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6.033 Computer System Engineering
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Part I: For people thinking about taking 6.033

Q. Prerequisites. I want to take 6.033 this term, but I haven't taken 6.004 yet, and the catalog says that is a prerequisite. Is the prerequisite really needed? I might be able to take 6.004 at the same time. Will that work? My friend started 6.004 but dropped it after the second quiz. Can she take 6.033?

A. No; you need 6.004 PRIOR to 6.033. 6.004 really is a *pre*-prerequisite, not a *co*-prerequisite for 6.033. 6.033 builds on material from the last half of 6.004, and it takes off with no review and at a substantially faster pace. If you haven't *completed* 6.004 in a previous term 6.033 will be sheer torture. In addition, 6.033 assumes that you really did absorb the transitive closure of the prerequisites to 6.004, namely 6.001, 6.002, 8.01/2, and 18.01/2/3.

Q. Sophomores. I'm a sophomore. I got an A in 6.004, I've been hacking systems for four summers at Microsoft and Akamai, and I want to take 6.033 now. But I have been warned that sophomores have a lot of trouble with 6.033. What's the story?

A. We strongly discourage sophomores from taking 6.033 even if they have already accumulated the nominal prerequisites. 6.033 depends on a lot of unwritten computer street knowledge, of which juniors have accumulated another year's worth in various ways--their UROP assignments, doing other courses on Athena, one more summer job, a few more Computer Science subjects, etc. Although we don't require it, some of the things we discuss will be much easier to follow if, as most upperclass members, you know some probability, such as found in 6.042. The success rate of sophomores is typically lower than for juniors and seniors. A few sophomores try it every year, and about half of them survive to the end. On the other hand, if you really have been hacking systems at Microsoft and Akamai for four years, you are welcome to give it a try.

Q. Late start. It is now {choose one: 1, 2, 3, 4} weeks into the term and I want to add 6.033. I haven't been participating up till now, but I'm willing to work hard to catch up. What are my prospects?

A. It is harder than it looks, for three reasons. First, some of the material in the lectures, especially the examples, isn't in the class notes; you will be depending on your classmates' notes taken in lecture. Second, much of the learning experience in 6.033 comes from participating in recitation discussions of assigned papers, and the level of the discussions advances rapidly in sophistication as the term progresses. Finally, the reading assignments are long. Many people can barely keep up with the reading even if they started on day one; catching up in addition to keeping up can be really tough. There are short assignments due each week; as of the Nth week you have missed N of those. The cumulative impact of all these considerations suggests that for $N > 2$ it is probably hopeless.

Q. Listeners. 6.033 isn't in my list of requirements, and I don't need a grade. But the material looks interesting. Can I have permission to register for it as a listener?

A. Yes and No. In 6.033, we regularly have a much larger enrollment than the department has teaching resources. At the same time, we would like to cater to students who want just to listen. So we offer a compromise: we have no objection to listeners attending the lectures, but we don't permit listeners to join recitations. The

reason is that 6.033 recitations are intended for discussion. Active listeners usurp opportunities that registered class members should have to participate. And passive listeners act as negative role models for those registered students who are hesitant to participate. Either way, it doesn't work very well.

Part II: The mechanics of 6.033

Q. Tutorials. Are tutorials mandatory?

A. Yes, they are. They are likely to be very helpful to you in developing a good design project.

Q. Section assignments. I'd really rather be in a different section from the one you are trying to push me into. Why can't I switch to the section I want? Does one more person really matter?

A. One of the main features of 6.033 is discussion in recitations, of the papers we are reading, almost like in a humanities class. A good discussion, involving all the class members, doesn't often happen in a large class. Since the department can't afford an unlimited number of recitation instructors, we therefore have to push for more equally balanced sections than in other EECS subjects. In fact, we don't just push, we employ forcible measures as necessary to get the sections closely balanced.

Q. Confidential info. I'm working for a start-up company that is doing nearly the same thing as the second design project, and my non-disclosure agreement (NDA) with the company will prevent me from doing a good job on the design project. Could you please assign me a different design project?

A. (Short answer) *No.*

(Longer answer) Honest, in recent years this really has become a frequently-asked question. After much careful thought and debate about priorities and the purposes of education, the conclusion of the teaching staff and the EECS department is that students should be cautious about signing NDA's that relate to things that they may also study in class. In 6.033 we try to come up with assignments, quizzes, and design projects that are both realistic and timely. Those are two of the same criteria that start-ups use to choose business opportunities. So the chance of conflict is actually surprisingly high. We don't want to avoid an interesting project idea, assignment, or quiz question just because a start-up is also working on it, and in the case of design projects, we think that our educational goals are better met by having everyone work on the same topic. So our formal policy is: if any 6.033 assignment conflicts with an NDA, then your choice is to fail the assignment or resolve the conflict with the company with which you have an NDA. (Incidentally, experience suggests that working for a start-up, which requires 150% of your attention, is fundamentally incompatible with getting a good grade in 6.033. You might consider delaying one or the other of these activities so that they don't happen at the same time.)

Q. Medical needs. I have extremely thick glasses, which take a long time for light to propagate through. As a result, the medical department has suggested that I ask instructors for extra time on quizzes. Can you handle that?

A. Talk to us. If you have special needs for taking quizzes (e.g., you need additional time), 6.033 will be happy to accommodate you, provided you can supply a letter from either the medical department or an academic dean, **and** you give us enough advance notice.

Q. Teams. For the second design project I understand we are supposed to form teams of three people. One of the people I want to work with is in a different recitation section. Is that OK?

A. Unfortunately, no. Your recitation instructor, in consultation with your teaching assistant, assigns your design project grade, and your friend's recitation instructor assigns his or her grade. If you work together on the same team, then both recitation instructors will have to read your team's design project and agree on a grade for the team. This procedure causes two problems, one for the teaching staff and one for you. The problem for the teaching staff, which, like you, has a finite amount of time, is less reading time per design project. The problem for you is that whenever two instructors read the same design project, they will find two completely different lists of things they don't like. When they get together and compare notes, they will start by merging the lists of things they didn't like into one longer list. So your team is almost certain to get a lower grade than it would have if either instructor had evaluated it alone. We've tried it in the past and found that it simply doesn't work. In addition, we think there is some educational value in occasionally working with someone different.

Q. Quiz grading. I just got my quiz back. It had several multiple-choice questions, and it looks like they were graded by an ogre who doesn't appreciate the concept of partial credit. Why?

A. Actually, in 6.033 we use a quiz scoring procedure that includes quite a lot of partial credit. But if you aren't careful, you can lose credit that you gained for correct answers. Here is how it works: As you have noticed, each question has some number of assigned points. When the question offers several "choose all that apply" answers, the staff carefully reviews the various offered answers to decide which right answers require the deepest understanding and which wrong answers reveal the most egregious misconceptions. If a 10-point question has two answers that should be circled, the one that requires deeper understanding may thus be assigned 7 points and the one that can be circled with only a superficial acquaintance with the material receives 3 points. A correct response thus receives 10 points.

But... the answers that should *not* have been circled are assigned negative points. An answer that reveals a serious misconception may be assigned -8 (thus losing most of the credit for also circling the right answers), while one that suggests that the examinee missed an exceptionally subtle issue may be assigned just -1. Most wrong answers are assigned something in between. The point total for an individual question has a floor of zero.

When a multiple-choice question offers a "choose the best answer" response, the right answer receives full credit, but a wrong answer that is almost right often gets some partial credit.

In all cases, circling a wrong answer and adding an explanation why it is really right always receives careful consideration and, depending on how good the explanation is, it may receive full credit, partial credit, or no credit.

Q. Presentation in final week of classes. Isn't having a presentation in the final week of classes against MIT rules?

A. Thanks for keeping track of the rules. We appreciate students being overloaded in the last week of the term. When these rules were introduced, we checked with the chair of the faculty whether a 5-minute presentation of a project that was due a week earlier is in violation of the rules or not. In this case, the presentation and the report should be considered as a single assignment that was due on the last Thursday on which assignments can be due, in a class with no final in the last week of classes. The presentation itself is a low-key event and falls under class participation; to keep the workload under control we have assigned no reading for the section in which the presentations happen.

Part III: Submitting assignments

Q. Late assignments. I've been sick this weekend. Can I have an extension on my hands-on assignment?

A. The brief answer is no. The long answer is that one of our purposes in making assignments is so that you gain some familiarity and practice *before* the recitation class discussion or tutorial that immediately follows. Even if you later do a good job on the write-up, you still have missed one crucial component: an opportunity to discuss the topic *after* doing the exercise. However, we offer the following compromise: if you hand it in late we will record it with an "L" rather than a check (your TA will still review it, so you can find out whether or not your write-up was OK). If you turn in only one or two assignments late it won't have any noticeable effect on your grade. But if they are systematically late or missing, the effect on your grade grows non-linearly, like most 6.033 graphs.

Q. Format. What's the format for written assignments?

A. In general:

1. Please use a word processor (or type the assignment, if there are any typewriters left). Hand-written assignments don't go over with the graders.
2. Please put your name, the name of your recitation instructor, and your section meeting time at the top of the page. (Section *numbers* are assigned by the registrar at random, and no one, including your instructor, can ever remember what number is associated with which section, so don't bother to list it.) If you're unsure which section you are in, find your name on the section assignment page, which is a class roll by section, and find your

- instructor's name on the list of recitations. *For the assignments in which your work is to be formatted as a memo, follow the instructions on embedding this information in the memo headers.*
3. Use a type font and size that is large enough to be easily readable (11 or 12 point is good for most fonts); single space. For one-page essays and memos, the entire assignment should fit on one side of one sheet of paper. For the other written assignments (design project proposals, design project reports, etc.) follow the instructions given in the assignment.

Q. Writing. Should the first sentence of each paragraph be a summary of the whole paragraph?

A. Short answer: talk to the writing program lecturer assigned to your section; they are there to help you.

Longer answer: Usually the first sentence of the paragraph acts as the topic sentence for the paragraph. The topic sentence signals to the reader your main argument for the paragraph. It's not a "summary," but a "claim," i.e., a point that you want to make to your reader. The remainder of the paragraph provides evidence to support that claim (examples, etc.).