COMP1200 Perspectives on Computing

How to use lectures in first year Computer Science

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When you first get into a large scale lecture in Computer Science you are probably not familiar with what is going to happen and how you can best make use of the lecture to help you to learn the subject.

This is a brief set of notes on what you can expect in Computer Science lectures and how you can make use of them.

What to expect in lectures

A lecture lasts about 50 minutes, and is mainly one person talking, using overhead projected transparencies, a whiteboard, or projected computer-stored notes. But there is more than this going on: there are deliberate breaks and pauses, short problems and quizzes, opportunities to you to ask questions and make feedback comments.

In most computer science courses all of the overhead projection materials will be made available on the World Wide Web either before or soon after the lecture. So you do not have to copy it all down word for word. But you can make use of your ability to write down notes. The lecturer will almost always say more than the notes contain. There will be examples on the whiteboard, or spoken examples and expansions of points. There may also be small problems given to you in the lecture class. If you follow the lecture you will have questions that you may ask the lecturer on the spot, or you may be able to fully express - but it is answered by something said in the next few minutes.

Your attention span is probably only about 15-20 minutes. How can you make sense of the other 30 minutes?

Why lectures?

After the printed book was invented in about the year 1540, why do we still have lectures? The answer is in the psychology of how people understand and learn. You can learn some aspects best from a live person speaking to you, backed up by your own review and study of written material, whether it comes from the lecture or from a book or other websites. The two modes are simply not the same.

What to do with lectures - how to learn from a lecture

Come and listen to the lectures! even thought the notes are all there on the web you can use your time best by pacing your learning, week by week - and the pace of the series of lectures is a guide. You can't understand and learn all this in a rush in the last few weeks of the semester before the final exams.

What really helps you to learn from a lecture is if you make some notes of your own during the lecture, which you can add to the web handout notes. Note any of the interesting additional examples, the questions that you think of - things you do not understand, for you to follow up later by asking the question perhaps on the email phorum, or that you look for the answer in the textbook. This is called "actively engaging with the material", and it's *you* being *active* that really helps you to learn with less overall effort.

There's an old joke that a lecture is the transferring of material from one person's notes to one hundred other people's notes, without passing through the minds of either lecturer or audience (or "while they are all asleep"). How can we avoid this? One way is to give you the basic notes so that you do not have to copy down every word. Lecturers try to make the lectures interesting, but this is *intellectually* interesting: it is not meant to be like a TV show with an entertainer who is paid a 6-figure salary for minimal content with maximum flashiness. The advertisers don't pay for this show: you do, but you are paying for a challenge, not an entertainment. You can get the best value for your money by adding some active listening.

In some lectures there will be breakout moments where the lecturer sets the whole class a question or suggests some other activity for a few minutes. It's really important that you make an attempt at the question: the human psychology of learning tells us that this will allow your brain to assimilate and digest what you have been hearing for the past few minutes, and to start putting into place in your memory. This also gives you a break from listening and means that you can get something from listening for the next 10 minutes: it refreshes your attention. Whether you get the answer right or wrong you should make a note of the question, and review it against the notes and the textbook later. And you can create your own version of other similar problems for practice.

Sometimes there will be a chance to ask questions directly. In large lectures this is obviously not easy - there isn't enough time, and it's hard to get the attention of the lecturer. And many people find it hard to express their question quickly and clearly on the spot. You can make a note and put the question on the phorum discussion after the lecture, or email to the lecturer directly. Most questions are ones that lots of people in the class would also like to know the answer to - so the answer to your question may be posted to the whole class, and you have helped everybody by asking it.

Don't go to lectures :-)

> *So what? you reckon have heard this lecture before. You think the course is boring and just repeats what you learned last year. You can always catch up by reading the notes, so there isn't any point in going to the lectures.*

If you think you have heard it all before and so you can skip lectures, beware! you are in danger. The speed of university courses is faster than you think, and you can fall a long way behind as soon as we hit something that's new to you, if you are not in practice with learning as you go. You are wasting your effort in coming to university if you just go for the minimal learning option - you can always get more by reading ahead or in parallel to the suggested reading, and by doing the Challenge problems in the lecture notes.

Reviewing lectures

Reviewing the written notes and the web notes and the corresponding parts of the textbook, putting it all together in your head, is the real way that you will learn. What does this mean? It does not mean just writing out the notes neatly, though that can be a great help. It means going over something at writing speed, and finding ways to think about it. One way is trying to express the ideas better: make your own better explanation, like you would use to explain to someone else in the class who missed the lecture and does not have the web notes. This is a good way to learn.

Learning after lectures

Taking notes from the textbook- not just copying it, and not just extracting quotation, but writing out the main points of arguments, can also help. Doing the textbook problems is the next step- it develops your ability to apply the knowledge, as well as to recognise what is meant. This is the difference between understanding "what is the definition of the value of a binary number?" and "what is the value of 101010 binary in decimal?"
(and further, if you can write programs: "write a program to read any number of binary digits from input and output the equivalent decimal number"). These are all different ways of understanding the same concept. You can choose how much to do to increase your understanding; you obviously cannot do this will every part of the course, but as you listen in lectures, you will get strong hints about what is most important. (*Hint*: the use of sequennces of bits to represent information, is a very important topic to understand!)

Non-mathematical concepts need different ways of understanding than this. Some might need you to think about your knowledge and integrate it with your general knowledge and experience: "what are three good reasons why computers were not built in the nineteenth century"; "what is a really green computer"; "extrapolate Moore's Law of the density of transistors on a chip to the size of single atoms: when does the `law' say this will happen? what can happen after this time?".

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