How to succeed in CSCC63

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This course will provide you with a basic understanding of some fundamental questions in computer science: What is algorithmically computable? What is efficiently computable? You will learn how to make these questions precise; and how to prove that certain problems have no algorithmic solutions at all, while others, although solvable, are not likely to have efficient solutions.

A necessary condition for success in this course is to devote sufficient time to it. The course involves new concepts that require time to absorb. An unusual challenge in this particular edition of the course is that it is offered in an accelerated, six-week format, instead of the regular twelve-week one. We will literally be going at twice the usual speed. This means that during its six-week duration you must plan to spend on this course twice the amount of time that you would ordinarily devote to a challenging course. This could easily be 20-24 hours per week, for a typical student (this includes the time to watch the lecture videos.)

In terms of organizing your time, I suggest that during this six-week period, you consider each actual week as consisting of two “virtual weeks”: one spanning Monday through Wednesday; and another spanning Thursday through Saturday. Video recordings will be made available on Monday and Thursday mornings. On Tuesday and Friday mornings, I have office hours. Your TAs also have office hours on Wednesday, Thursday, and Friday afternoons. (See the course web page for times, and an email I sent you shortly before the class started for the Zoom link to access the office hours.)

Devoting enough time is a necessary, but not sufficient, condition for success. In the rest of this note I will suggest how you can make effective use of your time.

1. Before the lecture. The most important preparation before each lecture (other than the first one!) is to review the previous lecture. This is because each lecture often builds on concepts introduced in the preceding one. It is therefore important to view each lecture fully caught up (see item 3 below).

2. Viewing the lectures. While viewing the lecture videos, take notes as if you were attending class in person. Lectures are recorded in (roughly) three hour segments. It is not necessary to view each of them in one continuous sitting, but I strongly recommend that you do so in one day. This way you can use my office hours on the day after the video is posted to ask questions on anything that was unclear.

3. Soon after viewing the lecture. Carefully go over your notes and over the assigned material in the textbook. As a student, I found it useful in some courses to reorganize and rewrite my class notes into my “official” course notebook. This allowed me to review the material and make corrections to my notes while the lecture was still fresh in my mind.

You are not merely reading, you are studying — and this requires a more active engagement. You need pen and paper to sketch out ideas, create examples, draw pictures, work out detailed calculations, etc. You need to do this in a quiet environment with no distractions, and you need sustained focus for this effort to pay off.

It is OK to study in (small) groups, as long as the group isn’t a distraction but a resource to help you. In fact, a (small) group can be helpful not only because you will have some of your own questions answered but also because it will afford you the opportunity to answer other people’s questions. Nothing helps understanding a subject better than explaining it to someone else. I learned more as a teacher than I did as a student. (In connection with study groups, however, take note of the course policy on homework
collaboration. Also, during this period of pandemic, be sure to follow the Public Health Authorities’ guidelines regarding physical distancing: organize your study group as an on-line activity.)

Make sure you understand everything. Jot down anything that is unclear and return to it later on your own; if you cannot understand it on your own, ask me or post a question on the course forum.

4. Do the homework; start early. Homework assignments enhance learning in two ways: One is by exposing gaps in your understanding. If you are unable to do a problem, you need to reflect more deeply on it. You may well need to go back and study more carefully the material on which the problem is based. The second way in which homework assignments enhance learning is by having you actually use your newly acquired knowledge to solve new problems. This requires a deeper level of understanding and is a form of the much venerated “experiential learning”: learning by actively doing.¹

The assignments are designed to be reasonably challenging; they are not meant to be routine exercises, and they cannot be completed in a short period of time. It is therefore important that you start working on each homework assignment as soon as it is posted.

Don’t start working on your homework until after you have completed item 3, i.e., until you have studied carefully the material on which the homework is based. Failing to heed this advice is a surprisingly common mistake. It seems like an expedient shortcut (“I will study only what I need to get this blasted homework out of my way”) but it is counterproductive and ultimately wasteful. You are very unlikely to do a good job on a homework assignment if you haven’t studied the material on which it is based; moreover, you are unlikely to identify the minimally necessary material to solve a problem you have not yet solved.

As per the course policy, you may work with a partner on homework assignments. Don’t share the work by dividing the homework in two and having each partner do half of it. Doing so will cheat you out of half of the above-mentioned benefit of doing homework. Instead, each partner should initially work on all problems alone; after an honest first effort, you can contact your partner to exchange ideas and try to make progress on the parts that you were unable to solve on your own.

5. Seek help when you need it. I am here to help. If you don’t understand something, don’t hesitate to ask. I will not judge your intelligence or your course performance by the questions you ask, so don’t let such inhibitions get in the way of learning. In-person interaction during office hours or by making an appointment is the best way to get help. The Piazza forum is another option. Email affords neither the immediacy of in-person interaction nor the efficiency of Piazza’s multi-party interaction; it should be used only when the other two options are not available.

My answers to your questions may well take the form of other questions or of advice as to what to study again, more carefully. This isn’t because I am too lazy or too coy to give a straight answer, but because arriving at the answer by yourself with some guidance puts you in a better position to attack a new problem than simply being handed the answer.

¹“I hear and I forget; I see and I remember; I do and I understand.” —Confucius