# IF YOU ARE CONSIDERING GRAD SCHOOL IN COMPUTER SCIENCE

(revised October 8, 2001)

You may be aware that there are two kinds of CS grad programs (and the same is true for many other disciplines): those where most/all students are expected to pursue a PhD, and those where students usually just go for the master’s, and a few go on for the PhD. The really prestigious schools will want you only if you tell them you want to go for the PhD. Doctoral programs are designed to be individualized: rather than following a departmental ladder of required courses, you can set your own agenda. MSc programs are usually an extension of undergraduate CS coursework, sometimes topped off with a few months devoted to research working with one professor for the master’s thesis.

As a matter of fact, some schools offering the MSc may not even require a thesis. But if you take that route, it may be more difficult to enter a doctoral program as easily when you’re done. During your first term in grad school you should take time to begin narrowing choices on a major professor, who will be your long-term 1-on-1 instructor, your advisor, and maybe even your boss for a while. As soon as possible during that 1st term, meet (or at least get to know all the faces of) the faculty. Once you are there, find out if any professors are going to be on sabbatical in the near future. It would be a shame to pick a major professor who is going to be gone for several months at the time that you are ready to begin your thesis. Choosing a major professor is probably a more important decision than choosing a graduate school.

If you are looking for a master’s program, I think you may be better off at a department where is no PhD program. That way, the professor won’t be as distracted with lots of other research projects and can spend more time helping you. The quality of classroom teaching at master’s institutions tends to be much better, with smaller class sizes too. Doctoral programs are usually located only at very large schools. But if you are PhD-bound (and you might not know it for a while!) it’s more efficient to do all your work at one school, with the same major professor.

Miscellaneous Sources of Information:

In major libraries you can find microfiche cards containing the college catalogues from practically all American and many foreign universities. Similar information can also be found on the Internet, as universities and individual departments have their own HTML home pages.

If you are interested in ratings and rankings, there is a book entitled “Research-Doctorate Programs” published in 1995. The Library of Congress call number is LB 2386 R 47. But note that prestige is strongly correlated with the number of faculty. The more professors a department has, the more research “output”, and greater chance of national recognition.

The Federal government publishes a book each year called the “Digest of Education Statistics” (also available via the Internet), and you can find out things about the discipline as a whole. It can tell you, for example, the number of CS degrees awarded each year in the US, and you can observe trends of growth and decline. Currently American universities award about 25,000 bachelor’s, 10,000 master’s and 1,000 PhD’s in CS each year. In addition, you can hunt down another annual publication called “American Doctoral Dissertations”. It lists the titles and authors of all dissertations written in the US, by field and by school. You can use this to see what grad students are writing about, and where.

The National Science Foundation (NSF) also publishes a treasure trove of statistics about scientists, graduate students and degree data. Here’s a good place to start: http://www.nsf.gov/sbe/srs/pubdata.htm

You should familiarize yourself with what the various research areas (subdivisions) of CS there are and which one(s) you find interesting, and probably which ones you hate as well. Browse recent issues of the Communications of the ACM or IEEE Computer to get a flavor of what is out there.

Eventually you will need to pick a school that has a grad program in CS that will meet your needs and desires. To make this task more manageable, I’ve come up with some questions you need to consider when examining a particular program. Many of these questions are not seeking a good vs. bad answer, but address issues you need to confront sooner or later. Find out:

1. What courses are required for the degree
2. If there is a comprehensive exam, what subjects are covered on it
3. The research areas of all the faculty, and also notice if there seems to be a lot of professors concentrated in one particular area… For example, ½ of the faculty may specialize in AI. And of course, find out – tactfully – about the reputation, personality and clout of the individual professors.
4. ASSISTANTSHIPS –
   1. Will the school pay for your tuition in addition to your salary?
   2. What are the criteria for earning and keeping the assistantship?
   3. What duties are expected of a 1st year TA or RA?
   4. Are TAs required to attend a training program or orientation?
5. What is the lowest mark allowed for CS coursework in order for you to count it towards the degree? Also ask whether required courses can be taken pass/fail (probably not).
6. Is a minor subject required? In other words, do you have to take classes in other departments?
7. Is a reading knowledge of a foreign language required for the degree?
8. Once a student has completed all the required coursework, is it permissible to work exclusively on the thesis/dissertation without taking any additional courses? In some schools, a student must always register for at least 1 regular class per term (except summer) even if you’ve taken all the required classes.
9. What is the minimum course load per term?
10. Are any classes offered in the summer?

Are students required to be in residence in the summer?

What do students typically do in the summer – can one get an industry internship in the summer?

1. How many grad students are in the department?

How many of those are full time, and how many are master’s students and how many are PhD students?

1. Is OFFICE SPACE available for all students, or just for those on assistantships, or…
2. What hardware is available for student use?
   1. Is there a “grad lab” with 24-hour access?
   2. Access to laser printer
   3. What kinds of machines (and operating systems) do they use? Sun, NeXT, SGI, PC, Mac, …
   4. Are students required to own a PC?
3. If a student really wants to go for the PhD, is it required to get a master’s (and write a master’s thesis) first before taking the doctoral preliminary exam? How long into the program do students take the prelim (or qualifying) exam? (e.g. 2nd or 3rd year)
4. What proportion of students are from foreign countries?
5. How many MSc and PhD degrees were awarded this year? In the last 5 years?
6. Is the department more committed to serving the needs of the undergraduate students? Don’t ask this directly, but you can gather this by looking at how many undergraduate majors there are versus how many grad students are in the department, and by how many classes are offered at each level. Beware that at big schools, you may be dealing with a department that is trying to be really 3 departments in 1: a graduate program, an undergraduate program, and courses for non-majors. Each of these 3 endeavors can be a huge undertaking. Beware of tension between these multi-faceted goals. Similarly, is there any tension between the goals of the master’s and PhD programs?
7. What is the level of prestige of the department within the university? How does the department get along with its neighbors and other departments (e.g. electrical engineering, math) that might compete for students and other resources?
8. Can any undergraduate courses count towards the graduate degree?
9. What courses were offered in the most recent academic year? This will give you an idea of what electives are typically offered.
10. Is the school on the quarter system or the semester system?
11. For the school as a whole, how many grad students are there? And how does this figure compare to the number of undergrads? Some prestigious schools have more grads than undergrads.
12. What is the typical rent for a 2-bedroom apartment in the area? How far of a commute is it from a nice neighborhood to school? -- Find out from people who are already there.
13. How long does it usually take a full-time student in the department to get the degree? The typical numbers in CS are 2 years for the MSc and 4 more for the PhD, but these are national medians and there is a lot of variation. Graduate degrees are often treated like fine wines.
14. FUNDING! Are the faculty successful in securing grants to support their research, so that they can hire their own grad students as RAs? It would be nice if your major professor can pay you while you are getting your degree (without you having to do additional work not directly related to your research, such as teaching). The best financial aid is the “fellowship”, which is awarded to a few of the best entering grad students. A fellowship is like a scholarship – an award, with no work obligation.
15. What is the school’s Carnegie classification? This rating is given to the school as a whole, and gives you an idea of the academic climate of the school. In descending order of prestige, they are: Research I, Research II, Doctoral I, Doctoral II, Comprehensive I, Comprehensive II, …
16. What classes are TAs expected to teach (in later years)? Although teaching may seem like a distraction from getting on with your own academic progress and not seem as desirable as a research assistantship, you may enjoy it immensely. About being a TA: what freedom does a TA have in teaching his own class? Is there a department-mandated syllabus? Can you make up your own homework assignments and tests? How many students are in each section, and how many sections must I teach?
17. What jobs have recent graduates taken?
18. Does the university library have a good (extensive) collection of CS books, and more importantly, journals and conference proceedings?
19. Does a student have to be in residence while finishing the thesis/dissertation? It’s a good idea to stick around, but some people get early job offers they can’t pass up. The down side is they may forget to finish the thesis!
20. Are students who have assistantships or fellowships allowed to supplement their income with an outside part-time job?
21. Has the department experienced a stable student population, or has it been growing/shrinking lately? Would the department like to see the number of students (both undergrad and grad) grow, shrink or stay the same? Is the department overcrowded (not enough faculty or office space)? Are there brand new faculty members? Does the department plan on hiring new faculty soon?
22. Is income from being a TA or RA subject to state and/or local income tax? Are Social Security (FICA) and Medicare taxes taken out of assistantship income?