College of Engineering

TA HANDBOOK

2010

167 Olin Hall, Cornell University
www.engineering.cornell.edu/tadevelopment

ENGINEERING LEARNING INITIATIVES
The College of Engineering TA Handbook contains almost two decades of expert teaching advice and insight from experienced TAs and TA developers; it is our hope that you will find it useful in your assignment as a teaching assistant. In order to take full advantage of what the handbook has to offer, we encourage you to spend some time familiarizing yourself with it before you start your work as a TA.

We recognize that teaching assistants in the College are an important part of a teaching and learning continuum, adding progressive options to the "top down" model of higher education. The awareness is growing that we can learn from our peers and that we all have things to teach. By providing TAs a sophisticated understanding of how human learning occurs, as well as training in administrative management responsibilities, we are creating a pool of talent that enriches the pedagogical life of the College and further supports all students of various backgrounds and diverse learning styles.

Whether considering a career in higher education, research, or in the corporate world, we believe that serving as a TA will prove to be an invaluable experience. We wish you the best.

~Engineering Learning Initiatives

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Engineering Learning Initiatives
167 Olin Hall, Cornell University
www.engineering.cornell.edu/tadevelopment
Resource Guide

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Tutorial and Academic Support Services

- Center for Learning & Teaching 420 CCC 255-6310
- Diversity Programs in Engineering 146 Olin Hall 255-6403
- Engineering Advising 167 Olin Hall 255-7414
- Engineering Career Services 201 Carpenter Hall 255-5006
- Engineering Learning Initiatives 167 Olin Hall 255-9622
- Math Support Center 256 Malott Hall 255-4658
- Office of Research and Graduate Studies 222 Carpenter Hall 255-7413
- Writing Workshop 174 Rockefeller Hall 255-6349

Other Resources

- Bursar’s Office 260 Day Hall 255-2336
- Dean of Students 401 Willard Straight Hall 255-6839
- Financial Aid and Student Employment 203 Day Hall 255-5145
- Gannett Health Center Gannett Clinic 255-5155
- Housing Office 206 RPCC 255-5368
- Internal Transfer Division 220 Day Hall 255-4386
- International Students and Scholars Office B50 Caldwell Hall 255-5243
- Judicial Administrator 500 Day Hall 255-4680
- Office of Minority Educational Affairs 100 Barnes Hall 255-3841
- Ombudsman 118 Stimson Hall 255-4321
- Student Disability Services 420 CCC 255-4545
- University Registrar B07 Day Hall 255-4232

Emergency Contacts

- Tompkins County Emergency Services 911
  For all emergency cases.

- CU Emergency Medical Services 255-5155
  - Main Floor, Gannett Health Center.
  - Also call 255-1111

- Dept. of Public Safety, Non-Emergency 255-1111
  - G2 Barton Hall. Available 24 Hours.

- Suicide Prevention and Crisis Service 272-1616
  - 24 Hour telephone service.

Personal Counseling Services

- International Students and Scholars Office, B-50 Caldwell Hall 255-5243
  - Assists international students and scholars with matters of arrival, housing, immigration, finance, and personal or social situations.

- Counseling and Psychological Services (CAPS), Ground Floor, Gannett 255-5208
  - Professional therapists offer assessment, crisis prevention, and counseling. In case of an emergency, a staff member can be reached at all times by calling 255-5155.

- EARS, 211 Willard Straight Hall. Walk-in or call 255-3277
  - Sun – Thurs 3-11pm, Fri-Sat 6-10pm.
  - Trained volunteers provide confidential, non-judgmental, and free counseling and referrals.
Preparing to Teach

INTRODUCTION
As a Teaching Assistant (TA) in the College of Engineering, one of your goals is to provide students with learning opportunities to help them understand engineering concepts and to become critical thinkers and active learners. Whether you are leading recitations, conducting office hours, or running labs, TAs help students understand, apply, analyze, and synthesize course concepts and material, and help students build upon the knowledge they have thus far. It is critical for you, as a TA and a student, to recognize that you must apply, analyze, and synthesize knowledge and strategies related not only to course material but also to effective teaching.

This section of the handbook will provide important information and resources for you to consider as you begin preparing for your teaching assistantship. In preparation for the semester, it is critical to consider how the following items will affect your teaching:

- The goals of engineering education
- Your personal teaching philosophy
- The course professor’s teaching philosophy
- The professor’s and course objectives
- Diversity of students in the college and course
- Students’ learning needs and prior knowledge

GOALS OF AN ENGINEERING EDUCATION

A View from Academia
William Streett, former Dean, The College of Engineering, Cornell University

An undergraduate education should provide the following:
1. A firm foundation in math and science;
2. Beginning of a working knowledge of current technology in a specialized field;
3. Acquisition of skills and motivation for continued self-education;
4. Opportunity to exercise ingenuity and inventiveness as part of a research project;
5. Opportunity to perform engineering synthesis in a design project;
6. Communication skills;
7. Beginning of an understanding of the diverse nature and history of human societies, and their literary, philosophical and artistic traditions; and the
8. Beginning of an understanding and respect for the ethical, economic, political, social, and environmental issues surrounding technical developments.
A View from Industry
Richard Albrecht, Ph.D. of Moog, Inc.

An undergraduate education should instill the following in its students:
1. Technological capability (a strong understanding of the fundamentals of engineering, so engineers can adapt to changing technology);
2. Ability to analyze and think critically (problem solving);
3. Ability for life-long learning;
4. Communication skills;
5. Ability to work on a team;
6. Enthusiasm in one's specialty;
7. Intuition for one's field;
8. Broad field of interest (interdisciplinary interests lead to creativity); and the
9. Ability to synthesize.
Preparing for the First Class

INTRODUCTION
The first class is typically the one that induces the most anxiety in new TAs. While it can be challenging, particularly if you are unprepared, it can also be one of the most exciting. Student enthusiasm (and attendance) is often at its highest in the first class, and it is important to capitalize on that energy. Simply handing out the syllabus and leaving is not the best use of your—or the students’—time. During the first class, it is essential that you provide a sense of direction and a set of expectations. Let students know what kind of person you are and what you expect of them. It is also important to convey your enthusiasm about the subject matter so that students will feel you care about their learning; they might even leave thinking that the class will be interesting and fun. The following are a few tips you might find useful:

CHECKLIST

1. **Make a definite start.** Engage in casual conversation before class/lab starts, then indicate, in a definite manner, when you are starting the lab/class. If the class is noisy, try turning the lights off and on. You are in control of the class now.

2. **Provide outline or agenda of today’s class/lab on board.** This helps keep you and your students on track. Distribute course outline, if possible. Part of this first class should be spent in establishing policies and administrative procedures.

3. **Introduce yourself.** Include something interesting about yourself as well as your academic background. Offer your teaching philosophy and what you think is the purpose of this class/lab. Explain why you are excited about TAing this particular lab/class. Give the students all the information about you they will need to know: name, (some TAs choose to distribute their phone number and/or office number), office hours, e-mail, etc.

4. **Prepare a handout (or distribute the syllabus prepared by the professor and go over it).** This should include policies, logistics, formats, TA info, etc. Spend some time preparing the handout; this is the time to establish the policies and administrative procedures. **Policies should be well defined** so as to avoid misinterpretation. It is important that you give the students time to read and understand the rules. Allow them to ask questions and make suggestions. Ensure that students understand the reasoning behind the rules and accept the suggestions if there are legitimate reason for change. In the case of a lab, establish proper conduct and attire, safe lab procedures (safety is 5-1111), location of the fire extinguisher, medical supplies, fire exits, etc. Discuss consequences if students violate these rules.
5. **Get to know your students.** Have students tell something about themselves (where they are from, why they are taking the course, what they want to get out of it, etc.). Start using student names right away. Pass around a roster sheet on which students can write their names, phone numbers, and email addresses. To help you get to know your students, ask for student information, including descriptive characteristics, on 5x8 cards, and try to schedule students for 10 min. appointments during office hours the first week (if you have a big class/lab, have students come in small groups). Talk to your students about different learning styles. If you are planning to do group work, give the reasons why you are going to do so. Students love knowing the backbone structure behind the class.

6. **Provide mechanisms for student feedback.** Make it clear to students that you want their feedback: suggest using questions, 5x8 cards, office hours, notes in mailbox, e-mail, etc., to voice their concerns. Establish this in such a way that they can do it anonymously if they want.

7. **Schedule conflicts.** Resolve students' schedule conflicts with the lab or recitation.

8. **Introduce the class/lab subject and objectives.** Relate the topic to the real world; give a quick review of background material students are expected to know; and preview the first few weeks of the course. Describe how this course fits in with the other courses they have taken (or will be taking).

9. **Start into the material.** Teach something the first day. Provide homework hints if appropriate.

10. **Question & Summarize.** Ask for questions often, at least at every transition of your agenda, while being sure to allow at least 5 seconds for a response before moving on. Also, review the main points and/or provide handouts, etc. It is a good idea to summarize what you/they have done at each transition.

**Breaking the Ice**

1. **Raising Hands.** A good way to start is by asking students of different classes to raise their hands, i.e., first asking freshmen to raise their hands, then sophomores, then juniors, etc. You can also ask about their college majors as well as their hometowns. This gives you some idea of the class composition and gets the students involved immediately.

2. **Ask Students to Introduce Themselves.** In cases where class size permits, you might want to ask students to introduce themselves. Ask them where they are from, their field of concentration, and perhaps something more personal like their favorite place to eat on campus. Don’t forget to introduce yourself as well. Students want to know about your background and aspirations. Tell them about your goals for the class.
3. **The Name Game.** You can ask each student to introduce him- or herself and repeat the names of everyone who was introduced before, ending with the TA repeating the names of everyone in the class. This game is a surprisingly effective icebreaker and helps develop rapport amongst the students.

**ASSESSING PRIOR KNOWLEDGE**

1. **Raising Hands.** You might simply ask the students to raise a hand if they have taken a certain class before. You can also ask them what other courses they have taken in this subject area.

2. **Test! Test! Test!** You can give a short quiz that is not counted toward the scoring for the class. This will give you a clear idea of what the students know. For students who score poorly, you might want to suggest materials for self-study so they can keep up with the rest of the class. For students who score extremely high, you might suggest that they place-out of your course or take a more advanced level course.
Teaching Recitations

**WHAT ARE RECITATIONS?**
Small classes have a significant advantage over large classes: instructors of small classes have much more opportunity to interact with students, so they can better learn the interests and abilities of their students and adjust their presentations accordingly. But large engineering courses are a fact of life in large universities, so large engineering courses often are supplemented with “recitations” or “sections” that meet once or twice per week. Recitations are like small classes and usually are taught by graduate TAs. Those TAs have a responsibility to take advantage of the small-class environment in ways that the professor cannot in the full class.

While the TA will lead the recitation, the goals and content ultimately are up to the professor in charge of the course. Thus, it is crucial that TAs clarify expectations and objectives of the course and recitation with the professor.

**IF I'M NOT TEACHING RECITATIONS, WHY SHOULD I CARE?**
Recitation really is a mini-class: teaching large recitations is like teaching a class without all of the associated management responsibilities, and it is great preparation for other teaching jobs. Other TA roles use many of the same skills; office hours before exams are often well attended, making them much like recitations. Further, recitation skills prepare you to lead workshops or training sessions in other environments, perhaps in companies or clubs.

**HOW CAN I TAKE ADVANTAGE OF THE SMALL-CLASS ENVIRONMENT?**
Students expect recitations to have a relaxed atmosphere; they don't want just another lecture. They want and need structure, so recitations are often more like labs than lectures. Students who are actively involved with the material are likely to learn much more than passive listeners. Help students discover the material themselves or in small groups through guided exercises. Try to develop exercises that relate to a real-world scenario your students care about. At the very least, stop lecturing every twenty minutes and have your students do something like solve a problem. Otherwise, they will become bored and stop paying attention. The goal of the recitation should not be to summarize a chapter of the textbook. Instead, you will want to explore a multi-sided issue or teach a few principles and make sure your students can apply them.

**HOW DO I PREPARE FOR A RECITATION?**
As when preparing any presentation, you need to consider your goals as well as the size, interests, and abilities of your audience. Agree on the goals of the presentation with the faculty member in charge and with any other TAs presenting recitations for the same class. Identify appropriate examples for accomplishing those goals, and write out complete solutions to these examples in advance; solving problems in front of an audience, even if you have someone else's solutions to work from, is often unexpectedly
difficult. Write a lesson plan in the form of an outline of the recitation, including rough time estimates and any special announcements. The lesson plan can look rough, but it should be clear enough so that you can recover if you become lost during a recitation.

**HOW CAN I CONDUCT AN EFFECTIVE FIRST RECITATION?**
If you haven't taught much before, here are some first-class tips: Don't just dive into the material. First, introduce your topic by placing it into context relative to the other course material; write an agenda for the class if appropriate. Use a clear speaking voice, which is probably louder and slower than your conversational voice. Make eye contact with students when you speak; don't speak to the wall, and don't speak to the same students every time. Write with sufficiently large, legible characters (ask your students if you're not sure your writing is clear), and don't stand in front of what you just wrote. Periodically ask the students if they understand the material, and remember to wait several seconds for their answer.

**HOW CAN I TEACH STUDENTS TO SOLVE PROBLEMS ON THEIR OWN?**
Often you'll find that your students have great difficulty solving problems, which seem easy to you. When this happens, you should demonstrate your problem-solving approach on several example problems. The most important thing you can do at that time is to be a *transparent expert* -- explain your thought process aloud so your students can hear *why* you performed the steps you did and *why* you didn't perform other apparently reasonable steps. Be sure to explain any dead ends you considered so that your students can learn to recognize the same dead ends. Students who see you develop a solution without explaining your thoughts tend to see your problem-solving approach as being mysterious and beyond their abilities. Imagine trying to learn chess strategy only by watching other people play the game.

**HOW CAN I TEACH STUDENTS TO SOLVE PROBLEMS IN GROUPS?**
Cooperative group problem solving can be an effective method of teaching for problem-solving recitations. Cooperative learning promotes not only technological competence, but also interpersonal competence and social-technical competence. These skills are necessary for engineering and science students and are highly recommended for all students. Smith, Johnson, and Johnson (1981) state it well:

> Current technical and social-technical problems are much too complicated for a person working in isolation to formulate and solve. Input is needed from many different people, with differing viewpoints, to achieve a satisfactory solution. Professional engineers generally do not compete with their colleagues to obtain solutions to problems facing their organization. The successful engineer must cooperate with his or her colleagues and coordinate activities so that each person involved is contributing skills and resources.

In order for cooperative group learning to be an effective teaching method in recitation, the following ideas should be kept in mind:

- Emphasize that creativity and effort are rewarded, more than the "best" solution.
• Every student contributes to the group.
• Every idea is worth exploration, no idea should be immediately rejected.
• The group need not reach complete consensus. Each group may present multiple solutions.
• The TA should monitor the progress of each group by walking around, talking with the groups, and by simply listening in on the group.
• Some groups will finish the assignment early so have extra "what if" questions ready.
• Some groups will not finish the assignment, so keep them accountable by requesting that they bring in the completed assignment for the next class. Write yourself a note to remember to ask them about it.
• Different groups will have different solutions, so allow time in class for each group to present its solution to the others.
• Be sure the groups alternate weekly so that each student works with several people.
• Be sure that different students present solutions each week so that each student gets to practice public presentations.
• Be patient as the groups are working. Since you know the problem well, it may seem like they are taking forever. When you feel this way, excuse yourself to get a drink of water. Don't rush them.
• Watch for groups who are bogged down, not making progress. They may be too embarrassed to raise their hands, so you have to notice them.
• Occasionally require written solutions from each student to reinforce technical writing.
• Try to maintain a fun, relaxed atmosphere. Some students experience lots of stress in group activities.
• Praise the creativity and originality that emerges during the class.

**HOW SHOULD I HANDLE DIFFICULT STUDENT INTERACTIONS?**

Student interactions take many forms. Most importantly and generally, stay calm and don't ignore what your students have to say; if you dismiss their concerns before they've been heard, your students will feel slighted.

In one of the most common cases, a student disagrees with the material you're presenting. Hear the student out, at least until he has clarified his point. State your position as clearly as you can. If s/he can't accept your answer, insist that the discussion be continued outside of class time. If you have any doubts, admit that you may be wrong and offer to check your answers with another source (such as a book or faculty member).

**HOW CAN I GET FEEDBACK FROM MY STUDENTS?**

Sometimes you might feel as though your students won't respond to anything you say or do, and you need a way to reestablish communication with them. Or perhaps you seem to be doing fine but wonder whether your students find you effective. Maybe you believe that the standard mid-semester feedback forms are too late to be useful or fail to ask the right questions for your class.
If any of this sounds familiar, it's time to conduct your own survey. Don't worry. This doesn't have to take more than a few minutes of your time, and the feedback you receive can help tremendously. Construct a couple of questions to get information about students' understanding of the current topic, about your teaching in general, or about the use of class time. For example:

- What is unclear about the current topic?
- Do I interact sufficiently with students? How could I improve?
- Do you feel that these recitations are a good use of your time?
- How could they be improved?

Ask only a few questions, and only ask about things you can change during the semester. During the last five minutes of the recitation, have students get out a sheet of paper and write their answers anonymously. After class, spend a few minutes looking through the papers. At the beginning of the next recitation, be sure to respond to the students about what you learned so that they know you take their concerns seriously.

**WHAT ELSE CAN I DO TO IMPROVE AS A TEACHER?**

There's almost always something more you can do to enhance your teaching, so here are a few suggestions to get you moving in the right direction:

- Ask your professor or another TA to sit in on your class and give you suggestions afterwards.
- Attend one of the university-wide TA development workshops offered by the Center for Teaching Excellence (CTE) throughout the semester. Most of their workshops are similar to those in the College of Engineering, but they frequently offer new topics.
- Take time to reflect during and after the course, and write down your thoughts--your initial goals, the important decisions you made throughout the semester, the results of any student evaluations, and how successful you thought the course was.

If you like to read, here are two highly recommended books:

- McKeachie's *Teaching Tips* is the classic handbook for teachers. It's been around for over thirty years and gets revised every few more. It seems to cover everything, including more complete answers for the above questions, yet it's a very manageable size.
- Davis's *Tools for Teaching* is a collection of teaching strategies for all aspects of a course. If you need a creative idea to deal with a particular problem, this book will give you an answer.

**REFERENCES**


Teaching & Assisting in the Lab

OBJECTIVES OF LABORATORY INSTRUCTION
1. To illustrate, supplement, emphasize and reinforce material taught in lecture.
2. To achieve familiarity with and facility in the use of appropriate materials, techniques and instruments.
3. To gain an appreciation of the fact that experimental results do not necessarily correlate with the idealized theory.
4. To provide closer contact between student and instructor and a means for direct transfer of knowledge.
5. To stimulate an interest in design (especially true of senior labs).
6. To develop interpersonal relations and social skills essential for coordinated corporate activity.
7. To encourage critical analysis of relevant and irrelevant information.
8. To promote synthesis of knowledge from disciplines associated with the subject area.
9. To encourage a logical procedure toward an optimized solution.
10. To generate in the student persistence in the face of difficulties.
11. To encourage an appreciation for discovery-based active learning.

In addition, lab work
- Gives the students concrete, hands-on experience with the concepts taught in lecture.
- Develops students' laboratory skills, which are often critically important in their careers. Through the laboratory experience students will learn to work carefully, thoughtfully, and methodically in the lab, to write technical reports competently, and to operate laboratory equipment properly.

QUESTION: WHAT IS YOUR LAB PHILOSOPHY?
Or, how do you approach laboratory work? There are many different approaches, some better than others. For example, the "cookbook" approach is to follow the instructions in the lab manual, gather data, take the results home, and write the lab report. In contrast, the "real science" approach requires thinking about the concepts being tested while doing the experiments, asking questions, testing alternative hypotheses, or using alternative methods, etc. Through questions, the TA can steer the students toward the real science approach to lab work.

CHECKLIST

Prior to the Lab:
Meet with the Professor and other TAs and consider the following issues:
1. Grading policy and responsibilities
2. Acquiring a schedule-change policy
3. Obtaining an official list of students in your lab section with photos, if possible
4. Designing of the experiments
5. How the labs should be conducted
6. Safety Issues (refer to page 17)
7. Getting a copy of a good lab report from previous years
8. Doing the lab yourself. (Do not ignore details.)
9. Checking every set-up in the lab

**During the lab:**
1. Introduce yourself and have the students introduce themselves.
2. Describe the policies and expectations, grading, schedules etc.
3. Show them examples of good lab notebooks and lab reports.
4. Encourage them to explore the possibilities and also write down any observations made during the lab.
5. Briefly introduce the day’s experiment; link it back to their coursework if possible.
6. Emphasize any safety issues specific to the day’s lab.
7. Show them the basic operations of the equipment.
8. Check on interaction within groups and see that no one is alienated.
9. Identify slower and faster groups and spend a little more time with the slower ones.
10. Check on students’ understanding by going around and asking questions.
11. Before the students leave the lab, ensure that they have recorded all of the necessary data.

**FIRST LAB HINTS**
TA’s typically have many questions and concerns about their first interaction with their students. For this reason, we’ve included some “hints.” These hints apply to the classroom and the laboratory. The first lab agenda differs from its classroom counterpart; therefore, a sample first lab agenda is described below.

**First lab agenda**
The first lab session of the semester is often reserved for introducing students to the lab, discussing lab procedures, and other administrative tasks. This session provides an excellent opportunity for the TA to establish a lab environment that will be conducive to learning.

1. **Welcome** the students as they enter the lab. Smiling and friendly comments (e.g., "Come in and make yourself comfortable.") will put the students at ease. When everyone has arrived, state firmly that students must be on time for the remaining lab sessions.

2. **Tour the lab**, describing the lab layout, the equipment and its usage, supply cabinets, location of safety equipment (e.g., fire extinguishers), coat and
bookracks, etc. Try to impart spirit, enthusiasm, and respect for experimental work.

3. **Attend to the administrative details** (e.g., pass around a signup sheet, describe policies and expectations, grading, schedules, and other relevant topics).

4. **Create community** among the students through a discussion on the motives and philosophy of experimentation. Ask the students a few open-ended questions and encourage all students to participate in answering. Try to lead the discussion without getting too involved. Let the students do as much of the talking as possible. Sample questions are given below; you may want to have the students discuss these questions in pairs, small groups, or as a class.

5. **Question: Why does lab work?** Students may not clearly understand why they are doing experiments in the laboratory. This question is designed to allow them to discover (by themselves) the benefits of lab work. If students have difficulty getting started, then you may want to suggest some benefits of lab work.

**PREPARING FOR LAB WORK**

TA preparation for running a lab has both "managerial" and "teaching" components. The TA has to be prepared to manage the laboratory session effectively, providing a safe, well-equipped, and thought-provoking lab environment for the students to work in. The TA also has to facilitate the dynamics among students in order to run the lab smoothly. In addition, the TA has to be prepared to teach students through a lab lecture, answering questions about the lecture material, and demonstrating the experimental procedure.

**Safety**

One of the most important responsibilities of the Lab TA is to ensure the safety of the students working in the laboratory. A safe laboratory is the result of careful thought and planning by the professor and the lab TA, as well as considerable "safety training" of the students in the laboratory. Three basic steps for ensuring a safe laboratory are described below.

1. **Identifying hazards & preventing accidents**: Lab TAs should spend an afternoon in the laboratory identifying hazards and planning for the prevention of accidents. Ask the professor about any prior accidents.

2. **Safety training**: The TA should clearly describe the rules and procedures for working safely in the laboratory. These rules should be posted throughout the lab. All users of the Engineering laboratories and shops must receive the *Chemical Safety for Laboratory Workers* training. This training is required for all laboratory workers who may be exposed to chemicals.

3. **Preparing for emergencies**: The lab TA should know the location of the nearest phone and the Safety Department’s phone number (911). Also, TAs
should be aware of the location of the fire extinguishers and emergency showers.

Further information on the safety training course and emergency contacts for each of the buildings is available at http://www.ehs.cornell.edu/default.cfm.

The Experiment
To be an effective teacher in the laboratory, the TA should have carried out the experiment completely prior to the scheduled laboratory session. While going through the laboratory procedure, the TA should look for aspects of the procedure and/or documentation that may be confusing or misleading, and anticipate the questions that students may have.

Possible Problems in the Lab
Many of the problems that arise in the lab involve broken equipment, inadequate supplies, accidents, etc., and are handled easily if the TA is well prepared. However, some problems that may arise in the lab are more difficult to anticipate and require special consideration. Specifically, certain social problems among the lab students may severely damage the cordial and supportive environment necessary for learning.

A typical example of such a problem is when a foreign, minority, or disabled student is ignored in the choosing of a lab partner or lab group. There are several ways to avoid this situation. For example, lab partners can be chosen randomly by the TA.

Another possibility is that such a student may belong to a group, but is treated unfairly or is not encouraged to participate in the group's discussions and decisions. The TA should make clear his or her expectation of shared responsibility for experiments and write-up. To further discourage certain group members from dominating the equipment and its usage, the TA can grade the group on its ability to set up and explain the experiment.

If students are encouraged to share ideas in the laboratory, then they may be tempted to share experimental data. In general, data sharing is forbidden because it implies that some of the students are not performing the experiment. It is likely that a simple warning to the students will prevent any data sharing. However, if the TA believes that students are disregarding the warning, then some means of preventing data sharing must be used. One proven method is to require students to record all their laboratory results in a laboratory notebook. When a student leaves the lab, the TA signs or initials the lab notebook to verify that the student performed the experiment.

Encouraging Students to Think in the Lab
For a variety of reasons, some students complete their experiments as quickly as possible and then leave the laboratory. The TA should work to develop a "learning lab" environment where students take their time, think about the experiments, and ask questions while they are in the lab.

A learning lab is comfortable (physically and socially) and stimulating (intellectually and practically). Often labs are quiet, sterile rooms, lacking adequate space, fresh air, and sunshine: it is no wonder that the students want to leave early. The TA should encourage a warm and animated social environment through lab discussions.

The lab experience fosters critical thinking via contrast between theory and practice. In order to create an intellectually stimulating environment, the TA can encourage the students to think about the experiment and its relation to the underlying theory, while they are carrying out the experimental procedure. For example, at the beginning of the lab, the TA can pose a few open-ended questions that are not in the lab assignment. These questions will be even more interesting if they are linked to "real world" applications or problems.

1. **Helping students prepare for lab.** Students who are prepared for the laboratory will benefit more from the lab. All students should read the related lecture material and laboratory procedure and do any preliminary calculations that may be needed during the experiment. The TA may want to ask questions at the beginning of the lab (e.g., “Why are we doing this lab?”) to ensure that the students are adequately prepared and to encourage group thinking and group discussion. If students are consistently unprepared for the lab session, the TA may want to institute measures to 'encourage' students to prepare for lab. Some examples of such measures are listed below:
   a. Give a pre-lab quiz that contributes to their grade.
   b. Pairs or groups of students might be required to give short presentations on lab material.
   c. Students could be required to submit, prior to the lab, a short report on the purpose of the lab, what they intend to do in the lab, etc. This short report could then be appended to, and graded with, the final lab report.

2. **Group work.** Interpreting obtuse data or solving difficult problems is often more enlightening and enjoyable when working with a group rather than individually. TAs should try different types of group work, with the objective of providing manageable groups in which all students contribute. TAs should provide explicit guidelines describing what work may be done as a group and what must be done individually.

3. **Helping students answer their own questions.** As in the classroom, students in lab often ask questions that they are capable of answering. If a student (or group of students) asks the TA such a question, then the TA should not simply surrender the answer. Instead, the TA should try to lead the questioner(s) toward the answer,
without directly giving it. A blackboard mounted in an unobtrusive location in the lab provides a convenient setting for such exchanges.

4. **Making lab more active.** A laboratory is the place where students are able to get hands-on experience, making it easier for them to digest the related theory. Hence, care should be taken to encourage discovery-based active learning in the lab. This could be done by posing interesting questions for the students, encouraging them to safely tinker and play with the experimental set-up, and demonstrating experiments that arouse their curiosity.

**DEVELOPING STUDENTS’ LAB SKILLS**

Developing skills is an important part of the students' lab experience. In general, lab skills are acquired by observing experienced lab workers (i.e. lab TAs). Therefore, it is important that the TA describes and demonstrates good lab skills. Here are a few suggestions:

1. **Habits** describe how the student conducts her/himself in the lab. Examples of good habits include arriving at lab prepared, wearing proper lab attire, working neatly and efficiently, following all the established rules, and recording data and observations meticulously. The TA cultivates these habits in the students by setting a good example and by positive reinforcement.

2. **Techniques** describe the learned ways of using experimental equipment. Students learn these techniques usually by reading documentation, watching TA demonstrations, and getting the opportunity to try things. When students are having trouble learning to use laboratory equipment, a TA's natural reaction is to take control of the equipment and demonstrate its use to the student. However, *keep your hands off the equipment as much as possible.* Even if the students are only carrying out your instructions, they are still gaining familiarity and confidence with the equipment by handling it.

3. **Recording experiments—lab notebooks.** Good habits and techniques are of little use if students do not carefully and legibly record all relevant aspects of the experimental setup, acquired data, and all observed phenomena. Unfortunately, many students have not learned how to keep a proper lab book. Therefore, it may be the TA's responsibility to teach the students how to keep such a notebook and to monitor (or grade) lab notebooks to ensure that students are learning how to record experiments. The TA may want to show examples of "good" notebooks from previous years' students. For further information, see *Writing the Laboratory Notebook*, Howard M. Kanare, American Chemical Society, Washington, D.C., 1985.

**SUMMARY**
Laboratories are places for learning, not just acquiring experimental data. The Lab TA should try to create a safe, enjoyable environment that fosters learning.

**REFERENCES**


http://www.crlt.umich.edu/lab_guidebook.html
Office Hours and Tutoring

TAs and Office Hours
Office hours are one of the main responsibilities of many Engineering TAs and can provide valuable teaching experience and insight. They can be fun and useful, helping you to improve or develop skills needed in the workplace—leadership, communication, problem solving, and presentation. Explaining things to others is the best way to learn yourself. You'll see immediately where the gaps are in your own understanding, and new ways of looking at a problem will occur to you as you discuss it with the student. Conducting office hours is a great way to review for your Q and A exams. It is also the time when you get to know your students.

What are “Office Hours”?
Office hours are times for students to get extra help with course material, assigned readings, and homework. They are often held in small group or one-on-one settings and TAs need to be prepared to interact with everyone who walks through their door. This time is not limited to “in office” assistance, but also includes computer science consulting hours and laboratory experiments.

Office hours also provide time for administrative work to be done, meaning that it is a time when you can act as an intermediary between students and the professor by allowing students to voice their concerns about grades, exams, class, and the professor. Oftentimes a student simply needs to vent about these issues. However, it is not uncommon for some to reveal personal difficulties in the process of doing so. Gauge your comfort level and experience in these situations, and be prepared to refer out if necessary.

How to Set Up Your Office Hours

Time
The best times for holding your office hours would be those that accommodate all students, but that is nearly impossible. Therefore, when selecting time for office hours, consider three simple steps: choose, check, and check again.

1. Choose. Based on the course time and your own class schedule, choose the time that best fits your schedule. This is because you want to be most available to the student and you are the best person to know when that time is. Depending on the number of office hours you are required to hold, always have a few extra choices of time. When there is more than one TA working for the class, it is also important to coordinate your office hours with them. It is not necessary or required for all TAs of the class to have different times; however, providing more alternatives gives students more options or opportunities to learn.
A day or two before the homework due date is often a popular time for office hours. Another possibility is an hour before or after class. It is nice to have one set of office hours when they will be under pressure and one set when it's not so hectic. Be aware of possible extra demands on your time around midterm exams, including extra office hours or a review session. Be open-minded. Sometimes the best available time might be a weekend or a late night. If this is the case, make sure you consult with the professor before setting any final times. Some professors give you the full authority to choose your own office hours, while others might not agree with a session of office hours on Sunday when homework is due on Monday.

Just a note to keep in mind: Many times you'll hear people say, “Don’t set your office hours at 8:00 in the morning.” While it is true that most students don’t like to get up early in the morning (TAs as well), statistics show that most core engineering courses are offered between 10:00 a.m. and 1:30 p.m. This shows that the early morning time might accommodate most students better than the lunchtime hours. At least offer them the choice.

2. **Check.** Within the first week of class (either in lecture, recitation, or lab), remember to pass out written information or make announcements about your office hours and location. Check with students to see whether the chosen times will work for them or not. Ask them to write down the time that they would like to have office hours, but remind them that the listed times are the ones that best fit your schedule and that they should try to choose time from this list.

3. **Check again.** It is almost always the case that students do not have their class schedule finalized within the first week of class. Therefore, it is a very good idea (and strongly recommended) for TAs to follow up on the set office hours. Do this after a few weeks into the semester and then again halfway into the semester. Make sure that it is still convenient for most students in the class.

TAs should also remind students from time to time of their office hours and encourage students to come even if it is only to talk. One possible way to make students comfortable with coming to you is to schedule 10-minute appointments for each student in the first two weeks to discuss the first homework assignment and chat a bit. If you have too large a class, have them come in pairs or groups. Don't expect struggling students to be the only ones to take advantage of office hours.

**Location**

More often than not, people forget how important a convenient location is. If you keep in mind the 3 C’s—convenience, comfort, and consideration—you will never go wrong with your office hour location. As a TA, you really do not have the power to pick and choose the room you want. Most of the time, your office hours will be held in your office (if you have one), or held in a shared room in your department building. However, most departments are very accommodating if you make a reasonable request. Talk to your professor and other TAs who might have taught the class before to see how many
students usually come to office hours. If it is a large class that expects a lot of students to show up at one time, you might want to make a request for a larger room. If you know that there will be a lot of blackboard use, you might want to request a small classroom. If you notice that you have a student with a disability in class, you might want to try to find a room that accommodates that particular disability.

**HELPFUL HINTS ON OFFICE HOURS**

A successful office hour requires preparation before your first class. Here are some tips:

1. **Motivate students to come to office hours.**
   - Schedule your office hours in an accessible location and at a reasonable time.
   - Post your office hours in several places (for example, on your door, in the department office).
   - Consider scheduling 5-10 minute appointments with your students to learn more about them.
   - Learn your students’ names.

2. **Establish reliability.**
   - Always be available during your office hours in the pre-assigned room.
   - Be prepared with the material and the homework that is due.
   - Hand out a grading policy in your first recitation section. Be sure to make your re-grade, late homework and partial credit policies explicit. Be firm and stick to your policies. Be consistent in your grading.

3. **Encourage learning during office hours:**
   - Offer positive encouragement.
   - Use questions as a feedback mechanism and to probe further into their depth of understanding; help them identify the problem being posed and set up a framework for the solution; think aloud, and encourage them to do so too.
   - Try and bring in real-world examples and other reasons why they should learn the material.
   - Be supportive; avoid intimidating your students.
   - Make sure there is participation from all students. Encourage group work.
   - Do not concentrate on any one person; divide attention equally.

**More Helpful hints on Office Hours**

1. **For Teaching**
   - Be prepared. Make sure you've done the problems yourself before entertaining questions. Lack of preparation can destroy your credibility.

   - Emphasize the concepts that a problem illustrates. Make the underlying assumptions explicit. Make sure they understand the reasoning for every step leading to the solution of the problem.
• Ask leading questions. It is easier for student to get involved in the problem solving process if they have help. Asking leading questions such as, “Can you tell me what is given in this problem?” or “If this law (e.g. 1st law of thermodynamics) is being used, what other information do we need to find before we can solve this problem” can be a great way to start solving problems.

2. For Yourself
• Assess Student Knowledge. Ask students to explain what they know about the problem so you can listen carefully for clues to determine where they lack understanding. But be aware that very few students come to office hours prepared. One way to get them involved is to insist that they draw a diagram of the problem, label it, and explain what's going on. Also, use dimensional analysis (units) at each step to find where the student made a mistake in a series of equations. This way you can focus your tutoring on the students' needs.

• Ask more questions than you answer. You want students to solve the problem, not you. Remember, the ultimate goal of education is to make students independent of the instructor. With this in mind, guide them through a problem or topic by asking them questions, and wait for a response. Lead the students from what they already know to the new concepts.

• Adjust to the student’s learning style. Knowing a student’s learning style might determine the way in which you explain the material. Helping a student identify his or her learning style might help them learn in class in the future. For example, a global learner may need a glimpse of the 'big picture,” or a context for a specific problem. A visual learner may benefit from an alternative text, which has different diagrams or a different point of view in explaining the material. Be familiar with a variety of references to share with them.

• Don’t let the students struggle too much. You want the student to solve the problem but you don’t want them leaving office hours more frustrated than when they came in. Try to ask leading questions that will allow them some success and give them a hint if you really sense them struggling.

• Be supportive and positive. Look for opportunities to bolster a student's confidence. This is crucial to success in engineering, especially. Also, don't write on the student's paper. Write on a separate sheet so you don't deface their work, and so they have something to take with them to ponder later.

• Be patient. It is easy for TAs to forget that they too, weren’t always experts on the course material. Remember that the material is new to the student and that the student is striving to be an expert as well.
• Be aware of unconscious biases. Be fair to all students. Do not favor anyone because of ethnicity, culture, gender, age or family/social background.

• Ensure that the student has been helped. At the end of your meeting, asks the student to make sure that the question or problem that they came to see you for has been answered. Summarize what you and the student plan to do. For example, if there was an unanswered question, be sure to find the answer and pass it on to the student in a timely manner.

3. For the Student
• Help him or her relate the problem to the real world. Illustrate with examples you are familiar with, and insist that the student justify the order of magnitude of a numerical result.

• Discuss student’s progress. Ask the student how he or she is doing in class and if there is any specific problem that is affecting his or her progress. You can also take this opportunity to ask about other classes or about life in general.

• Help with note-taking skills and study habits. You may want to refer students to the Learning Strategies Center (607-255-6310) for help in these areas.

Grading concerns
Most students have concerns about their grades and have doubts about the grading policy, which can be addressed in office hours. Students often come to office hours for re-grades. Feel free to give yourself a day or two to think re-grades over, rather than be pressured. After a prelim, quiz, or an exam, you should have available the average and distribution of points and grades. You could also have spare handouts from your recitation and the professor's class.

Feedback
Office hours offer a good opportunity to find out what is or is not working during recitations, lectures, homework, or exams. You should try as much as possible to be aware of each student's progress in order to understand their needs and to make the best use of time during office hours.

Professionalism
Always, always be at your office hours when you say you will. On the other hand, don't be too available outside of office hours because you don't want to be taken advantage of.

Be prepared for your office hours. TAs should have all the necessary materials on hand when they come to office hours. These might include textbook, homework assignment, returned homework, returned exams, notes from lecture (if you have them), and class schedule. If you do not go to lecture, you can always ask the student what is covered in class at the time, but having the tentative class schedule allows you to bring necessary notes of previous or future lectures to your office hours. It is always a good practice to
list topics covered in class that week on a nearby blackboard if available; it might remind students of something they did not understand in class.

**Facilitate presentation and group-work skills**
You can develop the students’ confidence and presentation skills by having them work on the board during office hours. In addition, you can help create camaraderie and group-work skills by having students help each other during office hours.

**TRoubled Students**
As a TA, you are often the most likely person to find out when a student is having emotional or other problems. Be aware of the available resources to recommend to a student. You can also inform the professor of any concerns you have about your students. You might want to document students’ appearances at office hours on a 3 x 5 card. Describe them so you'll have a record of their attempts to get additional help, and of their interest in the course.

There are a number of signs that TAs can look for to spot troubled students:

1. **Behavioral Changes**
   (1) Significant decline in classroom, athletic, or other performances
   (2) Consistent absences from class, athletic practices, work, or other important activities
   (3) Suddenly becoming quieter or more aggressive

2. **Physical Changes**
   (1) Deterioration in physical appearances
   (2) Excessive fatigue

3. **Personality Changes**
   (1) Direct statements indicating distress, family problems, or other difficulties
   (2) Unprovoked anger or hostility
   (3) Constant sadness, tearfulness

4. **Safety Risk Indicators**
   (1) Any written note or verbal statement which may suggest finality or suicide
   (2) Self-injurious or self-destructive behaviors
   (3) Threats against other people

Possible ways to respond to students with signs mentioned above are:

1. **Consult with an expert.** For example, you may call Counseling and Psychological Services (CAPS) at 255-5208, Cornell United Religious Work (CURW) at 255-4214, the Office of the Dean of Students at 255-1115 or 255-3608, the International Students and Scholars Office at 255-5243, Campus Life crisis coordination (for students living in dorms) at 255-5511.

2. **Be aware of your role.** For example, you can offer concern, listening, and support, help with decision-making, and give referrals.

3. **Be aware of your limitations.** You do not have to take on the role of counselor. You only need to care and refer.
Effective Grading & Preventing Cheating

PURPOSES OF EFFECTIVE GRADING
1. Feedback to students, TA and professor: knowing and conveying how well your students are learning the material.

2. Incentive for students to complete assignments and exams; encouraging students to keep up with coursework.

3. Evaluation of your students. Help students to self-evaluate. Inform professor what students have learned by assigning a numerical value to each student's achievement.

Additional purposes may be imposed by the professor.
- Different aspects of the course may have these purposes ordered in different ways (e.g., exams versus homework).

- Even though you might consider "evaluation" to be less important than "feedback," many of your students will think otherwise. Their actual grade will mean much more to them than how well they comprehend the material.

YOUR GRADING PHILOSOPHY
A grading philosophy will derive from your broader teaching/learning philosophy.

1. This is a combination of your personal style and your educational values. Whatever your approach to grading is, be comfortable with it.

2. Tailor the types of homework and other assignments, your grading policies, etc., accordingly. For example, a freshmen math course and a design course for seniors would not be structured or evaluated in the same way.

3. Make your philosophy known to your students, as appropriate (Refer to the model provided at the end of this section).

4. Examples of where your own philosophy appears:
- Identifying what is necessary for the student to receive credit on a problem, i.e., proper assumptions, set-up, common sense, thoroughness, etc.

- When students should work alone or in groups and when to encourage/discourage this

- Allocation of credit to a given problem, amount of partial credit given and to what degree you will assist your students on problems

- Re-grades, late assignment, and makeup policies

- Extra credit assignments/problems
ADMINISTRATION AND POLICY

Student performance
1. Keep accurate records. A good spreadsheet program, such as Microsoft Excel, is recommended. This particular program is able to determine means and standard deviations as well as assign random numbers to students to preserve confidentiality. Make sure you make frequent hard copies of your grades.
2. Keep the professor aware of students' performances.
3. Make students aware of their own performances.
4. Be aware of aberrations, i.e., when a student has a "bad day" relative to their established pattern.
5. Watch for deviations in student performance that may be attributable to personal problems.

Confidentiality
1. University policy officially states that homework and exams are to be returned in a confidential manner, so return them individually whenever possible.
2. Don’t email grades in any circumstance.
3. Second Page. Write the score on the 2nd page of assignments and exams, especially if you are unable to return them individually.
4. Do not use transparent schemes such as merely covering up names on a list that is in alphabetical order.

Grading policies
1. "Global" policies (usually set by professor): relative weighting of different aspects of the course, to curve or not, assigning letter grades to the distribution, etc. Be aware of these and convey them clearly to your students, especially if the professor has not done so.
2. "Local" policies (usually set by TA): relative weighting of different problem sets, different problems on a given set, different parts of a problem, how much work should be shown, etc. Convey clearly to your students.
3. Re-grading, late assignments, group work on homework, make-ups: establish a written policy; make it well known to your students, and stick to it. Do not feel that you have to make a re-grade decision on the spot. Tell students you will consider their requests and get back to them. In general, establish, convey, uphold.
ACTUAL GRADING: LOGISTICS AND HELPFUL HINTS

What to have in mind while grading to be EFFECTIVE:

1. **Be consistent** above all else. Students will forgive occasional harshness and/or laxness much more readily than inconsistencies. Be consistent with other TAs and with the professor as well as with yourself.

2. **Be fair.** Never favor a “good” student over a “bad” one, a neat one over an untidy one, or one you are familiar with, or the quiet one in class, or the one who says hi to you in the hallway.

3. **Be open and reasonable.** As TAs, we make mistakes. Since we are not perfect, students may think of answers we might have not thought of. Let them be creative and encourage it!

4. **Be Firm.** Don’t change your mind on policies, i.e., accepting homework late, regrades, etc. As a TA you need to have credibility and must gain respect from your students. You cannot have doubts about the rules you started with, so think about them before distributing them.

5. **Be punctual.** If you say you will have the homework ready for next class, do so. Students learn from example. You cannot ask them to follow deadlines when you don’t respect your own.

6. **Be neat.** Remember you are grading a person’s effort; work and time were invested onto the piece of paper you are evaluating. Respect it.

7. **Try to grade in one sitting.** It may seem like a lot of work, but you will be done faster and you will likely be more consistent. But don’t go above your limits!

### Before Grading

1. **Prepare a scoring guide in advance.** Develop your own model answer with explicit point values for each category, i.e., attempt, effort, units, numerical solution. Think: HOLISTIC GRADING.

2. **Look it over.** Look over all or some of the problem sets first before beginning grading. This helps you decide whether your grading guidelines are reasonable.

### While Grading

1. Grade one problem at a time, going through each assignment or exam for that one problem. This promotes consistency and efficiency.

2. List common errors and assign explicit deductions for these. This will allow you to grade more quickly.

3. Whenever possible, grade without knowing the identity of the student.

4. Clearly indicate where points are awarded or subtracted, do not just write an “X” or a check mark.

5. Create a written dialogue between you and your students.

6. Encourage a written dialogue from your students. This will fulfill several purposes:
   a. It will make sure that the students explain what they are doing, therefore it is easier to grade.
   b. It will make the students find their own mistakes while doing the homework or exam,
c. It will give them a better sense of what you expect and will give you a better sense of their understanding of the material.
d. It will show appreciation from your part when you find the mistakes and explain what is wrong, and they will able to correct the procedure in future homework or exams.

7. Offer constructive comments whenever possible to supplement a straight "point count," clearly explaining what went wrong and providing hints leading them to the correct answer. You can also point out a similar problem in the textbook. Offer to look at second attempts on difficult problems or concepts.

8. Give partial credit whenever possible. Allow students to explain (in words and/or equations) "what they would have done if..." when they cannot get a problem or part of a problem whose solution is necessary for subsequent problem solving.

After Grading
1. Post or distribute solution sets/answer keys. Be neat and timely, and include how points were distributed on each problem.
2. Go through the common errors you found during office hours or recitation.
3. Always evaluate and re-evaluate your grading; in effect, grade yourself as a grader. Be receptive to making changes and improvements.

Homework/Problem Sets
1. Preparation: If you can, do all problems yourself.
2. Be explicit about when, where and how assignments are to be distributed, collected, and returned. Also be explicit about the format of the homework (for example, one-sided or two sided, typed/hand-written).
3. Complete the grading as soon as possible and return papers to students individually, whenever possible. Do not post students’ grades. Refer to FERPA guidelines for acceptable methods.

Lab Reports
1. Be clear in conveying what is expected for the report.
2. Lab reports are usually part of courses that have lecture sections. Expect students to make reasonable connections between the two. Be aware of discrepancies or timing problems, e.g., the lab being too far ahead of the lecture.
3. Engineers are expected to have competent writing skills; enforce this by checking for proper grammar, spelling, organization, neatness, etc., whenever possible.

Exams and Quizzes
1. Grade consistently with the manner in which the quiz was given, e.g., if a quiz was meant as a spot-check on a concept, don't be harsh about numerical errors.
2. Exams are usually a big percentage of students' grades; take extra care.
3. Encourage written explanations from students should they get lost on a problem.
4. Go over the exam in class (at least the areas where most students had difficulty) and post your answer key.
5. Stay in close contact with the professor regarding what is reasonable to be expected of both you and your students.
6. Exams and quizzes should be learning experiences and not simply evaluation mechanisms. Help students to profit from this part of your course.

CHEATING

Question: Is there likely to be cheating on exams in the course I’m about to teach?
Answer: Yes.

Question: How will they do it?
Answer:
1. The Sneak Preview. (They get advance copies.)
2. The Eyes Have It. (They scan neighbors’ papers.)
3. The Note of Precaution. (They bring crib sheets.)
4. The Call of (a Warped) Nature. (They leave the test room and get help.)
5. Quick Change Artistry. (They pick up your worked-out solution and correct their paper before handing it in.)
6. Now You See It, Now You Don’t. (They don’t hand in the test and later claim you lost it.)
7. Three-Page Monte. (They substitute correct solutions for incorrect ones after the graded tests are handed back.)
8. History Repeating Itself. (They memorize solutions to the same questions on past tests.) *This one is not cheating—it’s your fault for repeating questions.*

Question: How can I minimize cheating?
Answer:
1. Don’t leave copies lying around, *including in computer files.*
2. Know how many copies were run off, and count them before the test is given.
3. Make sure the exam is carefully proctored.
4. Don’t hand out worked-out solutions until you are sure all the papers have been collected.
5. Log in the papers as soon as you collect them, so you will know immediately if someone didn’t hand one in.
6. Use exam booklets if possible.
7. Make photocopies of some or all graded solution papers, particularly those of anyone you have suspicions about, before handing them back.
8. Avoid true-false and multiple choice exams—they are trivial to cheat on.
9. Require complete solutions. Don’t give credit for the right answer magically appearing. Be liberal with partial credit.
10. Give tests that are easy to read and possible to solve. *Students are much more likely to cheat on tests they regard as unfair.*

The authority to determine whether a specific action shall be treated as a violation of The Code of Academic Integrity lies with the Academic Integrity Hearing Board. Those who violate the Code of Academic Integrity will be subject to penalties under this code and may be subject to penalties under state and federal laws. Please refer to the following web page for all details: http://cuinfo.cornell.edu/Academic/AIC.html

Specifically: Code of Academic Integrity, as amended December 8, 1999. This is a small description of the procedure followed at Cornell if someone is accused of cheating:

Students and staff members discovering an apparent violation should report the matter to the faculty member in charge of the course or to the chairperson of the Appropriate Hearing Board. The faculty member presenting the student with the charge concerned, and a third-party independent witness will hold a Primary hearing. The independent witness shall be a faculty member or a student appointed by the Hearing Board Chairperson or the chairperson of the faculty member's department. The student may also bring to the hearing an advisor and additional witnesses to testify to his or her innocence. The student shall be given the opportunity to respond and, if he or she wishes, to present evidence refuting the charge. After hearing the student, the faculty member may either dismiss the charge or, if there is clear and convincing evidence that the student has violated this Code, find the student guilty. If the student is found guilty, the faculty member may impose any suitable grade punishment including failure in the course. A student wishing to seek review of the decision may bring the case before the Academic Integrity Hearing Board of the faculty member's college. A faculty member who gives a penalty for a violation of academic integrity shall immediately report this action and the nature of the violation in writing to the student and to the record keeper of the faculty member’s Academic Integrity Hearing Board. This record-keeper shall then be responsible for its communication to the record-keeper in the student's college. If the student fails to attend the primary hearing without a compelling excuse, the hearing may proceed in his or her absence.

**SAMPLE: HOMEWORK GUIDELINES**

1. **Goal.** The goal of homework sets is to develop your skills and give you a more fundamental understanding of the material presented in class.
2. **Due date.** Unless stated otherwise, homework is due at the end of the class period on the due date.
3. **Presentation.** Staple your homework. No string, dog-ears, or paper clips. Write your name and the problem number on every sheet of paper.
4. **Label** each problem clearly, if you are using more than one sheet of paper per problem be sure to write it down. Numbering the sheets of paper helps. Have the problems in order.
5. **Neatness and clarity** are essential for full credit. If it is hard to follow your reasoning or your handwriting, you will not get full credit even if you get the correct numerical answer.
6. **Show** all of your work.
7. **Draw.** Before starting a problem, draw a picture or diagram describing what you think is happening. List all your assumptions. Explain why you can ignore certain
terms and use specific equations. You don't have to write a dissertation on the subject—a short sentence or a few words will suffice. This is one of the most important parts of any problem.

8. **Evidence.** When you use a tabulated quantity, identify where you found it, i.e. book title and page number.

9. **Units** must accompany every step of the problem. Keeping track of your units will in many cases help you solve a problem. If your units aren't working out, you're probably doing something wrong. No answer is complete without units and the proper sign, and points will be deducted if either is omitted.

10. **Box** all your answers. Make sure you answer the problem completely.

11. **Late homework.** Expect to lose 10% of the credit for each late day.

12. **Cheating.** The work submitted (i.e., discussion, spreadsheets, graphs, calculations etc.) MUST be your own. Copying will be considered a violation of the honor code. While collaboration and group work is encouraged, remember that cheating (copying someone else's work) is a violation of the Academic Code of Conduct and something that will not be tolerated.

13. **Re-grades.** Requests for a re-grade must be submitted no more than three days after the exam/problem set is returned and must be accompanied by a written explanation of why you believe a re-grade is in order. Only problem sets written in permanent ink will be accepted for re-grade. The final will not be re-graded.

14. The authority and responsibility for grading homework problems reside with the teaching assistants. All questions regarding homework grades should be discussed with the TA.
Presentation Skills

FOCUS YOUR PRESENTATION

Ask the following question: **What do I want my students to learn today?**

Answering that question will help you determine your commitment to what you want to cover and to focus on your students’ learning. Good presentation skills support the message you want to communicate. Reflect on your presentation afterward by asking, "Did my students learn what I expected them to learn today?"

THE THREE P’S: PREPARATION, PRESENTATION, PARTICIPATION

I. Preparation

1. **What is your message?** Don't think of just which questions you will cover, but what basic concepts those questions will illustrate. Highlight the two or three main points of your presentation first; then decide on the logical presentation of supporting details for those key points. Your own conceptual organization is critical to a good presentation.

2. **Plan your presentation strategies.** Which problems will you solve yourself and which ones should students present? What questions will you ask to guide student thinking? How can you best use the board? Are there handouts you can prepare?

3. **Prepare your lecture notes.** You may want to write out important sections in a conversational style and later condense your notes into an outline from which to teach. Be sure to also include times you can actively engage your students.

4. **Pay particular attention to your introduction, transitions, and conclusion.** Plan those sections carefully so that you capture student attention and interest, smoothly connect and relate your major points, and provide a summary that reinforces the key points of the class.

5. **Practice.** You may want to practice your presentation, especially your opening remarks so you know that you will start off well. Talk into a mirror or a tape recorder, or ask a friend to listen to you and give you feedback.

   Going through your notes several times will help you rehearse and also better estimate the time each section will take. The more experience you get speaking in front of groups, the less you will find you need to practice. However, while you are establishing your credibility and building your confidence at the beginning of the semester, it is wise to plan time for rehearsal.
II. Presentation
Three aspects of a good presentation are voice, body, and visual aids. Most of the suggestions one can read on presentation skills are common sense, so we will only mention the most important. Remember that if your focus is on sharing information and talking with your students, you will communicate naturally in a manner that is easy to hear and understand.

1. **Voice**: You may want to speak at a slightly lower pitch, which helps you to project your voice. Address students in the back row and you will be sure to be loud enough. If you use a natural, conversational tone, your pauses and pacing should be appropriate. But you can use dramatic pauses to emphasize points and transitions.

   Eye contact with students helps you to be understood and to remember that your goal is communication.

   If English is not your first language, be sure to write key words and phrases on the board or overhead (certainly good advice for native speakers also). Speak at a slow enough pace that students can adjust to your accent. Encourage students to tell you if they can't understand something you say, and feel free to use other students to help you translate difficult concepts into English. Ask students to speak up when they ask questions, and repeat their questions to them so that you are sure you have understood what they are asking.

2. **Body**: If you are comfortable with your teaching, your body will communicate that confidence. You will probably find that you easily move about the room as you talk with students and that your hand gestures naturally emphasize your main points. If you are uncomfortable, you may have to do some acting until you become more at ease in your teaching. Try to move out from behind the desk or podium and closer to your students when you are asking them questions or taking questions from them.

   Adopt a comfortable and relaxed stance. And be assured that the more you focus on communicating with your students, the more natural your movements will become.

3. **Visual Aids**: Two simple pieces of advice—write in an organized and legible fashion and don't talk to the board.

   When you use the board or overhead to logically develop a problem solution, determine which steps need to be written out. Be careful to label diagrams and graphs and use appropriate units. Model a good problem presentation style for your students by your own work on the board. Start at one side of the board and work across in an organized fashion. Ask students whether they have everything down before you erase a section of the board.

   Put your agenda and important announcements off in a corner of the board where they can remain all period. The agenda can help keep you and your students on track.

   Overhead projectors allow you to face students and talk. Do not put too much information on an overhead; students tend to copy everything and not to pay
attention. When preparing overheads before class, put down key words, formulae, phrases, and then leave space to develop the notes you want your students to take. If you are putting complicated diagrams of solutions on an overhead, you may want to make hard copies for your students. They can then focus on what you are saying instead of just trying to copy everything down. Laser writers make wonderful overheads—but use a font size of no less than 18.

With both overheads and black boards, step back and look at what your students are seeing. Does it make sense? Walk around the room; can you read it?

III. Participation
Good presentation skills include the ability to interact with students and get them actively involved in their own learning. Refer to the section of the handbook on leading a recitation.

1. **Ask rhetorical questions to stimulate thinking.** Ask direct questions to individual students and wait patiently for an answer. Encourage and reward answers. Distribute your questions equally around the class. Ask for examples, input, or opinions from students.

2. **Use pair or group work.** Ask each person to turn to a neighbor and discuss a topic, work a problem, or formulate a question. Call on a few pairs to share their work with the class.

3. **Use short writing assignments.** Assign a one-minute paper. Ask students to write down their understanding of a certain concept or problem on a 3x5 card, anonymously if you wish, and then collect the cards.

**COMMUNICATING TECHNICAL INFORMATION**

**The Problem:** Not everyone has the same experience or familiarity with your subject as you do. A perfectly good explanation can be wasted if it is set in an unfamiliar context.

**The Solution:** Describe new technical information in a context in which the audience is more comfortable. This is called “empowering the audience.”

**Hints for Empowering the Audience**

1. **Use appropriate similes, metaphors, and analogies.** Comparing technical information to something familiar to the audience is the most powerful method of explanation. Many analogies can be used for explanation; make sure you pick one that is most appropriate to your main point.

2. **Avoid unnecessary detail at all costs.** Though important to technical issues, detail can clutter the learning process. Start general and add details slowly as the presentation progresses. Filter out those details that are not necessary to the presentation.
3. **Clearly define all acronyms and jargon.** Or avoid them completely. Don't assume technical acronyms or terms are familiar to your audience.

4. **Know your audience.** Knowing the background of your audience can help you know at what level you have to teach. It can enhance your student-teacher relationship.

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**DEALING WITH NERVOUSNESS**

Everyone gets nervous! There is no public speaker, no matter how experienced, who does not get at least slightly nervous when speaking in public. It is a perfectly natural reaction. Awareness of this fact is the first step in dealing with nervousness.

**Physical Reactions:** Nervousness is similar to your body's natural defense mechanism against fear. Adrenaline is released into the bloodstream, your muscles tense, and your heart rate and breathing rate increase. Blood rushes to your muscles and leaves the brain, which may explain why you may lose concentration or stutter momentarily. Many speakers use deep breathing exercises, stretching, or meditation to help relax and combat these natural reactions to nervousness.

**Tips for Dealing with Nervousness**

1. **Understand that nervousness is a natural reaction.** As stated before, it happens to everyone, no matter how experienced.

2. **Practice!** Your best defense against nervousness is to be prepared for your presentation. You'll be more able to anticipate questions. Each rehearsal should lessen your fears. And don't just practice for your upcoming presentation; take advantage of every public speaking opportunity. Nervousness becomes a lot easier to cope with the more experience you have.

3. **Think positively.** Channel the physical energy of nervousness into a positive feeling of anticipation for your presentation. Avoid negative thinking--if you think something will go wrong, you will dwell on this fear and lose concentration on the subject. Laugh with your audience when appropriate. Laughter relieves tension.

4. **Trust yourself.** If you are confident about your presentation, you will appear confident to your audience. Visualize yourself a success after it's all over.

5. **Take control of your presentation.** Your audience expects you to be in control. Be energetic. Don't expect to be perfect, mistakes will always occur; just don't let that bother you as you continue the presentation.

6. **Make the audience your partner.** The audience didn't come to watch a bad presentation--they want you to succeed! If you are comfortable, your audience will reflect that comfort.
REFERENCES

Teaching in a Diverse Community

INTRODUCTION
This handbook chapter is designed to assist you in increasing your awareness and comfort level in the classroom, whether you are a native or international TA. We first present some principles and practices of equitable teaching in a community as diverse as Cornell. Section II of this chapter addresses some of the specific challenges International TAs may face as they enter the Cornell classroom.

PRINCIPLES AND PRACTICES

What is Multiculturalism?

“Multicultural education incorporates the idea that all students—regardless of their gender and social class, and their ethnic, racial, or cultural characteristics—should have an equal opportunity to learn in school. Another important idea in multicultural education is that some students, because of these cultural characteristics, have a better chance to learn in schools as they are currently structured than do students who belong to other groups or have different cultural characteristics.”

James A. Banks
Multicultural Education: Issues and Perspectives

“The guidepost for a responsible and effective university is the quality of education provided to historically marginalized students. A pedagogy that fosters the learning of these students also benefits mainstream students.”

Rodney Parrott
Graduate TA Multicultural Project

Why does multiculturalism matter to Engineering TAs at Cornell?

• The world community is at our doorstep.

• Ignorance of diversity will make your job harder.

• Multiculturalism is a major institutional priority, not only at Cornell, but also in industry.

• Multiculturalism gives us an opportunity to learn cultural richness from each other.
• There is always more than one way to effectively address challenges.

• The engineering culture at Cornell may be different than the engineering culture you were in at your undergraduate institution.

What are the facts?

• The student population in engineering is diverse.

• Attrition of *qualified* minority and female students continues to be a problem. Studies show that grade point averages of students who leave engineering are no different than those who choose to remain\(^1\),\(^2\).

• Factors that contribute to low retention and graduation of minority engineering students include\(^3\):
  
  - Isolation within their department.
  - Inadequate faculty involvement in academic life of students.
  - Unsupportive campus climate.
  - Low expectations from faculty and peers.
  - Shortage of role models in engineering.
  - Ineffective study habits.
  - Poor understanding of engineering and science careers.

What can Engineering TAs do?

• Increase your personal awareness of your own internal biases and assumptions and how these prejudices influence our behavior.

• Realize that there are biases inherent in the engineering educational institution.

• Try to see your students as individuals. Some of your initial assumptions may be incorrect.

• Remember that each student comes with a set of cultural norms that may be similar to yours or extremely different. Realize that different is not bad.

• Think before you speak or act.

• Be a role model in how you deal with people who are different from you.
### SOME INTERACTIONS AND INTERVENTIONS

<table>
<thead>
<tr>
<th><strong>Interaction</strong></th>
<th><strong>Intervention</strong></th>
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<tbody>
<tr>
<td>Course material is not balanced in its use of masculine and feminine pronouns and culturally diverse roles.</td>
<td>Try to use course material that clearly includes women and minorities.</td>
</tr>
<tr>
<td>Women and minority students are not answering questions you have posed</td>
<td>Pause (4-5 seconds) before allowing students to respond to questions.</td>
</tr>
<tr>
<td>Students add qualifiers to statements (for example, “I’m probably wrong, but . . .”)</td>
<td>Encourage hesitant-sounding student to elaborate. Don’t assume that he/she does not have a clear idea in their mind.</td>
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<tr>
<td>There is a subtle tendency to de-value the work of women when grading.</td>
<td>Have students put their name on the last page of assignments so that a name does not influence the grading.</td>
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<tr>
<td>A student is consistently pushed into secretarial roles in group work.</td>
<td>Assign rotating tasks in each group and/or change group membership periodically.</td>
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<td>After a hard exam, several men complain that the test was unfair and some women say they lack the ability or didn’t study enough</td>
<td>Help students realistically evaluate their performance. Be aware of differences in blame assumption; awareness can help you understand students’ motivations and comments.</td>
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<tr>
<td>After returning the first lab report, an African American student expresses concern about her B grade. You reply, “You did pretty well, don’t worry about it.” Later, you ask an Asian student who received a B on the same assignment, “What happened, I’m surprised.”</td>
<td>Be aware of your own assumptions. Do not judge people based on their culture (or yours).</td>
</tr>
</tbody>
</table>

### REFERENCES


Henes, Robby (1994) *Creating Gender Equity in Your Teaching.* College of Engineering, University of California, Davis.


STRATEGIES FOR GAY, LESBIAN, AND BISEXUAL STUDENTS

• Don’t assume all your students are straight.
• Don’t always use straight lifestyle examples in class.
• Confront homophobia in your classroom interactions.
• Avoid humor at our expense.
• Ask us about our private lives to the same extent that you ask straight people.

STRATEGIES FOR STUDENTS WITH STRONG RELIGIOUS BELIEFS

• Realize as a teacher that the way you see your students is conditioned by your faith.
• Realize that our faith stance and our academic perspective do coexist harmoniously.
• Realize that not all your students believe in abortion rights and the truth of evolution.

STRATEGIES FOR WOMEN STUDENTS

• Use non-gender specific language.
• If material is available, use women’s research in your course.
• Offer support group sessions if some women feel alienated in class.
• Use last names only on lab reports to avoid gender bias in grading.
• Have a safe suggestion box for students to critique your gender related teaching style.

STRATEGIES FOR INTERNATIONAL STUDENTS

• Write key words and concepts on overheads/blackboard to support spoken lecture.
• Allow extra time on exams for students who speak English as a second language.
• Remember that insider jokes and explanatory stories only make sense to insiders.
• Offer alternate ways to gain class participation credit.
• Encourage us to bring a knowledgeable friend to office hour appointments.

STRATEGIES FOR STUDENTS OF COLOR

• Call on us to speak in class; assume our perspective is valuable.
• Don’t ask an individual to speak for an entire "race."
• Don’t think we are experts on issues of race and racism.
• Don’t assume that we are academically and economically disadvantaged.
• Expect all students to be good students.

From Cornell Graduate TA Multicultural Project, Graduate Teaching Development Workshop Series Handbook, Cornell University, 1996.
Models Of Learning And Teaching Styles

What is learning style?
“Learning style is the way students begin to concentrate on, process, internalize, and remember new and difficult academic information” (Dunn & Dunn, 1993).

Dimensions of Learning and Teaching Styles by Felder & Silverman
A student’s learning style may be defined in large part by the answers to these questions:

1) Through which sensory channel is external information most effectively perceived: visual—pictures, diagrams, graphs, demonstrations, or auditory—words, sounds?

2) With what type of information is the student most comfortable: concrete—facts and observations are given, underlying principles are inferred, or abstract—principles are given, consequences and applications are deduced?

3) How does the student prefer to process information: actively—through engagement in physical activity or discussion, or reflectively—through introspection?

4) How does the student progress toward understanding: sequentially—in continual steps, or globally—in large jumps, holistically?

Teaching style may also be defined in terms of the answers to these questions:

1) What type of information is emphasized by the instructor: concrete—factual, or abstract—conceptual, theoretical?

2) What mode of presentation is stressed: visual—pictures, diagrams, films, demonstrations, or verbal—lectures, readings, discussions?

3) What mode of student participation is facilitated by the presentation: active—students talk, move, reflect, or passive—students watch and listen?

4) What type of perspective is provided on the information presented: sequential—step-by-step progression (the trees), or global—context and relevance (the forest)?
Kolb’s Learning Styles Inventory

David Kolb’s Learning Style Inventory describes the way you learn and how you deal with ideas and day-to-day situations in your life. Kolb identified two separate learning activities: perception and processing. Each of these learning activities can be divided into opposites. For example, some people best perceive information using concrete experiences (like feeling, touching, seeing, and hearing), while others best perceive information abstractly (using mental or visual conceptualization). Once information is perceived it must be processed. Some individuals process information best by active experimentation (doing something with the information), while others process best by reflective observation (thinking about it).

There are four learning dimensions within this model:

1. Concrete experience - learning from specific experiences, relating to people, and sensitivity to feelings and people
2. Reflective observation - careful observation before making a judgment, viewing things from different perspectives, and looking for the meaning of things
3. Abstract conceptualization - logical analysis of ideas, systematic planning, acting on intellectual understanding of a situation
4. Active experimentation - ability to get things done, risk taking, influence people and events through action

By combining the two opposite dimensions, four quadrants of learning behavior are created:

The quadrants describe four different types of learners:

**Type I learner:** Primarily a “hands-on” learner, tending to rely on intuition rather than logic. Likes to rely on other people’s analysis rather than own. Enjoys applying learning in real-life situations.
**Type II learner:** Likes to look at things from many points of view. Would rather watch than take action. Likes to gather information and create many categories for things. Uses imagination in problem solving. Is sensitive to feelings when learning.

**Type III learner:** Likes solving problems and finding practical solutions and uses for learning. Shies away from social and interpersonal issues. Prefers technical tasks.

**Type IV Learner:** Is concise and logical. Abstract ideas and concepts are more important than people issues. Practicality is less important than a good logical explanation.

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**Dunn & Dunn’s Learning Styles Model**

Dunn & Dunn describe learning styles of students and productivity styles of working adults as related to the following groups of innate and learned qualities:

- Environment (sound, light, temperature, and design)
- Emotional/Psychological (motivation, persistence, conformity/responsibility, and need of structure provided by source)
- Sociological work or learning choices (alone/self, with one other, with peers, with an adult, and varied, responds to situation or environment)
- Physical preferences (perceptual [visual, auditory, tactile, and/or kinesthetic], intake, time of day, and mobility)
- Psychological/Mental processing (global, analytic, right or left hemisphericity, and impulse or reflective)

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<thead>
<tr>
<th>Preferred Learning Style</th>
<th>Corresponding Teaching Style</th>
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<tr>
<td><strong>Analytic</strong></td>
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<tr>
<td>work alone</td>
<td>provide explanations and visual reinforcements</td>
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<tr>
<td>processes “step by step”</td>
<td>use direct teaching methods (outlines, handouts, step by step, underline)</td>
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<tr>
<td>one task at a time</td>
<td>provide opportunities for individual work</td>
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<tr>
<td>remembers details</td>
<td>provide options</td>
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<tr>
<td>likes organization</td>
<td>use formal, structured presentation format</td>
</tr>
<tr>
<td>analyzes then decides</td>
<td>test frequently</td>
</tr>
<tr>
<td>prefers specific criteria</td>
<td>provide feedback on details and sequence</td>
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<tr>
<td>doesn’t like vague questions</td>
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<tr>
<td>prefers options</td>
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<td>wants specific, constructive feedback</td>
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<tr>
<th>Preferred Learning Style</th>
<th>Corresponding Teaching Style</th>
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<tr>
<td><strong>Global</strong></td>
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<tr>
<td>needs “big picture”</td>
<td>make lessons real (stories, anecdotes)</td>
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<tr>
<td>reads for overall ideas (skims)</td>
<td>reach for emotional link to motivate and focus</td>
</tr>
<tr>
<td>likes to work with others</td>
<td>use visuals (videos, pictures, multimedia)</td>
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<tr>
<td>understands “in context”</td>
<td>present overview stressing main</td>
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<tr>
<td>can work on several things simultaneously</td>
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<tr>
<td>Personal Characteristics</td>
<td>Ideas and Practical Application</td>
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<tr>
<td>relates what is taught to personal experiences</td>
<td>use tactile materials</td>
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<tr>
<td>enjoys team competitions</td>
<td>use open-ended questions</td>
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<tr>
<td>takes criticism very hard</td>
<td>kinesthetic activities well received (labs, experiments)</td>
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<tr>
<td>sees relationships</td>
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*Adapted from T. Larkin-Hein, Teaching and Learning with STYLE, January 2002*