California Polytechnic State University
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Guidance and Advice on Teaching for New Faculty Members, Lecturers, and Teaching Associates in the College of Science and Mathematics

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Following are some general thoughts and ideas to guide you in your teaching at Cal Poly. They are based on my own personal teaching experiences but also from my opportunity as dean to examine teaching philosophies, course syllabi, exams, grading schemes, grade distributions, and lecture and laboratory teaching approaches for hundreds of instructors during normal evaluation cycles.

Please use this as only a beginning. Consult with your department chair, course coordinators, and key faculty members as you develop your own approach as an instructor. These people can give you information and ideas specific to the courses you are teaching and help you understand traditional grading schemes and patterns. Also, Cal Poly's Center for Teaching and Learning offers workshops and other opportunities for developing and improving teaching skills.

It is important for each of us to develop a personal teaching philosophy and to understand our roles in the teaching and learning process. Our job is to guide students in learning and promote student success. We are much more than presenters of information. In fact, the information we present and the laboratory techniques and instruments we introduce can become obsolete or forgotten. Our true role, whether we are teaching lecture, lab, or directing student research is to help students develop their intellects, exercise their minds, engage their curiosities and imaginations, become creative and critical thinkers, and to value life-long learning. We must create a true intellectual experience for our students and we must be relentless in this pursuit.

Teaching Lecture Courses

Lecture has been, and for the most part still is, the primary pedagogy for delivery of higher education in the United States. It is useful in organizing material, explaining concepts, modeling critical thinking and problem solving, and presenting strategies and thought processes for learning. Lecture can involve chalkboard, overhead, and PowerPoint-type presentations and can entertain class discussions. Many instructors incorporate active learning activities into their class time to encourage student involvement. Faculty members justifiably place a lot of importance on lecture and devote much preparation time to the selection, organization, and presentation of material.

Although lecture defines the foundation and structure of many courses and serves to inspire and guide learning, generally this is not where most student learning occurs. It is the personal engagement of students by studying that results in learning. Each lecture represents an opportunity to interest students in the subject, inspire them to personally engage in learning, and to encourage conceptual understanding and critical thinking. The following two proverbs, created by different cultures at different times, say a lot about the relationship between teaching and learning.

Tell me and I will forget,
Show me and I will remember,
Engage me and I will understand.
A Lakota Sioux Saying

I hear and I forget,
I see and I remember,
I do and I understand.
A Chinese Proverb

Lecture is valuable and effective, but it largely represents the first line of these two sayings, perhaps some of the second line. The third line represents true learning and it is our responsibility to encourage students to engage and accept personal responsibility for learning. During lecture students focus on the instructor; as part of the process we need to provide guidance for use of out-of-class learning time. A good analogy can be found in athletics. A basketball coach can demonstrate techniques for shooting free throws but unless the athlete personally practices the guidance is useless. An instructor can demonstrate how to approach mathematics problems but, again, this is useless if students don't personally do practice problems until competency is achieved. The coach or instructor can't do it for them. Learning is the responsibility of each individual student.

Incentives (quizzes, exams, homework, writing assignments, projects) are effective in promoting student engagement. Providing frequent incentives, especially quizzes and exams that require mastery of material, is especially important in courses populated with new freshmen who must make the transition from very little studying outside of class in high school to 25-35 hours per week in college (2hrs/unit/week). Early and frequent feedback is critical. Frequent quizzes and exams are also helpful in hierarchical subjects found in many mathematics and science courses.

Although presenting good lectures is important, a lecture instructor's responsibilities go far beyond the mere presentation of material. The primary responsibility is to guide students in the learning process, to help them develop an academic and intellectual work ethic, and to actively encourage student success.

Course Syllabus: A course syllabus is required and essential for lecture classes. There are many examples of excellent course syllabi in the College of Science and Mathematics and many approaches for preparing them. Here are some basic content ideas:

- Course description and purpose
- Grading scheme: quizzes, exams, final exam, homework, papers, projects, and the proportion each counts toward final course grade. Approximate level of achievement expected to earn various grades.
- Course outline: these vary from a list of textbook chapters to daily/weekly descriptions of material to be covered, textbook readings and problems, and quiz/exam schedules. The more the course is organized and described in the syllabus, the better.
- Suggestions for studying and learning.
- Office hours and contact information for the instructor (email, website, office location etc).
- Other: There are many other possible components of a course syllabus. If you are going to include rules and regulations, make them as positive as possible. For example, an honesty policy is more positive than a cheating policy. Stating there will be absolutely "no make-ups" or requiring a doctor's verification of minor illnesses can give a student a feeling of hopelessness right from the start and is not a reasonable policy anyway.

Writing and Grading Exams: Exams are much more than a tool for determining course grades. They represent incentives for studying and encouragement for learning. Exams should be an intellectual experience, but reasonable in terms of content and length. They can be written to challenge the A student while making an encouraging performance accessible to a responsible C student. Exceedingly low exam averages discourage students and cause them to question the effectiveness of studying. Very high averages diminish pride of accomplishment. Consider exams that encourage thought and expression rather than reliance on recognition or rote memorization. Don't make the content of an exam a mystery to your students. If they know what is expected of them and believe they will be able to show it on an exam, they will prepare. Include a variety of questions and problems, some that are just like the material they studied and some that require extending the concepts. Write and grade exams with the attitude of demonstrating what a student knows rather than showing them what they don't know. Make positive remarks, draw smiley faces, and give encouragement whenever possible. The sooner you can return a graded exam to your students the more meaningful it will be; most instructors try to get exams back within a class period or two, certainly within a week.

Final Exams: A comprehensive final exam (not just a last hour exam) is required for most lecture-type courses. Finals should be given at the scheduled time during finals week unless permission is obtained through the department chair and dean for an alternate time. They should not be scheduled during the last week of classes. Occasionally individual students will have emergency or personal reasons worthy of rescheduling an exam. You have the authority to do this without external permission. If an alternate time cannot be accommodated prior to submission of grades, an incomplete grade may be appropriate.

Grading Schemes: Let's consider a lecture course with exams, quizzes, final, and homework. Most instructors try to have some significant grading experience every three weeks or so, such as an hour exam. Some will have a couple of hour exams and several shorter quizzes, such as a weekly quiz. Obviously, there are many possibilities but the idea is to provide frequent incentive to study and to have exams that cover a reasonable amount of material. Final exams typically count 20-30%; 40% or greater is on the high side. For those giving exams and quizzes, they often count the quizzes as one exam, with the exam/quiz total being in the range of 60-70% of the grade. Homework is usually 5-15%. In a course with laboratory, consult the course coordinator. Generally one lab a week in a four or five unit course counts 15-20% and two a week counts 25-35% but it really depends on the course and the relationship between lecture and lab. Most faculty members provide approximate levels of achievement in terms of course content or numerical course averages to be used in assigning grades. Most do not express exact numerical averages (i.e. must have 90 or above for

an A) as this presumes perfection in exam construction and grading as well as evaluation of other assignments.

Assigning Grades: Following is a grade distribution for the College of Science and Mathematics in a recent fall quarter. Consult with your department chair for more specific information. *It is important to submit grades by the stated deadline!*

College of Science and Mathematics Grade Distributions (All Prefixes)

	A/A-	B+/B/B-	C+/C/C-	D+/D/D-	F/WU	Cr	NC	I/W/RP	GPA
Lower Division	17%	27%	27%	8%	6%	11%	2%	3%	2.43
Upper Division	30%	31%	22%	5%	4%	2%	0%	6%	2.74

A/B/C/Cr Rate by Prefix in Lower and Upper Division Courses and GPA

	Bio	Chem	Kine	Math	Phys	Stat
LD ABC/Cr	81%	79%	98%	78%	78%	84%
LD GPA	2.36	2.37	3.36	2.38	2.43	2.47
UD ABC/Cr	80%	78%	93%	87%	86%	83%
UD GPA	2.76	2.37	3.34	2.79	2.66	2.62

F/W/WU/I Grades: Withdrawals are decided by petition with the department chair making the final decision through the seventh week and the dean after the seventh week and then only for absolutely emergency reasons. The WU grade is appropriate for a student who signs up for your class and does not attend or who does attend for a period, does C or better work, and then discontinues attendance. For the latter case, the I (incomplete) grade may be appropriate. The WU grade is not appropriate for a student who does much of the work in the class but who is failing and discontinues attendance (such as skipping the final or the last exam and the final). The F grade is appropriate in this case.

Teaching Laboratory Courses

Laboratory type instruction accounts for 21% of Cal Poly's teaching in terms of student credit units generated. Because of the smaller laboratory sizes compared to lecture, the weighted teaching units assigned per course unit, and the cost of instrumentation and operating expense, it consumes quite a bit more than 21% of Cal Poly's instructional budget. Considering the importance of laboratory in Cal Poly's "learn by doing" curriculum and the cost, it is important that we offer quality instruction and experiences.

- ***Laboratory as an Intellectual Experience:*** Lab should be an interesting experience for both the student and instructor, one in which both are fully engaged all period. The experiments offer hands-on opportunities but these should be considered educational, not training. Techniques and instrumentation change during careers so it isn't realistic to think we can prepare students for particular jobs. However, becoming proficient with a technique or instrument, understanding the purpose and outcome of the use, and being able to use the results in drawing conclusions can give our students incredible confidence when they enter careers or graduate school. Consider ways to encourage individual initiative and personal decision-making and for collaboration, teamwork, and the opportunity for students to teach one another. Take advantage of the opportunities to pose and answer questions, stimulate discussion, and promote learning throughout each lab period.

- ***Lab Lecture***: Most labs begin with a pre-lab lecture. This is helpful in presenting students with an overview of the experiment, getting them started, and emphasizing safety issues. Be careful that lab lecture is not so complete as to eliminate the discovery that should accompany a good lab experiment. Avoid presenting plug-in formulas to easily calculate results or directions that are "cookbook". The intended experimental result is not important compared to the intellectual experience leading to the result.

  We sometimes overestimate the effectiveness of a pre-lab lecture. Even if students have read the experiment before coming to lab, they are not yet invested. Many instructors carefully limit the pre-lab lecture content and engage in an additional mid-lab discussion when the students have observations or data and are beginning to draw conclusions. At this time the students are engaged and invested and discussion is more meaningful.

- ***Atmosphere and Environment:*** Try to establish a friendly, open, and informal environment, a community in which students trust the instructor and one another and can interact comfortably. Consider occasional interruptions to showcase individual successes or errors as your class can learn from both. Be aware of the special opportunities to get to know your students in lab and the mentoring, guidance, and role-modeling that can occur as a result.

- ***Reports:*** Usually instructors have a range of methods for reporting results from a single card with data and calculated results to a full report. The method depends on the experiment and the time the instructor can allocate to grading reports. It is important to have some professional reports with an introduction, tabulated results, discussion, and conclusion. Promote and reward good writing skills. Warn against wordiness, poor paragraphing, choppiness, awkward phrases, and incomplete sentences. Encourage thoughtful interpretation of data and formulation of conclusions.

- ***Quizzes:*** Almost all lab instructors have quizzes or exams. Examples include weekly quizzes on the lab to be performed, occasional lab quizzes or exams, lab practicals, and final exams. Final exams in laboratory are not required but, if given, are usually administered during the last laboratory session.

- ***Grading:*** Please consult with the course coordinator or lecture instructor. If the lab is associated with a lecture course, the course instructor assigns the final course grade. The lab instructor must submit thoughtful lab grades that reflect performance. Since there are often many laboratory instructors supporting several lecture instructors, departments often ask lab instructors to submit grades with a specific average to avoid disparities among lab sections that could lead to inequities in determining final course grades.

- ***Instructor Involvement:*** A lab instructor should be engaged the entire laboratory period and encourage students to do the same. In general, the experiments should consume the entire lab period. As a lab instructor you should personally avoid using your time in lab to do things not related to lab instruction such as grading exams, preparing lectures, writing letters of recommendation etc. Sometimes an experiment is designed so there is time for data collection and calculation of results. It is important for your students to know that you expect them to stay to do the calculations. A lab instructor is the guide and leader in a significant intellectual experience and must be involved throughout the period.

25-35 Program and Promoting New Student Success

The College of Science and Mathematics has a profound responsibility in promoting success for all Cal Poly students. The foundation of a polytechnic curriculum is science and mathematics and we have many first-year students from the professional colleges in our courses, before the professional colleges get them. Please read the 25-35 program materials that are distributed each year and accept the responsibilities of your expected participation. The need to study an average 2 hours/unit/week upon entering college (a long-standing national recommendation), or 25-35 hours per week, is a tremendous transition that is not at all obvious to new students, most of whom spent less than five hours a week on homework in high school. It is reasonable and important for each of us to help our students with this transition. It is important for us to assist students in developing a strong academic work ethic and, through the organization and approach of our courses, clearly state our expectations and provide early and frequent opportunities for feedback through quizzes and exams.

Relationships with Students

Students will respect a faculty member who respects them, demonstrates enthusiasm for teaching and learning, is interested in student welfare and success, is polite, and is both friendly and professional. They appreciate faculty members who are organized and dependable, prepared for their teaching duties, and prompt in grading and returning exams, reports, and other assignments. Faculty members are seen by students as intellectual and personal role models and trusted mentors.

Although close relationships among students and the faculty are valued, they must be appropriate and proper. Inappropriate speech, conversation, or actions can damage student respect for a faculty member. Sexual harassment can damage or ruin a career. Respect for cultural, racial, ethnic, and other differences is critical; discrimination cannot be tolerated. Use good judgment in social events with students, especially if alcohol is involved. Don't joke about alcohol in class or otherwise.