources Center

The Teaching Resources Center (TRC), located in 17 Wellman Hall, exists to assist faculty members, TAs, students, and administrators in their efforts to develop and maintain excellence in teaching on the Davis campus.

To meet this goal the TRC offers a wide spectrum of programs and services. TAs who are interested in improving their teaching abilities are encouraged to meet with TRC consultants in order to discuss which programs and services may be of help. These programs include the annual TA orientation, videotape consultation service, course evaluation, workshops and seminars, consultation, a library of instructional resource materials, and future faculty programs.

# Conclusion

No one has ever suggested that good teaching can be learned from a single handbook. Becoming a competent teacher takes a great deal of time, effort, commitment, and experience. In creating this handbook, we have sought to provide a guide to improvement and a source of ideas, rather than a definitive text on the subject of teaching.

As is the case with any document of this type, the ECE TA Handbook is under continuous review and will be revised and revamped as new teaching strategies and technologies emerge. Because of this ongoing evaluation, we encourage comments and suggestions especially from newcomers to the teaching profession.

Teaching is a great responsibility, and good teaching takes a great deal of time. But in the final analysis, being a teacher is one of the most important and influential roles a person can play. And if you take that role seriously, and strive to be the best teacher you can be, the rewards will be most uncommon and truly gratifying.