

## COMPUTER SCIENCE PROGRAMS

The four tables in this chapter give details on the program for computer science majors, including the mathematics/statistics requirement both in aggregate form and by specific courses, the average number of students per computer station, and the general accessibility of computers.

While direct comparison with previous survey data is not possible, there was a general improvement in the availability and the average number of students per computer station over 1985.

Computer science programs are offered by both mathematics and computer science departments. The data are presented by Univ. (PhD), Univ. (MA) and College (BA) levels and combine information from computer science departments and mathematics departments that offer a computer science program.

For information on four-year college and university computer science see

Tables CS.1, CS.2, CS.3, CS.4.

**TABLE CS.1** Number of semester credits in Mathematics or Statistics at or above the Calculus level normally taken by Computer Science majors in four-year colleges and universities by type of school: Fall 1990.

	Univ (PhD)	Univ (MA)	College (BA)	<b>ALL CS Programs</b>
Number of CS programs	155	177	466	798
Average credit hours taken in Math and Stat at Calculus level or above	19.1	18	14.4	16.1

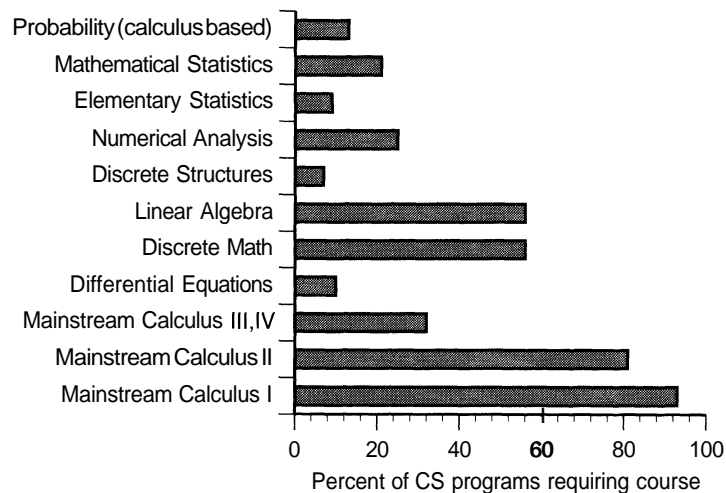
**TABLE CS.1** Computer science programs are in both mathematics and computer science departments. These 798 programs divide as follows:

	Univ.(PhD)	Univ. (MA)	College (BA)	TOTAL
Math. Depts.	19	72	228	319
Comp. Sci. Depts.	136	105	238	479
TOTAL	155	177	466	798

In this chapter, data were combined for programs in either mathematics or computer science departments by type of institution. The change in classification of institutions from 1985 to 1990 makes comparisons difficult.

**TABLE CS.2 Mathematics and statistics courses required by four-year college and university Computer Science programs; percent of programs requiring the course by type of school: Fall 1990.**

	Univ (PhD)	Univ (MA)	College (BA)	OVERALL
Number of CS programs	155	177	466	798
Mainstream Calculus I	94%	94%	90%	93%
Mainstream Calculus II	94%	82%	77%	81%
Mainstream Calculus III,IV	61%	36%	21%	32%
Differential Equations	25%	7%	6%	10%
Discrete Math	63%	57%	42%	56%
Linear Algebra	74%	61%	49%	56%
Discrete Structures	8%	14%	4%	7%
Numerical Analysis	14%	7%	35%	25%
Elementary Statistics	3%	20%	6%	9%
Mathematical Statistics	32%	24%	17%	21%
Probability (calculus based)	25%	18%	6%	13%



**FIGURE CS.2.1 Mathematics and statistics courses required by four-year college and university Computer Science programs: Fall 1990.**

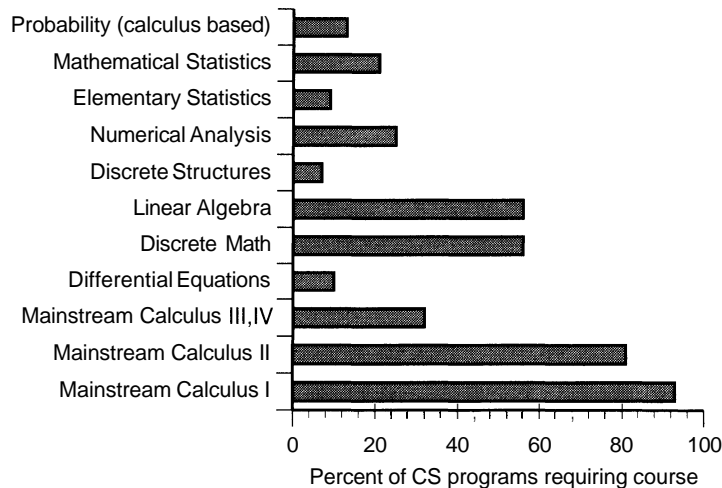
**TABLE CS.2** This survey does not report on the percent of programs that required various combinations of these courses. A similar table (4-13) appeared in the 1985 survey but the different classification of institution makes comparison difficult. No summary data were presented on this topic in the 1985 survey.

Two-year college instructors teach about 16 hours a week to relatively small classes, and many teach an additional class or two, usually for extra pay, or do work outside the college. A master's degree in the subject is the standard requirement for full-time employment in academic disciplines and a bachelor's degree with relevant experience is the usual requirement for employment in occupational programs. Twenty-five years ago, the majority of two-year college faculty were recruited from the high schools, but this is no longer the case. Although there is regional variation, most two-year college instructors are under no pressure to publish; promotion and tenure typically require adequate teaching and time in rank.

About 38% of all post-secondary mathematics, statistics, and computer science enrollments are in two-year colleges, up from 30% in 1985 (see Table S.1 and Figure S.1.2). In many state colleges and universities, a large percentage of mathematics majors began their studies in two-year colleges. In fact, "nearly 10 percent of U.S. students who receive a doctorate in the mathematical sciences began their undergraduate studies in a two-year college" [Moving Beyond Myths: Revitalizing Undergraduate Mathematics, National Research Council, Washington, DC, 1991, p.4].

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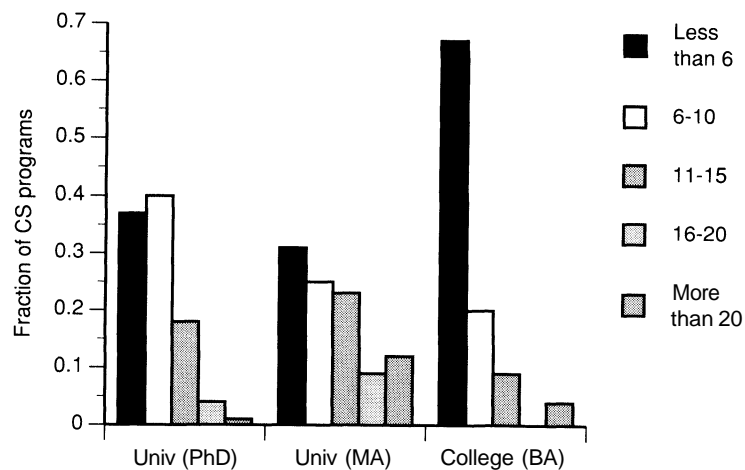


**FIGURE CS.2.1 Mathematics and statistics courses required by four-year college and university Computer Science programs: Fall 1990.**

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**TABLE CS.3 Average student enrollment per computer station in four-year college and university Computer Science programs; percent of programs with each enrollment by type of school: Fall 1990.**

	Univ (PhD)	Univ (MA)	College (BA)	ALL CS programs
Number of CS programs	155	177	466	798
Average enrollments per computer station	Percent of CS programs			
Less than 6	37%	31%	67%	53%
6-10	40%	25%	20%	25%
11-15	18%	23%	9%	14%
16-20	4%	9%	0%	3%
More than 20	1%	12%	4%	5%

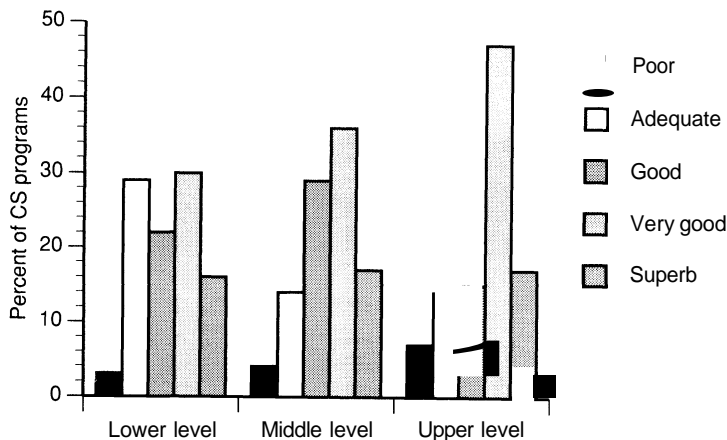


**FIGURE CS.3.1 Average student enrollment per computer station in four-year college and university Computer Science programs; fraction of programs with each enrollment by type of school: Fall 1990.**

**TABLE CS.3** While comparisons between this table and the corresponding Table (4-17) of the 1985 survey are not completely valid, it appears that the percent of average enrollment in the 0-5 and 6-10 categories increased dramatically. For example, in 1985 only 18% of private colleges reported that their average number of students per work station was less than six; in 1990 BA departments reported this percent as 67%.

**TABLE CS.4 Accessibility of computer stations both for students and for course work in four-year college and university Computer Science programs by level of courses and by type of school: Fall 1990.**

		Accessibility				
	Number of CS Programs	Poor	Adequate	Good	Very good	Superb
<b>Lower level</b>						
Univ (PhD)	155	5%	18%	34%	28%	15%
Univ (MA)	177	11%	33%	16%	25%	15%
College (BA)	466	0%	32%	20%	31%	17%
<b>ALL CS Programs</b>	<b>798</b>	<b>3%</b>	<b>29%</b>	<b>22%</b>	<b>30%</b>	<b>16%</b>
<b>Middle level</b>						
Univ (PhD)	155	3%	13%	34%	32%	18%
Univ (MA)	177	13%	21%	18%	33%	15%
College (BA)	466	2%	11%	31%	39%	17%
<b>ALL CS Programs</b>	<b>798</b>	<b>4%</b>	<b>14%</b>	<b>29%</b>	<b>36%</b>	<b>17%</b>
<b>Upper level</b>						
Univ (PhD)	155	3%	12%	26%	41%	18%
Univ (MA)	177	17%	16%	13%	37%	17%
College (BA)	466	5%	14%	12%	52%	17%
<b>ALL CS Programs</b>	<b>798</b>	<b>7%</b>	<b>14%</b>	<b>15%</b>	<b>47%</b>	<b>17%</b>



**FIGURE CS.4.1 Accessibility of computer stations both for students and for course work in four-year college and university Computer Science Programs by level of course: Fall 1990.**

**TABLE CS.4** This table does not correspond to any table in previous surveys.

