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I. INTRODUCTION

Congratulations on having been selected as a teaching assistant! Your selection is significant recognition of your scholastic achievements and of your interest in and potential for the teaching profession. Not only are you among the small fraction of applicants admitted to graduate study in the Department of Electrical and Computer Engineering at UCSB, but also you have been selected further from this group to fill a vital role in the Department's instructional program.

The faculty and staff of the Department welcome you to our group. We are proud of our Department's work, its standards, its traditions, and its graduates. It is our hope that your participation will be personally rewarding and that you will share our sense of pride.

The purposes of this Handbook are to help familiarize you with the organization, facilities, policies, and traditions of the Department, to provide a preliminary indication of the nature of the responsibilities you are about to assume, and to present miscellaneous information and advice that may be of assistance to you in performing your duties. It is Departmentally oriented and intended to supplement the book *TA's as Teachers*, prepared by the Office of Instructional Consultation and available at the campus-wide T.A. Orientation.

II. CONTRACTS, PAY, INCOME TAXES, AND OTHER MATTERS OF IMMEDIATE CONCERN

Putting first things first leads us immediately to the subject of your remuneration. You may have assumed logically that your letter of acceptance following the official offer to you of a teaching assistantship established a contractual relationship with the University. Nevertheless, that exchange of letters did not get your name placed on the payroll. Before placing your name on a paycheck, the University insists that you present yourself on campus and that you sign employment forms. You may do this in the ECE Graduate Student Office (Building 697, Room 101) shortly after arrival. The employment form will specify a percentage of full-time employment. 50% indicates 20 hours weekly, the maximum time ordinarily allowed for T.A. employment. (This is an average over the period of your tenure as a T.A.) In official university job parlance a twenty hour per week appointment is usually referred to as a .50 FTE (full-time equivalent).

The current gross pay is $1,848.55 per month for a .50 FTE T.A. (three checks per quarter). You will not receive your first paycheck until November 1, and your check will be for a lesser amount than the monthly salary noted above. The reason is that the University is required by law to withhold a small (but significant) fraction of your pay for payment to the state and federal governments as credits against your state and federal income tax liabilities.[1] For most T.A.'s (particularly those with little or no additional taxable income) the amount withheld will exceed the tax liability. In January of each

[1] Rulings of the Internal Revenue Service have established that income earned as a TA is taxable.

year you will receive from the Accounting Office a form (W-2) reporting your pay and the amount withheld in the prior calendar year. This form is to be used in filing your income tax returns. You must file both state and federal income tax return forms even though you may have no tax liability. In that happy circumstance, both governments will owe you money (the amounts withheld) and will make refunds to you following receipt of your tax return forms. Your money cannot be refunded unless you file returns. If you have dependents you may have the amount withheld reduced. You must indicate your status with regard to dependents on a W-4 form, obtained when you sign your employment contract form (and at any later time you wish to make a change).

For those of you who are foreign students, the Office of International Students and Scholars (Student Resource Bldg 3130) provides some helpful services at tax time. This office invites folks who are familiar with the Internal Revenue Service (IRS) policies to come to the campus to help foreign students complete the appropriate tax forms. Essentially, if you take your W-2 forms to them, they will do the rest as you answer their questions. Generally these people come in February or March; ask the Office of International Students and Scholars (OISS) for the exact dates early in the new year. The deadline for filing tax returns is April 15. The help via OISS in filing tax forms costs about $40 for a simple return. Check to see what the current rates are once the announcement from OISS is made regarding the availability of this service.

The other matters of immediate concern are: (1) becoming informed of your T.A. responsibilities; (2) registering for courses and paying fees, if you have not done so; (3) attending both the Departmental T.A. Orientation and the Graduate Student Orientation meeting; and (4) attending the campus-wide orientation program for T.A.'s. In addition, foreign students for whom English is not the first language must take the English Language Placement Examination (ELPE) as well as a 15-minute T.A. Language evaluation. See Val in the ECE Graduate Student Office for details.

Your specific T.A. assignment ordinarily will have been made when you arrive on campus one week or more prior to the beginning of classes. You will be informed via e-mail regarding your course assignment and expected duties. The course textbooks are available in the ECE Student Office. Please see the Undergraduate Staff Advisor for the book. (You may borrow a Department copy of the textbook for the duration of your assignment to the course.) *Report to the professor as soon as possible to learn your duties and to work with him/her in making final preparations for the beginning of the course.*

III. T.A. FUNCTIONS AND DUTIES

A teaching assistant, as the name implies, is a professor's helper. S/he is, in one sense of the word, an apprentice.

But there are several connotations of apprenticeship, which do not seem to apply to the teaching assistant. First, by academic standards at least, the work is highly

remunerative. Secondly, the teaching assistant is devoted primarily to being a student and only secondarily to learning the teaching profession. Finally, a teaching assistant is responsible to both the professor in charge of the course to which s/he is assigned and to the students in that course.

Our department has a tradition of service to students and is committed to maintaining it. It is a source of pride to us to find that students and graduates recognize this, particularly when they see us as more dedicated to the service of students than our counterpart departments in other universities. We should always remember that without students there would be no university, no professors, and no teaching assistants.

1. The Tutorial Role

The T.A. serves as a surrogate professor in many ways, some of which are detailed below. In some cases s/he has more contact with the students than does the professor. Frequently s/he has more one-to-one contact with the students than the professor. University-wide it is estimated that more than one-third of an undergraduate student's contact with instructors is with teaching assistants. No such estimate exists for our department, but the figure is unquestionably high. We need not be concerned here with the reasons for or the wisdom of policies which determine this. Rather we note that it is a fact of our existence and likely to remain so. We should note also the significance of the one-to-one contact in the student's educational experience. Largely, it is the one-to-one contact which personalizes the educational experience and allows for student expression of the joys of learning and of acquiring mastery of our discipline.

A teaching assistant's qualifications for this role are special and in many ways may be superior to those of the professor. The T.A. is regarded by the student as a peer or near peer. The knowledge that you, the T.A., stood recently where the student now stands with respect to the subject of the course is reassuring to the student. If you show an ordinary degree of personal warmth and enthusiasm for your subject, you may easily establish a rapport, which is difficult for the professor to achieve. A student may assume that you are more approachable and more understanding of his/her learning problems; you have indeed experienced those same problems much more recently than the professor. Given that your knowledge of the subject matter is sufficiently complete and that you have enthusiasm and good basic communication skills (all of which are reasonable to assume in view of your attainments to date), you have special advantages in communicating with undergraduates. We hope you will exploit those advantages in your tutorial role.

Finally, it should be noted that the tutorial role, because of the extended opportunity for contact with students, is a particularly rewarding one. Your own joy of learning and enthusiasm should increase with successful communication of your knowledge. Certainly your own self-assurance concerning your mastery of the

subject will increase. It might well be said that the best test of your knowledge and skill is your ability to communicate it. You now have a unique opportunity to share the joys of learning and the camaraderie of the students while at the same time sharpening your own technical and communication skills.

2. The Liaison Role

It is possible to identify a liaison role for a teaching assistant, since your perspective on the course is somewhere between that of the students and that of the professor. You should be aware of the approach the professor is using to communicate with the students and of the scope of the subject material s/he is presenting. You can aid the process by reinforcing or supplementing the professor's approach in your contact with the students. Because of more direct contact with students, you may become more acutely aware of their learning problems. You are then obliged to communicate your knowledge of these problems to the professor. You can provide most helpful feedback.

3. The Professor's Assistant Role

The ultimate responsibility for the conduct of the course to which you are assigned lies with the professor in charge of the course. You are his/her assistant in the instructional role. The instructor decides, taking into account your demonstrated abilities and the nature and needs of the course, which responsibilities to delegate to you, and in the process, the nature and scope of your duties. Keep in mind that your professor cannot give you responsibility; s/he can merely delegate it and something delegated is not passed on but shared. To the extent that you take charge and assume the responsibilities delegated to you, you may relieve your professor of some of the burdens of the instructional task, but you do not relieve him/her of responsibility. The professor and your students (who are the direct beneficiaries and evaluators of your services) will judge you on the basis of how well you share the delegated responsibilities. You will undoubtedly find that the degree of autonomy you have in your job and the extent of your delegated responsibility are related to how well you handle the responsibility. We hope that you, as a T.A., will display enthusiasm and initiative, and that you seek, accept, and enjoy responsibility. We know that you have shown these qualities in the pursuit of your educational goals to date.

When you discuss your duties with your professor you may receive some specific instructions on how to perform them. In most cases, however, the "how to" probably will be left largely to your discretion. Although this leaves you the opportunity to exercise your initiative and imagination, you should be careful to conform your efforts to those of your professor. Don't present your long-suffering students with two separate courses -- yours and the professor's. To this end you should be keenly aware of the course content, the day-by-day structure of the

lectures, homework, laboratory exercises, etc., even though you have not been delegated specific instructional responsibilities for some of it. It is important that at all times you maintain a sense of the student's perspective of the course. A complaint occasionally voiced by students is that the explanation and/or problem-solving techniques of the professor and teaching assistant could not be related. In this regard it is permissible, and indeed, desirable for professor and T.A. to be "different"; but it is necessary that they be compatible. Remember it is incumbent upon you to insure the compatibility. If your professor does not volunteer enough information for you, you should seek it. You may, for example, review the text assignments, ask for a copy of the class notes, or attend some of the lectures. Some of our T.A.'s attend the class lectures. (This is a recommended practice but may not always be justifiable in view of the time consumed and your familiarity with the lecture material.)

IV. TIME BUDGETS AND COURSE LOADS

T.A. assignment to courses is based on relative needs of the various courses as assessed by the Department Vice Chair. It is sometimes the case that Departmental budgetary constraints preclude assignment of the number of T.A. hours desired and required by the professor in charge of a course. This may create a potential conflict of interest in that the professor primarily is interested in handling the instructional tasks while you must be concerned that your involvement leaves you sufficient time for your primary interest in being a graduate student. Not infrequently graduate student teaching assistants have enjoyed their work so much or felt their responsibilities so keenly that their own scholarship and progress as graduate students have suffered. We hope you will not be a clock-watcher, just putting in your time, and that you will be dedicated to getting the job done. Nevertheless, the faculty recognizes that you are a student first and a teaching assistant second. It is not only in your best interest to maintain normal progress as a student, but also in the best interest of the Department.

The Department expects that you will be enrolled in at least 12 units of course work while you are a T.A. In addition, your work as a T.A. is treated as a course with unit count. All T.A.'s may enroll in ECE 502 worth from 1-4 units. Note that ECE 502 will not provide credit units for the purpose of satisfying degree requirements.

At the beginning of each course in which you assist, you should work out a time budget with the professor in charge of the course. This budget should apportion your total hours among the various assigned duties. The allotted times are approximate but should serve as a guide in controlling the use of your time.

V. SPECIFIC DUTIES PERFORMED BY TEACHING ASSISTANTS IN ECE

Teaching assistants may be assigned a wide range of duties. You may be asked to help with virtually any aspect of instructional duties in the context of the course to which

you are assigned. However, it is University policy that primary lecture responsibility not be delegated to T.A.'s. The most common T.A. duties are listed below. Your assignment is likely to include more than one of the following:

1. Laboratory direction and/or assistance

Teaching assistants are assigned to virtually every undergraduate course involving a laboratory session. Assignments vary from total responsibility for the laboratories, to assisting with direction. In some cases the T.A. will be asked to present a brief lecture on the experiment to be conducted. In all cases the T.A. will be responsible for checking on the availability and proper functioning of required laboratory equipment prior to the laboratory meeting. In addition, s/he is required to be present to assist students throughout the scheduled laboratory period and will be responsible for assuring any necessary clean-up and/or return of equipment at the end of a laboratory period.

2. Grading laboratory reports, papers, notebooks

Ordinarily the T.A. responsible for assisting in the conduct of the laboratory also will have responsibility for assigning and grading the written work. The written work may include laboratory reports, quizzes, and laboratory notebooks. (See Sections XII, XIII and XIV.)

3. Laboratory preparation

Occasionally an experienced T.A. will be asked to help in the design of laboratory experiments for instructional purposes. Included may be the design and construction of circuits or equipment required for the experiment.

4. Leading discussions and problem sessions

In courses with a weekly discussion or problem-solving session, T.A.'s may be assigned to preside over that session.

5. Tutoring

T.A.'s are asked to make some portion of their time available to students seeking counsel or help with course related learning problems. If you have such an assignment you must keep office hours so that you may be freely consulted.

6. Grading examinations

You are likely to be required to help your professor in grading examinations, particularly in the lower division courses with large enrollments.

7. Marking homework

T.A.'s are expected to read and mark student homework papers. (See Section XII, XIII, and XIV.)

VI. T.A. EVALUATION

T.A.'s are also evaluated twice during the quarter – mid-quarter by the faculty supervisor and end of the quarter by the students and the faculty supervisor. This evaluation using student questionnaires is conducted by the ECE Department Committee on Course and Teacher Evaluation at the conclusion of each quarter. The evaluations are read by the Vice Chair. T.A.'s may see these evaluations at the end of the quarter after grades have been submitted.

VII. T.A. TRAINING PROGRAM

The ECE department sponsors certain training activities for its new T.A.'s. In addition the Office of Instructional Consultation (OIC) provides the services described below to assist T.A.'s.

1. Departmental T.A. Orientation Meeting

An orientation meeting for all new ECE T.A.'s is held at the beginning of the fall quarter. In this meeting, the Department Vice Chair or his faculty designate and staff participate and offer information, advice, and guidance to new T.A.'s. Attendance at this meeting is required of all new T.A.'s.

2. Campus-wide T.A. Orientation

A T.A. orientation is conducted during the first week of the fall quarter by the Office of Instructional Consultation and the Graduate Division. The orientation is general in scope. It is designed to introduce new T.A.'s to their instructional roles and to provide them with guidance in acquiring some basic instructional skills. Attendance at this orientation also is required.

3. Videotaping, Classroom Visitation & Consulting Service

The OIC provides T.A.'s with the opportunity to be videotaped or observed while teaching. You will receive a copy of your tape if you wish. You may view your videotape, discuss your instructional techniques, and explore alternative approaches to teaching with one of the T.A. Development Program's Peer Consultants. Peer Consultants are experienced T.A.'s from a variety of departments who have trained in observing teaching as a process.

Videotaping and viewing the tape are required for all new ECE T.A.'s. Make an appointment by sending an e-mail message to tavideo@id.ucsb.edu. Appointments should be made as early as possible in the quarter but no later than the fifth week of the quarter and as much as a week in advance notice to the OIC, if possible.

4. T.A. Departmental (TAD) Training Grants

TA Training Departmental (TAD) Grant proposal are submitted annually by academic departments for the purpose of strengthening and improving departmentally-based TA training. For more information, please refer to the following website: http://oic.id.ucsb.edu/ta-training-programs/ta-departmentaltad-training-grants.

VIII. SHOPS

If you are a T.A. in a course which has a laboratory associated with it, you will need to know about the Department's Electronics Shop (Harold Frank Hall (HFH), Room 1160).

The Electronics Shop is responsible for the maintenance and control of laboratory equipment. It has facilities for electronics maintenance and light machine work (drilling and sanding, etc.). You may need the services of this shop in obtaining necessary equipment and materials for your laboratory and on various other occasions. It is important that you develop good working relations and rapport with the Shop personnel. They are Paul Gritt, the Shop supervisor, Avery Juan and Raul "Bear" Ramirez. The Shop personnel have many and varied responsibilities, and the demands on their time and expertise are sometimes excessive. Servicing instructional laboratories is at the top of their list of priorities, but they cannot provide a high level of service without your consideration and cooperation. With this need in mind, the following statement of policy for T.A.'s in shops and laboratories is provided.

- The shop and laboratory storerooms are not for the open and unrestricted use of faculty, staff, or T.A.'s. Never simply remove a part or item of equipment which you may need. To do so would seriously impair the ability of Shop personnel to maintain

the accountability for equipment with which they are charged. Even a relatively innocent-appearing violation of this principle can mean that the next lab will be unable to run the way it should. This in turn can result in a line of unhappy students and T.A.'s waiting outside the shop to complain...and this is the sort of thing that WILL reflect in a most negative way on the person who broke the rules in the first place.

- Be professional and businesslike in your dealings with Shop personnel. When you have need of their services, go to the front desk in the Shop (Room 1160) and introduce yourself to Bear (or his stand-in). (If no one is at the front desk, use the "call for service" button. Do not walk on back.) Be sure to state that you are a T.A. and give your course number. Then request the particular service in which you are interested. The introduction will not be necessary, of course, after you become well known to the shop personnel. This may take time, however, as there are many courses with T.A.'s and the T.A. personnel change every quarter.

- Machine tools and test equipment in the Shop are there for the use of the Shop staff and are not available for use by others. Do not ask to use or remove the Shop's test equipment: it is not a collection of spares but rather a collection of the tools needed by Shop staff to do their job – supporting your labs.

- **Anticipate your needs** for equipment and shop services well in advance. Work with your faculty member to get the description of the lab procedures (with lists of needed parts, materials and equipment) as soon as possible after the beginning of the course, and take a copy of such descriptions to the Shop. Allow one or two weeks' lead time for each lab, more when the parts needed are not among those carried as shop standards. Extra lead-time should also be allowed when large numbers of students (or groups) are involved, and/or when the parts packets are extensive. Be sure to notify Shop personnel of all the needs they will be expected to satisfy.

  Never forget. YOU are responsible for the successful operation of the lab.

- Be thoroughly familiar with the principles of operation and the limitations of the equipment used in your laboratory. It is your responsibility to insure that you and your students use the equipment properly. It may be necessary for you to study the manufacturer's instruction manuals for certain equipment. These are not available to students, but you may check them out in the shop. Ask the Shop personnel. Use the manuals carefully and be sure to return them immediately upon completion of your reading.

- You will be asked to sign check-out slips for certain parts, equipment, and instruction manuals obtained in the Shop. You then will be held strictly accountable for those items. On the return of an item, it will be your responsibility to make sure that you recover the check-out slip with your signature. Ask for it and destroy it to ensure that you will no longer be held accountable.

- Do not attempt to repair or recalibrate malfunctioning laboratory equipment. Instead, take it to the Shop and give it to the people responsible for its maintenance. To be sure that you have communicated the nature of the problem to Shop personnel, make it a habit to leave a written description of the problem also containing the course number, the date and your name (in case the repair crew needs more information). Never return an inoperative or malfunctioning piece of equipment to a storage location where it will be selected by the next unsuspecting user, who will then repeat your cycle of discovery, or, what is worse, make erroneous measurements unknowingly.

  If you make the discovery of a failed instrument outside of regular Shop hours, or if the instrument is attached to a bench, leave a note on the instrument AND send a message to the shop as noted above. Use of e-mail can be especially effective in these instances (shop@ece.ucsb.edu).

As a T.A., you ordinarily will not need a machine shop. However, the College of Engineering maintains such a shop. This shop provides machining and other metal work services. The Department must pay the College for any services provided by the machine shop. As light machine work is done in the Electronics Shop, you would direct your request there and be redirected to the machine shop only if necessary.

ECE Electronics Support has created a "Company Store" of electronic parts, materials, tools and equipment which has been made available for purchase by students, staff, and faculty. Students can purchase from this Store via their BARC accounts; researchers and faculty can recharge to their assorted research accounts; and all can be purchased with checks made payable to UC Regents. While virtually any part or material which is stocked for use by Electronics Support can be purchased, of particular interest to Teaching Assistants is the stock maintained in support of the various electronics-related laboratories. A common routine for such courses as ECE 2A-B-C, ECE 137A-B, or ECE 145A-B would be that a set of parts would be issued to a student (or group); after they destroy those, they purchase replacements from the Company Store. This provides reasonable assurance that they will be able to get replacements without resorting to "procurement" from other students' supplies. In addition, if the student wishes to try alternatives for which parts were not provided, such parts can be made available through the Store (providing, of course, that this has not been forbidden by the instructor of the course).

IX. OTHER FACILITIES

You may do T.A.-related copying yourself. Go to HFH, Room 4155 for a copy code for the copying machine for photocopying materials for the course for which you are the T.A. (The copy machine is NOT available for your personal work unrelated to your instructional duties as a T.A..)

X. LABORATORY SUPERVISION

Supervising a laboratory can be one of the most enjoyable and also one of the most demanding T.A. assignments. If you have such an assignment, the manner in which you conduct your laboratory sessions will depend on the nature of the course, the wishes of the professor in charge, your personality and abilities, and the number of students, among other factors. Consequently, it is not possible to enumerate a complete set of procedures universally applicable in laboratory supervision. Rather, the following set of generally useful suggestions and guidelines are offered:

- Have handouts describing laboratory experiments prepared and distributed to students well in advance of experiments. (Usually the professor in charge will supply a copy of the handout, and you will be responsible for reproducing copies for the students.)

- Read the handout at least a week before the experiment is to be performed, and take action to insure that all components and equipment required will be available when needed. It is not enough to sight the equipment in laboratories or laboratory equipment rooms, as other users may claim it in the interim period. The Electronics Shop, who is responsible for controlling the equipment, must be advised of your needs. A good practice is to leave a copy of the handout (containing the equipment list) with the Shop. The date or dates on which the experiment is to be conducted should be written on this handout sheet. If the required parts and equipment are not available in the laboratory on your sight check, be sure to so advise the Shop as they may need to take some action to procure them for your use.

- If an experiment involves the use of equipment with which your students are unfamiliar, you will have the responsibility of instructing them in its proper use. This instruction may take the form of prepared handouts describing the equipment operation, a pre-laboratory lecture, or a laboratory demonstration. You will want to be familiar with all aspects of equipment operation and may find it necessary or desirable to consult the manufacturer's instruction manual in the shop.

- Analyze the experimental procedure with a view toward anticipating student problems and difficulties. If you are not thoroughly familiar with the experiment, it would be well for you to run through the experiment yourself in advance of the laboratory period. You should be able to give prompt, correct answers to student questions and to correct student mistakes promptly. You will not be expected to be a magician, able to instantly discern and remedy all manner of student misdirection; but the more proficient you are, the greater will be the students' confidence in you, themselves, and the subject matter.

- If you do have to trouble-shoot a student experimental setup, be careful to explain what was wrong and what steps you take to check and correct the setup. There is

no learning experience for the students when you right the situation with what appears to them as your magic touch.

- Prevent formation of large laboratory groups. Invariably in large groups one student leads in the conduct of the experiment, one takes data, and the others are (often disinterested) spectators. Two-person teams are perhaps optimal.

- Occasionally a student may ask a really good question which presents an opportunity to make a point which may not be directly addressed in the text or laboratory manual. Your preparation of a brief answer presented to the entire class would be most helpful.

- It is a relatively common practice for students to come to laboratory sessions without preparation. This can lead to much unnecessary confusion and intolerable delay in the conduct of the experiment. One way of dealing with this problem is to begin the laboratory session with a pre-lab lecture providing sufficient guidance for expeditious and proper conduct of the experiment. Another way is to require the students to prepare and provide them with the necessary incentives. Brief 10-minute quizzes or pre-lab homework due at the beginning of the laboratory period might serve this purpose. It may be useful to employ both quizzes and pre-lab lectures.

- In supervising a laboratory experiment you may find that some of the procedures noted on the handout sheet are inappropriate or even in error, or you may have ideas on how to improve the experiment. Even though the experiment may have been completed, see the professor in charge; and if s/he is in agreement with your proposed change, have the master copy of the handout instruction sheet changed. There is a natural tendency to forget the experiment once it is completed; yet it would be unfortunate if your experience did not contribute to a more successful experiment in succeeding years.

- Certain parts and equipment used in the laboratories are easily lost or stolen. You are reminded that you are responsible for the return of all equipment used by the students in your laboratory. When certain equipment is issued to you by the Shop for the use of students in your laboratory, you may be required to sign for it, thus establishing your specific personal responsibility. You would be well advised to in turn require students using such parts or equipment to sign for them, establishing accountability to you. Timely return of or payment for such equipment can be made a condition for the students passing the course. But you must notify the professor in charge before the assignment of final grades if students fail to return equipment or this leverage is lost.

- Make yourself as available as possible to the students during laboratory sessions. Do not merely sit at a bench and wait for students to seek your help. Move around observing the various lab groups, and offer your assistance where you observe apparent difficulties.

- Remember that following your laboratory session, another T.A. and group of students will be using the laboratory. It is your responsibility to insure that the laboratory is left clean and in a state of readiness for the next group. To this end, you should insist that each group of students take responsibility for the cleanup of the bench and for the return of the equipment it uses. Before leaving the laboratory at the conclusion of a laboratory session, it is your personal responsibility to check all laboratory stations, insure that all power switches are off, and that windows are closed and the laboratory locked.

- Be safety conscious. Do not allow students to conduct electrical experiments while barefoot. Insure that equipment is properly grounded. Note the Emergency Procedures in Section XVI of this handbook.

XI. LEADING DISCUSSION GROUPS

Many of our courses provide for a discussion session supplementing the lecture presentations. Although lecture sections are sometimes large, discussion sections are invariably restricted to relatively small groups of students. The purpose of the discussion sections is to discuss, with maximal student participation, the subject material of the lectures, to present examples, and to demonstrate problem-solving in a depth impractical in the lecture presentations.

If you are assigned a discussion section, you will find that "leading" aptly describes your role. Ideally your students would be so enthusiastic about the truths revealed to them in the text and lecture that they would be brimming with relevant observations and questions and simply couldn't wait for the opportunity to speak in your discussion meeting. But don't expect it to happen that way. You are much more likely to encounter a stony silence and an expectation that you will perform for them. You may even feel that your group of students is apathetic. Such a judgment would be too harsh, however. Many students, including some very good ones, will wait to be given every advantage (and this includes the performance they expect from you in the discussion) before beginning to do their thinking or assigned problem-solving. Others may simply not have had the time to think about the subject since the last lecture. And, of course, some simply aren't going to do any more thinking about the course content than you or the problem assignments force them to. A few may even be too shy to volunteer a contribution or question; others may fear their questions are not good ones. What this all means is that the quality of your discussion will depend on how well you can induce good student participation (i.e., how well you can lead). A common mistake of T.A.'s who are uncomfortable with silences is to proceed too quickly, thus "losing" students who need more time to think about what is being said.

How do you prepare to lead a discussion? Obviously you do not prepare a lecture, for then you would be doing all the talking. It is essential to review the material presented in lecture since the previous discussion and to try to anticipate student difficulties in understanding. A list of points on topics that ought to be discussed is

helpful. You can always steer the discussion to any point or topic by your own appropriate question. You must also be familiar with the current homework assignments and their solutions. A minimal goal for your discussion should be to ensure that the students understand how to approach the homework. You may, however, have to guard against actually doing the homework. If you show an inclination toward doing it you can be sure that the questioning will request it. One good technique is to be prepared to do some examples similar to the homework but which do not pre-empt any student thought process the homework was designed to evoke. You may have to exercise your good judgment in deciding how far to proceed. Another good practice is to involve student decision-making in the problem-solving you present.

There is obviously no one best way to lead a discussion that is suitable for everyone. What is best for you depends greatly on your own style and personality. You should try to adapt them to the goals stated above.

XII. EVALUATING STUDENT PAPERS

Most undergraduate papers, with the possible exception of examinations, are evaluated by T.A.'s and readers. Your T.A. duties are almost certain to involve at some stage evaluation of homework, laboratory reports, or other papers. In marking student papers you have a special responsibility that ordinarily receives far too little attention. It is widely perceived that marking student papers serves to measure student comprehension of subject material, i.e., technical concepts and problem-solving techniques. With this purpose in mind a reader of undergraduate papers looks for (1) the correct problem solution, result, or conclusion, (2) a proper starting point or recourse to first principles, (3) a logical nexus between first principles and the final result, (4) a check of the reasonableness of the result (i.e., is it dimensionally consistent, intuitively reasonable, correct in trivial and limiting cases, etc.?), and (5) some discussion regarding conclusions and consequences of the results. The above points are listed in ascending order of quality of reader performance. Thus a shoddy reading would examine only (1), a marginally adequate one would take into account (1) through (3), and a truly conscientious one would consider (1) through (5). Students are, of course, very sensitive to the scope and depth of examination of their papers. If they perceive that readers only look at the final results, they are likely to put little else on their papers and may not be too concerned about how they are obtained. If, on the other hand, they perceive that the reader scrutinizes their work carefully, they are apt to do their best quality work. The point is that students enjoy attention and want their best work to be noticed. It is the function of the reader or T.A. to supply that attention. It follows that reader comments, both pro and con, are to be preferred over perfunctory check marks. Likewise, students appreciate seeing the professor's or T.A.'s problem solutions, done with care and in full detail.

There is another aspect of evaluating student papers, which is perhaps of nearly equal importance with evaluating technical content and understanding. The writing and expository communication skills evidenced in student papers should also be evaluated.

We tend to regard ourselves as concerned with imparting knowledge, technical skills, and the engineering approach to problem-solving to our students. We largely take it for granted that someone else is concerned with honing their writing skills. Unfortunately, however, one develops writing skills only by writing. It is a fact that our native students have been required to do very little writing in their college preparatory education; obviously, many of our foreign students have done even less writing in English. It is also true that engineering, like other science oriented disciplines, sometimes attracts the less verbally gifted. Thus our students, with a few exceptions, have inadequately developed writing skills. This lack of writing skill applies not only to writing essays in general education courses but also manifests itself in an inability to adequately verbalize descriptions and explanations required in engineering papers. In this situation, students tend to develop an unfortunate overdependence on equations and technical jargon.

What are we as evaluators of student papers to do in this situation? Obviously we can do little to make good writers out of bad writers. Given the confines of the curriculum it is unlikely that any student assignments will be devoted primarily to developing communication skills. What we can and must do is to convey to our students a sense of the importance of such skills in our profession. We should emphasize to them that communication skills are almost as important as the basic technical skills. (Who among us has not agonized over an article in a technical journal reporting the work of a colleague whose writing skill did not match his technical expertise? Or who has not gone to a lecture hoping to learn about an interesting sounding topic only to find that the lecturer could not shift perspective from that of the knowledgeable expert to that of the novice listener?) We should require of our students in all the papers they submit and in all their presentations their best efforts at writing and exposition. When we recognize their shortcomings, we ought to point them out. We should not read between the lines when appropriate technical words by their mere inclusion suggest an understanding on the part of a writer; rather we should require that the student clearly demonstrate an understanding. Poor grammar, misspelled words, and clumsy style impede communication and ought to be marked. Truly messy or cluttered and disorganized papers may make it impossible for a reader to grasp the writer's train of thought. Students should be informed that such papers will not be tolerated and if repeated should not be accepted for even minimal credit. It is entirely reasonable that a reader give weight to writing or expository skills in assigning marks; in fact, in many cases it is impossible to evaluate separately writing skill and the correctness of a verbal explanation.

There is an ancillary benefit for those readers who are critical of their students' communication skills; their own skills will inevitably improve. For those who are especially serious about improving their own skills, the following reading is recommended:

N. Strunk, Jr. and E. B. White, *The Elements of Style,* MacMillan.

R. Barass, *Scientists Must Write*, Chapman & Hall, Ltd.

T. E. Pearsall and D. H. Cunningham, *How to Write for the World of Work*, Holt Rinehart & Winston.

XIII. GRADING POLICIES

The professor in charge of your course is responsible for assigning final course grades to the students. S/he will undoubtedly rely on you to assign marks for much of the assigned work. You should discuss with him/her at the beginning of the course what grading you will be responsible for, what scale of marks to use, what weights are to be assigned to labs, exams, homework, etc. You should obtain a gradebook or a version of it from your professor. Possibly you will have a great deal of autonomy in your grading practices. The only universal rules are that you must be consistent and fair. Fairness implies that differences in grades adequately reflect differences in demonstrated understanding of the subject material. It would be unfair, for example, to assign a grade of 90 to a marginally acceptable lab report that was done in about 30 minutes when an outstanding one over which the writer labored for hours can receive at most a grade of 100. Fairness also implies that your students be informed as early as possible of the criteria in grading and that correct answers or solutions are provided.

Your task as a grader can often be made easier if you require students to follow certain prescribed formats in some of their papers, e.g. stating the problem as well as giving a solution, writing on only one side of the paper, underlining results, etc. Prescribed formats are primarily for your benefit, and it probably should be so noted to the students. But they also can be helpful to students in that they promote neatness and ordered thinking.

If you are responsible for grading laboratory reports, you must provide students with guidance regarding the desired format and scope. You should, in establishing these, consult your professor as s/he must be cognizant of the amount of student effort involved. There is probably no single best format for a laboratory report nor is there a standard format for all courses in ECE. Yet, some standardization is probably essential in the interest of minimizing your workload in grading. With this in mind the following laboratory report guidelines are suggested:

- The first page of the laboratory report should contain the following information:

  Course name
  Experiment name
  Student name
  Group number (if assigned)
  Group members

- The report should begin with an abstract that describes the experiment and its outcome as briefly and succinctly as possible.

- The body of the report should include an adequate description of the experiment and apparatus, a presentation of results and relevant theory, an explanation of results inconsistent with those expected, and conclusions, where applicable.

- All pages should be numbered, as should all graphs, tables, and figures. All references to the various graphs, tables, and figures should be by these numbers.

- All graphs should have appropriate captions, e.g.,

  Graph of I_C vs. V_{CE}
  Table of B vs. H
  Configuration of experimental apparatus

- All graphs should be drawn on standard graph paper or plotted using appropriate software. The axes should be appropriate for the particular plot. For example, log-log paper should be used for Bode plots.

- The coordinate axes of graphs should be scaled and should indicate the quantities represented with their units.

- Data sheets should be initialed by the T.A. before students leave the lab. This can discourage the generation of "synthetic" data outside the laboratory.

- Set deadlines for the submission of laboratory reports, and establish grade penalties for late submissions. Such penalties should be sufficient to discourage lateness, but not so severe as to discourage ultimate submission; i.e., it should always be to a student's advantage to complete assignments even though late.

XIV. ACADEMIC DISHONESTY

A current UCSB Dean of Students publication describes academic dishonesty as:

> Academic dishonesty is an assault upon the basic integrity and meaning of a University. Cheating, plagiarism, and collusion in dishonest activities are serious acts, which erode the University's activities and research roles and cheapen the learning experience not only for perpetrators, but also for the entire community. It is expected that UCSB students will understand and subscribe to the ideal of academic integrity and that they will be willing to bear individual responsibility for their work.[2]

Occasionally a T.A. may encounter cheating on the part of one or two of his students. This is most likely to take the form of copying of homework and/or lab reports. Frequently, cheating is best dealt with quietly and unobtrusively at the lowest

[2]"The Academic Dishonesty Question: An Answer through Education, Prevention, Adjudication, and Obligation." Pamphlet, Office of the Dean of Students, UCSB, undated.

administrative level, i.e. between professor, T.A., and student. Formal administrative procedures for dealing with cheating exist at the administrative levels of the Dean of Engineering and Dean of Students, but these should be resorted to only in more serious or repeated cases. Our goals in dealing with cheating are to preserve the integrity of our grading procedures and to demonstrate to the students involved the error of their ways.

A T.A. encountering cheating should, in all cases, inform his/her professor and decide, in concert with the professor, on the appropriate action to be taken. In the case of copying, appropriate action might be to assign half of the earned grade each to copier and copyee and to discuss the matter privately with each of them. Ordinarily such simple actions are quite effective.

The more difficult problem with copying is its recognition. It is a common practice for students to work together and, in fact, we give this practice official sanction and encouragement when we have students work in laboratory groups. It is probably a good practice for students to work together if they are of approximately equal ability; it is nearly always unwise if they are of significantly disparate ability. When students work together, we must rely on their being sufficiently mature to avoid copying; that is, mature students will do their own thinking and will make sure they understand those portions of assignments where their working partners make the basic contributions to understanding. A careful and conscientious T.A. will recognize which students work together and on reading their papers will be able to single out copying when it occurs.

XV. EMERGENCIES

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IN CASE OF EMERGENCY DIAL:

9-911

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1. Electric Shock

Working with high voltages generally is the greatest hazard in electrical engineering laboratories. Fortunately, the advent of transistors and integrated circuits has minimized the need for high voltages. Nevertheless, much of our laboratory equipment is powered by 120 volts AC and some lower division laboratory experiments require the use of high voltages. If you are in charge of a laboratory in which students work with high voltages, make certain that you provide your students with instruction in safety precautions and that you are prepared to act in the event of an emergency. Familiarize yourself with the methods of quickly shutting down power to a given work area so that you can do so quickly if the situation warrants.

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IN CASE OF ELECTRIC SHOCK

FIRST

TURN THE POWER OFF

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After turning the power off, dial the paramedical unit (dial 911 if not using a campus phone or dial 9-911 if using a campus phone). If there is no phone in the laboratory, use the nearest one. Be sure to tell the dispatcher the problem and your location (UCSB, which building and room). Next, assist but do not move the victim. It would be well for you to know how to administer CPR (Cardiopulmonary Resuscitation).

2. Injury

In case of serious injury, first call the paramedic unit (dial 911 if not using a campus phone or dial 9-911 if using a campus phone). Try to assist, but do not move the victim. On weekdays, the ECE Electronics Shop is staffed from 8 am to 5 pm and will respond to your call for help as quickly as they can. They are located in HFH, Room 1160 and can be telephoned at ext. 2403.

3. Fire

In the event of fire, you will find a fire extinguisher available in your laboratory. If assistance is required, dial 911 if not using a campus phone or dial 9-911 if using a campus phone. For most ECE labs, help will be most quickly available from the Electronics Shop as noted in 2 above. In the event of a fire alarm, discontinue your laboratory activities and calmly lead your students down the stairs and out of the building. Remember, do not use the elevators! If possible, turn the laboratory power off before you leave.

4. Earthquake

In the event of an earthquake, advise your students to take shelter under any available solid object. After the shock has passed, evacuate the building through the stairwells.

5. Contact with Hazardous Chemicals

Most but not all hazardous chemicals will be found in the Solid-State Laboratories. The T.A.'s should impress upon their students that their life or health may be affected by contact with or by breathing certain chemicals or gases. Contact can be prevented by using goggles, gloves and lab coats, but each individual has to accept the responsibility for his/her own safety. If contact does occur, it is necessary to wash the affected area **IMMEDIATELY AND CONTINUOUSLY WITH COPIOUS AMOUNTS OF RUNNING WATER FOR AT LEAST 15 FULL MINUTES**. Call the paramedics for help; do not assume that all will be well without them.

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REMEMBER:

IN THE EVENT OF FIRE OR EARTHQUAKE

DO NOT USE THE ELEVATORS!

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A rule of thumb regarding emergencies or safety questions: If in doubt, contact someone in the Electronics Shop (HFH 1160, ext. 2403).

IT IS MOST IMPORTANT THAT IN ANY CASE OF EMERGENCY YOU ACT DELIBERATELY BUT WITHOUT HASTE OR PANIC.