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## DESIGNING YOUR FIRST CLASS

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You've started your first position as an assistant professor and have been assigned your first class with real students.

- What do you do?
- What teaching method do you use?
- What level do you aim for?
- How do you structure the class?
- How do you pick a textbook?
- What do you ask on tests?
- How do you know how much you can cover in a semester?
- How many tests and how much homework do you require?
- How do you grade?
- How do you behave toward the students?
- How much time will this take you?
- Why didn't someone tell you how to do this?

This chapter provides an overview of what a professor does in designing and teaching a course, and it raises a number of questions about the process. The remainder of this book will be spent finding some answers to these questions.

### 3.1. TYPES OF COURSES

Engineering professors teach a variety of courses. Since course design is often different for different types of courses, it is useful to categorize them.

Required undergraduate courses which are prerequisites for other required courses tend to have the most structured content. It's likely that a curriculum committee will select the content and even the textbook. Professors who teach succeeding courses care about how well the introductory or prerequisite course is taught and the extent of the coverage. If the XYZ transform is not taught and they expect it to be taught, they will let you know about the omission. So it's a good idea to ask other professors what they expect from a course. In teaching these courses you'll likely have less freedom in coverage. Balancing this, particularly for new professors, it is highly likely that past syllabi, homework, tests, and a recommended textbook will be available. Past instructors will be available for some assistance if they are asked, but you'll probably have to ask since few faculty will volunteer teaching help unless asked. Often, these classes may be rather large, and student abilities will vary widely.

Required undergraduate courses which are not prerequisites for other courses are similar but have a few differences. The course content is probably a bit less rigid, and other professors have less of a vested interest in what is taught. These are often senior courses, which means that very weak students will not have made it this far. However, graduating seniors are notoriously difficult to motivate. Past syllabi and a textbook are probably available, but there will be less pressure to follow them closely.

Required or core graduate-level courses have all graduate students in them, and class size varies from small to medium. A syllabus probably exists, but the professor usually has some freedom in rearranging it. Invariably, the amount of material to be covered is staggering, and textbooks may or may not be available. The research professors in the department are often very interested in the content and how well the students learn the material. These courses often give the professor a good opportunity to get to know and impress new graduate students before they pick research topics. Thus, in some departments these courses may be considered "plums."

Undergraduate electives and dual-level undergraduate-graduate electives are usually regularly offered courses with a sample syllabus, textbook, and tests available. Professors who have taught the course in the past are probably available for advice. Since electives are not prerequisites for other courses, the professor can usually change the syllabus and textbook, and these courses have a comfortable combination of guidance and freedom. Class size is usually small to medium, and students tend to be interested since they have selected the course. Overall, these courses offer a new assistant professor a good beginning to an academic career.

Graduate-level electives and seminars are the most open in coverage of content. These courses may be very specialized, and other professors in the department often pay little attention to what is covered as long as their graduate students don't complain too loudly. The freedom involved in selecting course content is very liberating but also somewhat daunting since well-developed syllabi, homework and test examples, and a textbook probably are not available. The classes are usually small, and the students are likely to be both intelligent and interested. The teaching of graduate electives in one's research area is an effective way to integrate teaching and research. However, faculty often compete to offer these courses, and new professors may not be given the opportunity immediately.

Design classes, particularly capstone design classes for undergraduates, tend to be somewhat different from other classes. Economics may be a required part of the course. The course may be taught with case studies and often is loosely structured. The workload is often high because of grading demands and the need to develop new case studies. Design classes are also sometimes associated with laboratories, which can further increase the large workload. Professors with industrial experience are often assigned to these classes. Chapter 9 deals with design classes in more detail.

The laboratory course usually differs markedly from all the other types of courses which are often referred to as “lecture courses” (see Chapter 9). It may be attached to another course and may or may not be administered separately. It also tends to be tightly structured since the experiments or projects are limited by the available equipment. Unfortunately, the equipment is often old and may not work well. Experimental write-ups are available, but always need modification. For safety reasons, the section size is usually controlled. And, for various reasons, new professors commonly find themselves assigned to a laboratory course. It is easier to step into a lab course without much preparation, and since teaching lab courses tends to be an unpopular assignment, the department head may also staff the lab with new professors since they are more likely to accept the assignment gracefully. Although the course is a required one, the material covered is usually not a critical prerequisite for follow-up courses. Teaching involves a great deal of informal contact with students and extensive grading of laboratory reports; little if any lecturing is done. Some schools have adapted the lab course and added a communication component by adding a credit hour and a lecture on writing and speaking. The often extensive report writing in the course makes it a natural place for teaching such skills, one advantage being the focus of the report on technical material which adds relevance to the student’s job.

## 3.2. BEFORE THE COURSE STARTS

Several tasks normally need to be completed before the course starts (exceptions occur when students are heavily involved in planning the course). Some may be done for the professor if the course is well-established, but with new courses all these tasks need to be at least partially completed before classes start.

### 3.2.1. Knowing the audience

Clearly, it is helpful to understand your students. Are they sophomores, juniors, or graduate students? What prerequisite courses have they had? What are they capable of doing? Are they mostly full-time or part-time students? Are they majoring in your field? Have they made a definite commitment to be an X-type engineer, or are they still searching for a major? How mature are they? In general, is it likely to be a good or poor class? The more you know about the students, the better you will be able to plan the course and select the appropriate level for the material. Student characteristics are discussed in detail in Chapters 13 and 14.

### 3.2.2. Choosing Course Goals and Objectives

What should the students know and be able to do at the end of the semester? This question includes both coverage of the content and the ability *to do something* with the content. Goals are relatively broad, while objectives tend to be quite specific. For example, your goal may be that students understand the control of systems, whereas an objective may be that they know how to use the Laplace transform in the analysis of linear control problems. The goals and objectives must satisfy what is expected for any subsequent courses. The development of goals and objectives for a course is important since it controls the coverage and, to a lesser extent, the teaching method. The most important part of a class is the content covered because it makes no sense to do a wonderful job teaching unimportant material. A part of the goals and objectives for the course is the choice of the level at which to present the material. New professors, particularly those fresh out of graduate school, are notorious for setting the level too high and being too theoretical. The choice of an appropriate level for a class is actually a complicated question (see Chapters 14 and 15). Appropriate goals and objectives for a course may be somewhat subtle; for example, if one departmental goal is to produce graduates who are good communicators, then writing and speaking have to be incorporated into the engineering courses in the department. Goals and objectives are discussed fully in Chapter 4. Existing courses may not have explicitly stated goals and objectives.

### 3.2.3. Picking a Teaching Method

Once you know what you want to accomplish, you can choose a teaching method that is congruent with your style and with the students' learning styles. The teaching method should also satisfy certain learning principles so that the method will be effective. Learning styles and learning principles are the subjects of Chapters 13 and 15. Lecturing and various modifications of lecturing are by far the most common teaching methods and in most universities will be acceptable to the other professors in the department. Lecturing is also one of the easiest methods to use the first time you teach a course, partly because everyone is familiar with the method. Unfortunately, lecturing is not the best method for some of the goals of engineering education. If one goal of the course is to have students become proficient in working in engineering teams, then lectures need to be supplemented with group work. No matter which teaching method is chosen, you need to check the classroom ahead of time to be sure that appropriate equipment such as a blackboard or an overhead projector will be available. Teaching methods are discussed in Chapters 6 through 10.

### 3.2.4. Choosing a textbook

The quality of the textbook will have a major effect on the quality of the course and on what can be conveniently covered. Unfortunately, the textbook may have to be selected months ahead of time because of bookstore requirements. For new professors who arrive a week before the semester starts, the book has probably been chosen by someone else. For required undergraduate courses a committee may select the book. If you do not like the textbook, you can work at changing it for subsequent semesters, but do *not* tell the students that it is a poor book. Textbook selection is discussed in Chapter 4.

### 3.2.5. Preparing a Tentative Course Outline

An outline of the entire course in advance is helpful but not essential. If time is short, outline at least the first month so that you and the students know where you are going. The course outline should list topics for each day. This requires that you estimate the rate at which you can cover topics. New faculty find this to be very difficult. It is useful to build in one or more open periods, or periods which can be skipped before major tests. Tests, quizzes, and student presentation days should be noted. This requires that you decide on the number of tests and quizzes initially. Every school has breaks, student trips to conventions, major extracurricular activities such as homecoming, and student professional activities such as the Engineering-in-Training examination. Do you want to adjust your schedule for these events? Also, now is the time to look at your calendar and adjust the class schedule if you will be out of town for one or two classes. In a required undergraduate course the existing course outline will probably be adapted.

### 3.2.6. Deciding on a Grading Scheme

You can be sure that on the first day of class the students will ask how the course will be graded. Yes, our schools put too much emphasis on grading. Yes, it would be better if the students were there mainly to learn. No, you cannot ignore the students' desire to know how they will be evaluated. They want to know how much quizzes, tests, a final, homework, computer problems, and projects will count. Will there be extra credit? Will you follow a 90-80-70-60 scale or will you use a curve? Are you an easy or a tough grader? Are you fair? And so on. In our experience most students are satisfied if given the major outline of the grading method. Grading is discussed in Chapter 11.

### 3.2.7. Arrange To Have Appropriate Material Available

Appropriate material includes the textbook and supplementary books, handouts, and solutions to homework and tests. Copies of these materials should be available to students in a library or learning resource center. Be sure the bookstore has enough copies of the textbook.

### 3.2.8. Preparing for the First Class

Preparation for the first class is discussed in detail in section 3.3.

### 3.2.9. Developing Your Attitude or Personal Interaction Style

What is your attitude toward teaching and toward students? It helps to be enthusiastic and to believe that teaching is an important and even noble activity. How much personal warmth and caring will you show to the students? What, if any, is your responsibility for helping students grow? Is it important to you to be loved, or is respect sufficient? Do you believe all students can learn, or is removing students who cannot learn part of your job? Great teachers are marked by a deep commitment to their students. Your attitudes and style will have a major effect on your rapport with students. Once this and the other tasks are taken care of, you are ready to start. It is usually desirable to have these chores done before class starts, but fortunately some of them can be partially delayed until after the semester starts.

## 3.3. THE FIRST CLASS

It is traditional to start the first class with “housekeeping chores.” There are other ways to start a class and these will be discussed at the end of this section. Housekeeping chores are routine and nondemanding. They allow students to get settled in, but this is not an exciting way to start a class. Use the blackboard to write down information or pass out a paper with the information on it or do both. Then latecomers (and there are always latecomers on the first day of class) can get the information without interrupting the class. Give the students all the information about the course structure that you can. The following items probably should be included:

**1 Course name and number.** You will be surprised by the number of students who come to the wrong classroom. Also list the hours and the class location, particularly if two locations are used.

**2 Professor’s name, office location, office phone number, and office hours.** The way you present your name is important. If you write it as Professor Jones, the students will call

you Professor Jones. If you write Carol or John, they will call you Carol or John. You need to select your office hours before the class starts. Try to choose office hours which will be available to most students. If you welcome phone calls at home, give your home phone number. If you don't want to be called at home, don't give your home phone number. If computer mail is to be used, give your e-mail address.

**3 TA names, office hours, and office location.** Introduce the TAs if they are present.

**4 Prerequisites.** Discuss how important these prerequisites are. Will you accept an F or a D or an incomplete in a prerequisite course? (Check your school's policy on this ahead of time.)

**5 Textbook.** Discuss any other supplementary material that the students should buy or that is available in the library. Pass out a reading list if you use one.

**6 Tentative course outline.** Discuss the course outline and note the dates of tests and due dates of major projects. The earlier you give this information to the students, the fewer problems you will have with conflicts.

**7 Teaching method and expectations of the students.** If 99 percent of the students' courses have been lectures and you will lecture, this can be very brief. If your course will be different, added discussion will be valuable.

**8 Grading scheme.** If you don't discuss the grading scheme, the students will ask about it. Be prepared for a question on extra credit.

**9 Seating arrangements and names.** Begin to learn names. If there is to be a seating chart, describe how it will be set up. Start learning student names unless there will be a large turnover the first week. Note that seating is not discussed at the beginning of the period since not everyone will be on time. If it is important to you that the students know that you care about them as individuals, then you *must* learn their names fairly quickly. Some teachers memorize the seating chart, others use photographs of students, some call the roll the first few weeks, and some ask questions using the class list. If discussion or group work will be important, you may want to use some method which introduces students to each other. Various types of "name games" can be used to do this. Students can introduce themselves or others. Many students will appreciate a copy of the class roster.

**10 General discipline policies.** Always enter the class with a positive attitude toward your students. However, since it's likely that one or two of them may pose problems, briefly discuss the rules the class must live by. What is the policy about cheating, being late, being absent, and reading a newspaper or sleeping in class? What will your policy on makeups be? Be sure that your policies do not conflict with university and school policies.

**11 Student questions about course structure and policies.** If there are no immediate questions, erase the board to give the students time to formulate questions.

The housekeeping chores are complete at this point. Some professors dismiss the students at this point, but this may be a mistake. Instead, start in on the course. Send the message that you mean business. The students will not be ready to start business, but they are never ready until you get them started. What should you do with the remaining fifteen to thirty minutes? Use it for lecture, discussion, or whatever teaching method you intend to use in class. What content should be covered? One possibility is to give an overview of the entire course and to explain the importance of the material. A second possibility is to review a previous course

which is an important prerequisite for the course. A third possibility is to start the first lesson. Regardless of the content, it should be presented with enthusiasm and a sense of excitement so that the students will know that you consider the material to be important. Leave enough time for a short summary.

Finally, give the first homework assignment. Homework on the first day! Yes, at the very least the students should start reading. You know that they will not be very busy with homework the first week, and you want them to take your course at least as seriously as the competition. Pass out a sheet with the homework assignment on it. There will be fewer misunderstandings about what is due when. This completes the first class. Tell the students you will see them on Wednesday (or whenever) and signal them that class has ended. A clear signal that the class is over, such as picking up your books or saying goodbye, will be useful throughout the semester.

If you don't like housekeeping, there are other ways to start the first class. The first class period can be used to develop a course outline with the students' input. This may be appropriate in some elective courses. A test on prerequisite material can be given, but this will be unpopular and probably won't be extremely valid since no one has reviewed for it. The students can be given a problem which they will be able to solve at the end of the course, and they can be asked to work on it in teams. This works if the importance of the problem is clear. The students can be required to write and turn in a paragraph on why they are taking the course. This is usually meaningful only in electives. It does give you a writing sample and makes the students think. Your creativity can guide you to other possibilities (see problem 6).

Your attitude toward teaching is very important. If you are enthusiastic and look forward to the class, then the students will tend to do the same. If you have the attitude that it is your job to help student's learn and earn a good grade, then you've taken a big step toward building rapport.

### 3.4. THE SECOND CLASS

The second class is surprisingly important since many students consider it the first "real" class of the semester. The first and second classes set the tone for the remainder of the semester. Thus, it is very important for you to be well prepared for it. "Winging it" is always a mistake, but can be a disaster if done while you are still setting the course tone and student expectations. Enter the class with a sense of excitement and be enthusiastic. It should be obvious that you should avoid scheduling trips the first week of the term so that you can meet with your classes.

Start the class slowly but on time. Classes should always be started slowly so that students can switch gears and start thinking about this class. For starting this and other classes you might:

- Collect homework.
- Practice the names of students.
- Review the previous class.

- Add a bit of humor if you can do so naturally.
- Show a cartoon related to the day's subject on the overhead projector. A little entertainment before the class gets started will not detract from the seriousness of your message.
  - Make announcements from student organizations.
  - Answer student questions from previous classes, reading, or homework.
  - Mention a current event which relates to the class. Examples are a strike at a plant, the sale of sensitive computer parts to unfriendly countries, a new automotive design, an explosion and fire at a chemical plant, and a nuclear protest. Be sure to explicitly relate the event to the class.

A slow start is important, but these activities should last only a few minutes. Don't allow the students to lead you off on extensive tangents. During the remainder of the class cover the content listed in the course outline using the teaching method of your choice. It is very important in this class section to work hard at getting the students to be active since you are setting the tone for the rest of the semester (see Chapter 15 for a discussion of why students should be active). Toward the end of the period set aside time for student questions. Then summarize what has been covered in class. Pass out the homework and reading assignments or remind the class of the assignments. Remind students of your office hours and invite them to stop in and see you. Ask anyone who missed the first class period to see you after class. Dismiss the class slightly before or at the bell.

In general, it is useful for you to leave the classroom very slowly. This gives students time to ask you questions. Many of these questions will be questions that could have been asked during class. Answer them this time, but encourage students to ask similar questions in class next time. Most classes need a good deal of encouragement to ask questions. Some student questions pertain only to a particular student and should be handled privately.

### 3.5. THE REST OF THE SEMESTER

With the semester under way, classes develop a routine which is punctuated by tests and large projects. You prepare for class, develop homework assignments and tests, present lectures or use another teaching method, grade or arrange for grading of homework and tests, have office hours, and deal with any problems which may arise. Then at the end of the semester you assign course grades, post them on the wall, and run off to a meeting or vacation. This appears straightforward, but conceals many issues.

If you are lecturing, you will need to prepare each lecture before class. The way you go about this often requires a little experimentation before you obtain a feel for how to proceed. Do you need to write everything out, or are just a few notes sufficient? Can you accurately reproduce equations without notes? Are your presentations clearer when you use an overhead projector or a blackboard? How much material can you comfortably cover in a class period? What is a good balance between theory and examples? Students always want more examples. How closely should the lectures follow the textbook? Students will complain if you follow the

textbook too closely or if the lecture has little connection to the textbook. What material is important and should be emphasized? Every textbook (including this one) has both trivial material and material which is becoming obsolete. It is your job to weed this material out.

To keep students actively involved with the material, have them take notes, ask and answer questions, discuss the material, work in groups, write short summaries of the lecture, solve problems at the board or at their desks, hunt for “mistakes” made by the professor, and so forth. Active learners learn better. Encourage questions by allowing time for them, acknowledging the student by name, repeating the question so that everyone can hear it, and then answering it as appropriate. If the question will be covered later in the lecture, you can tell the student to wait a few minutes.

How should homework assignments be distributed throughout the semester? How long should problems be and how many problems should there be in each assignment? Should homework problems be done solo or should you encourage group effort? Do all problems have to be turned in and graded? Should a particular format be required? How do you or a TA grade a large number of homework problems? There is no one set of correct answers for these questions; however, if you want your students to spread their efforts throughout the semester, you must spread homework and quizzes throughout the semester. Students generally consider quizzes and tests the most important part of a course. Many questions can be asked about the form and method of testing, but the most important questions are on content. What material do you test on? There should be a correspondence between course objectives and the tests. Testing for memory is easier than testing for problem-solving skills but probably is much less important. If you want students to be able to solve problems, testing must include problem solving.

The methods used in testing must also be examined. How many quizzes and tests should you give? How much should they be worth? How many problems should be on each quiz or test? Is it acceptable to use multiple-choice questions? Students appreciate help sessions before tests. Should you have them? If so, who should lead them, and when and where? Do you want to give partial credit? If so, how do you decide how much credit to give? Tests should be graded rapidly and as fairly as possible. In an ideal class graded tests are returned during the next class period, and the professor goes over the correct solutions then. Students do prepare for tests, and students do become anxious before and during exams. Unfortunately, many students stop work on an area once the test is over. How do you get students to learn from their mistakes on tests? You will get requests for regrades, so it would be wise to develop a regrade policy ahead of time. Do you want to give a final? Finals provoke a great deal of anxiety, but they also force students to review the entire semester and to some extent integrate the material they have learned.

How do you establish and maintain rapport with students? Studies of effective teachers show that the best teachers have a good rapport with their students even in large classes (e.g., Lowman, 1985). Students prefer professors who are enthusiastic, are accessible and care about them as individuals. Perhaps most importantly, students want an instructor who is fair. Your challenge is to establish rapport while maintaining some professional distance so that evaluations of the students are fair. The goal is to develop a cooperative atmosphere where you and the students work together to maximize learning.

Office hours give students the chance to clarify questions and to get additional help when they need it. It is helpful if both the TA and the professor have office hours. Some students want to talk to the professor solely, while others are scared to death of the professor. Office hours are useful since they give you feedback on what the students are not understanding and on what problems they cannot do. Keep your office hours. A problem is how to get students to come in for office hours. Continual encouragement and an open and friendly demeanor help. Since students forget, you need to remind them of your office hours and of the TA's office hours. Students will start to use office hours just before the first test or big project. What is the best way to help them? How can you avoid spoonfeeding them and challenge them to extend themselves and do better than they think they can? What do you do with a student who is trying but is absolutely, totally lost? Should the TA be trained in helping students? Tutoring and advising are discussed in Chapter 10.

Suppose that as the semester continues you slowly fall behind and material that should have been covered on Monday isn't covered until Friday. It is important to know why this happens so that the next time it won't. Write yourself notes on a copy of the course outline. For example, if you do not plan to spend a large part of the period after the test going over the test, you may lose half a period. The note to yourself will remind you to allow time for this. Now you know what to do the next time, but what do you do now to cover all the material? If you haven't built an extra period into your course outline, there may be little that you can do other than skip some material. Look at the rest of the semester and decide what to delete. What if you get to the end of the syllabus and the semester is not over? Don't worry; this very seldom happens.

Throughout the semester you may have to deal with discipline problems. Student problems can range from the mildly annoying to the downright dangerous. The most common problems involve chronically late or absent students and passively disruptive students. If lateness bothers you, talk to chronically late students privately. They may have a legitimate reason for being late. However, in all cases start the class on time and do not backtrack for late comers. There is a reasonably strong positive correlation between attendance in class and grades. Chronically absent students will pull down the class average. One possible solution to this problem is to compute the class average and the grade distribution excluding chronically absent students. Then give these students the grade they have earned based on this grade distribution. Then the course grades will not be affected by those who are chronically absent. These students are also most likely to turn in homework and projects late and to be late for or miss a test. Have a policy ready in advance so that you can say, "My policy is to ...." Passively disruptive students include those who talk, sleep, read a newspaper, or wear headphones in class. Remember that the lack of a policy or ignoring these disruptions is also a policy. These problems are discussed in Chapter 12.

As the semester nears the end, you will want to know how well you have done from the students' viewpoint. Ask. Many universities have very elaborate arrangements for evaluating teaching, and some department heads require faculty to have their courses evaluated. If a mechanism does not exist, you can still ask the students for comments on the strengths and weaknesses of the course. The many factors which affect students' evaluation of teaching are discussed in Chapter 16.

At the end of the semester the professor has the privilege and responsibility of assigning grades. How do you do this? If you have given the students a detailed breakdown of grades,

you will need to follow that procedure; however, few students will complain if the scale is made easier. If you have been vague about the assignment of grades, make the decision now. Several schemes for assigning grades are discussed in Chapter 11.

Throughout the first year new professors will have many questions about teaching. Talk to other professors—many of them. Since there is no single method of good teaching, you will get varied and occasionally contradictory responses. Sort through these responses and adopt those that fit you. Once you find a kindred spirit, talk to her or him about teaching. If you feel comfortable taking the risk, invite another professor into your classroom. Exploring teaching issues with other professors will help you to learn to teach better and more efficiently, and it will help you maintain your sanity during a very busy first year.

This outline of what a professor does to design and teach a course shows that new professors are very busy their first few semesters. These are also the semesters when you want to start your research program. What really needs to be done? How do you get everything done? The first question is discussed in Chapter 17, while the second is essentially the topic of Chapter 2.

### 3.6. THE NEW FACULTY MEMBER EXPERIENCE

Most new faculty members feel unprepared to teach (usually a realistic appraisal of the situation) and are emotionally drained by the experience. For most new professors, learning to teach is on-the-job training (OJT) which is strongly motivating but is not the best way to learn. New faculty often overprepare and spend sixteen to twenty hours per week preparing for one course, and as much as thirty-five hours per week (Turner and Boice, 1989). This is much more time than experienced faculty spend; it can be reduced by learning how to teach before teaching the first class. Invariably, new faculty members would like more advice about teaching and handling problem students (Boice, 1991).

Turner and Boice (1989) report on three major problems for new faculty. In order of importance they are:

**1** “Adapting to the appropriate pace and level of difficulty for the students.”

New professors have forgotten what it is like to learn the material for the first time, and they invariably go too fast and are too theoretical. The lower the level of the students, the more likely this is to occur.

**2** “Feeling professionally overspecialized, while not having a well-rounded knowledge of their own discipline.”

New faculty members often teach undergraduate courses which have little in common with their Ph.D. research. As undergraduates themselves once, they may have learned the material, but by now are rusty. In addition, a typical new engineering professor may have little or no industrial experience and is not sure what the students will use in an industrial career.

**3** “Having trouble establishing an appropriate professional demeanor in their relationships with students.”

New professors are asked to make the transition from student to faculty essentially overnight and often are not much older than their students. It is difficult to determine how to

act to help students learn and yet maintain enough distance to be objective in grading. New faculty members must develop a professional demeanor which will allow them to effectively teach and grade both students they like and those they dislike. It takes time to learn the proper distance between oneself and students.

An additional problem of many new faculty members is a fear of not knowing all the answers. It is OK to tell students that you don't know the answer to a question but that you will find out. It is also OK, and actually helps to build rapport, to admit mistakes to the class.

They also are likely to feel that there are not enough hours to get everything done (Boice, 1991). In addition to teaching they have to start a research program, write proposals, finish papers from their thesis, learn the rules of a new university, and adjust to a new city. There is also a psychological adjustment in becoming a professor instead of being a student. It is very useful to have a mentor who knows many of the unwritten rules. Mentoring works best when the procedure is formalized (Sands et al., 1991). Some universities use team teaching of courses to help new faculty. Formal development programs have also been shown to work if new professors will use them (Boice, 1991).

### 3.7. CHAPTER COMMENTS

The most common method of designing a course and a curriculum in engineering education is to put all the fundamentals first. Once these have been covered, the course or curriculum can proceed to the practical and interesting real-life problems. This approach appears rational but ignores motivation. Most people learn best when they know why they need to learn something. Thus, considering some practical, real-life problems early can help such students significantly. This is one reason why cooperative education works well. This chapter follows this analysis and discusses a real problem before the reader has all the information required to solve it completely.

Although this chapter purposely raises more questions than it answers, clearly spelling out what needs to be done for a class should be helpful to the new professor, and we wanted to provide a chapter that would be immediately useful. One potential problem with enumerating tasks is that they assume a greater importance than attitudes. It is often the teacher's attitude of excitement, enthusiasm, and caring for the student which catches hold of students and fires them up for future work in the discipline. You may be able to do an adequate job as a teacher by just going through the motions, but for excellence you must do more.

Since many professors never ask themselves many of the questions asked in this chapter, one can obviously teach without understanding the process. Instead, the professor mimics former professors. Although strongly discouraged in research, mimicry or plagiarism is encouraged in teaching. Perhaps this observation helps explain why many schools value research more than teaching in their promotion policies.

All books are somewhat idiosyncratic, and this one is no exception. If you want to read alternate approaches to preparing for your first course, try McKeachie (1986) or Dekker and Froyd (1986).

### 3.8. SUMMARY AND OBJECTIVES

After reading this chapter, you should be able to:

- List the salient features of different types of engineering courses.
- Enumerate the activities which need to be completed before starting a course.
- Discuss how a course is started.
- Explain the importance of the second class period and discuss appropriate activities.
- List the other important activities which occur during the semester. Explain the importance of each of these activities.
  - For the preceding items discuss some of the important questions which the professor should consider when designing a course.
  - Discuss some of the psychological aspects of becoming a new professor.

### HOMEWORK

- 1** Look through the undergraduate and graduate courses offered in your department. Classify each course. Is the classification system adequate or are there some courses which really do not fit? (Hint: There probably are). If there are, develop new classification categories for the courses which do not fit.
- 2** What are some sources of information to help you estimate how much material can be covered in one semester?
- 3** Discuss additional reasons why it is a good idea to learn the names of students.
- 4** Class size is an important consideration in how you teach a course. List some of the things which are affected by class size.
- 5** Should you use a seating chart? It seems like a high school practice, but it is almost necessary for large classes if you want to take attendance or learn names. Discuss this issue. Think of alternatives.
- 6** Brainstorm alternative ways to start the first class. List at least five additional ways.
- 7** How do you decide what to cover in a course which has never been taught at your school? Brainstorm at least five methods for developing ideas.
- 8** Do you think it is a bad idea to tell the class that the textbook is a poor book? Explain your answer.
- 9** What are some of the dangers in teaching a student whom you instinctively like or dislike?

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