

Comprehensive Report¹ on the 1999 Survey of Departments Offering CSAC/CSAB-Accredited Degree Programs²

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Introduction

This is the fifth year of publication of an annual survey of departments offering degree programs accredited by the Computer Science Accreditation Commission of the Computing Sciences Accreditation Board (CSAC/CSAB). This is the second year that this survey was carried out with support from the National Science Foundation.²

The goal of this survey effort is to provide structured, up-to-date information in terms of demographics and statistics related to curricula, faculty, and students in accredited undergraduate computer science degree programs. This project has the following objectives:

- ?? facilitate the sharing and communication of information among departments offering baccalaureate degree programs in CS;
- ?? provide faculty with information that can be used to assess, monitor, and compare their programs to others in the nation in terms of curriculum issues, faculty composition, faculty workloads, student enrollment and graduation rates; and
- ?? provide faculty with supporting information to be used in planning and implementing course and curriculum developments and program enhancements by identifying standards in infrastructure and curricula.

An electronic information collection and partial verification system was employed for this year's survey.

The tables listed in this document present summaries of various results from the survey collected in the winter of 1999-2000.³ These tables are grouped according to their focus, namely academic-unit-, curriculum-, student-, and faculty-related information. Whenever relevant, data collected over the past 5 years are shown.

Academic Unit Information (Tables 1-3)

This section presents information on the academic units offering the accredited degree programs. Table 1 displays the names of the departments offering the accredited degree programs.

Name of Department	Number
Computer/Computing Science	45 (72%)
Computer Science & Engineering	8 (13%)
Computer & Information Science	5 (8%)
Mathematical Sciences	2 (3%)
Computer Science & Mathematics	2 (3%)
Office of Institutional Research	1 (2%)
Total	63 (100%)

Table 1. Names of Departments Participating in this Survey

Table 2 displays the names of the academic divisions (college or school) housing these departments. All engineering-related⁴ divisions have been included in the *Engineering* category. All sciences-only-related⁵ divisions have been included in the *Sciences* category.

¹ This report may be referenced as technical report CoC/CS TR# 2000-9-1, Department of Computer Science, College of Charleston and is available in HTML at <<http://www.cs.cofc.edu/~mccauley/survey/report99/>>

² Partial support for this work was provided by the National Science Foundation's Division of Undergraduate Education through grant DUE #9752482.

³ This survey was sent to 151 departments. Of these units, 63 returned the survey instrument.

⁴ These are divisions whose title includes the word "engineering".

⁵ These are divisions whose title includes "science", but not "engineering" or "arts".

Name of Academic Division	Number
Engineering	21 (33%)
Sciences	14 (22%)
Arts & Sciences	17 (27%)
Computer Science	2 (3%)
<i>Did not indicate</i>	9 (14%)
Total	63 (100%)

Table 2. Name of Academic Division

Table 3 displays information on degrees offered by departments in addition to the accredited degree program. The percentages included in this table are calculated as the number of departments that offer this degree out of the eighty-two departments responding to the survey. Seventeen departments (27%) offer only undergraduate degrees in Computer Science. Nineteen departments (30%) offer M.S. but no Ph.D. degree in Computer Science.

Name of Degree	Number of Departments
Computer Science, Ph.D.	27 (43%)
Computer Science, M.S.	47 (73%)
Computer Science, B.S.	10 (16%)
Computer Science, B.A.	9 (14%)
Computer Engineering	11 (17%)
Computer Information Systems	9 (14%)
Electrical Engineering	3 (5%)
Mathematics	6 (10%)
Information Science	4 (6%)
Software Engineering	1 (2%)
Other baccalaureate degrees	5 (8%)

Table 3. Degrees Offered by Departments

Five departments reported offering baccalaureate degrees other than those listed above. They included: Computer Systems, Mathematics-Computer Science, Operations Research, Statistics, and Computer Science with Applications.

Curriculum Data (Tables 4- 14)

This section presents curriculum-related information for academic years 1995-96 through 1999-2000.

Table 4 displays five years of data on the programming languages taught as *first* programming languages for majors in accredited programs [2, 3, 4, 5]. It also provides information on languages expected to be taught in the 2000-2001 academic year. The percentages included in this table are calculated as the number of departments using a specific language out of the total number of departments responding to the survey in the specified survey year.⁶

First Language	1995-96	1996-97	1997-98	1998-1999	1999-2000	Projections for 2000-2001
Ada	12%	18%	19%	7%	6%	3%
BASIC	-	-	-	1%	-	
C	17%	14%	11%	20%	19%	19%
C++	32%	39%	47%	50%	54%	51%
Eiffel	2%	-	2%	1%	-	
FORTRAN	2%	-	-	-	-	
Java	-	-	9%	22%	22%	32%
JavaScript	-	-	-	1%	1%	
Modula-2	-	2%	-	-	-	
Pascal	36%	23%	6%	2%	5%	2%
Scheme	2%	4%	4%	1%	-	
Visual BASIC	-	2%		-	-	

Table 4. First Languages Taught in Curricula in Academic Years 1995-96 Through 1999-2000

⁶ The number of schools responding has averaged 42% over the five years of this study.

Table 5 displays data on usage of programming language(s) considered to be the *primary* teaching languages in degree programs [2, 3, 4, 5]. It also shows the languages that departments expect to be teaching in academic year 2000-2001. (Several schools consider more than one language to be primary in their programs.)

Primary Language	1995-96	1996-97	1997-98	1998-1999	1999-2000	Projections for 2000-2001
Ada	17%	14%	15%	7%	6%	3%
C	49%	27%	9%	24%	16%	16%
C++	48%	54%	68%	77%	75%	72%
Java	-	-	11%	21%	27%	35%
Modula-2	-	2%	-	-	-	-
Pascal	25%	13%	6%	4%	3%	3%
Prolog	2%	-	-	-	-	-
Scheme	-	-	-	1%	1%	2%
Smalltalk	-	-	-	1%	-	-

Table 5. Primary Programming Languages in Use in Curricula

Table 6 displays statistics on the primary programming paradigm taught [2, 3, 4, 5]. (Some schools consider both paradigms as primary to their degree program.)

Paradigm	1995-96	1996-97	1997-98	1998-99	1999-2000
Procedure-Oriented	73%	54%	30%	35%	27%
Object-Oriented	36%	55%	74%	74%	83%

Table 6. Primary Paradigm Taught

Table 7 displays statistics on the use of closed labs⁷ [2, 3, 4, 5]. Additionally, for the current survey year, twenty-one departments (33%) indicated using closed labs in a wide variety of courses beyond CS2.

	CS1	CS2	CS3	Other
1995	35 (60%)	33 (57%)	10 (17%)	17 (29%)
1996	39 (70%)	23 (41%)	8 (14%)	22 (39%)
1997	39 (74%)	28 (53%)	11 (21%)	18 (34%)
1998	58 (71%)	37 (45%)	-	28 (34%)
1999	44 (70%)	31 (49%)	-	21 (33%)

Table 7. Use of Closed Labs

Tables 8, 9 and 10 report credit-hour requirements in degree programs. Fifty-six departments (89%) provided answers in terms of semester credit hours. (All credit-hour data given in quarter credit hours have been converted to semester credit hours, using the formula: 120 semester credits = 180 quarter credits.) Table 8 indicates the number of semester credit hours required for a degree. These numbers are consistent with those reported over the past years [3, 4, 5].

	Minimum	Average	Maximum
Semester Hours	120	126	155

Table 8. Credit Hours Required for a Degree

Table 9 reports on the number of semester credit hours required in computer science, mathematics and science courses. Again, these averages are consistent with those reported over the past years [3, 4, 5].

Semester Hours	CS	Math	Sciences
Minimum	33	12	8
Average	43	18	15
Maximum	62	27	28

Table 9. Credit Hours Required in Various Areas of Study

⁷ Since 1998, the survey questionnaire has not listed CS3 as choice for the closed laboratory question.

Table 10 shows physics requirements. This information is gathered in order to ascertain to what extent physics is required in degree programs. Forty-three (or 68%) of programs require some physics credits, while the other programs allow students to choose from a variety of sciences including but not requiring physics.

Semester	Physics	Non Physics
Minimum	0	0
Average	9	6
Maximum	17	18

Table 10. Credit Hours Required in Specific Sciences

Table 11 names the computer science courses offered at the upper-level during academic year 1999-2000. The survey specifically asks about *required* and *elective courses offered* at the junior/senior level that are focused on the specific topics listed. The *Offered* column shows the number of departments that offer one or more courses in a the topic area. The *Required* and *Elective* columns show, respectively, the numbers of degree programs that require a course or offer an elective course in a topic area. These results are similar to those seen over the past years of this survey [3, 4, 5].

Course	Offered	Required	Elective
Analysis of Algorithms (AA)	55 (87%)	36 (57%)	20 (32%)
Architecture (AR)	59 (94%)	44 (70%)	17 (27%)
Artificial Intelligence (AI)	60 (95%)	2 (3%)	58 (92%)
Compiler Construction (CC)	58 (92%)	14 (22%)	44 (70%)
Database Management Systems (DB)	62 (98%)	14 (22%)	49 (78%)
Ethical, Social Issues (ET)	40 (63%)	35 (56%)	6 (10%)
Graphics (GR)	63 (100%)	-	63 (100%)
Human-Computer Interaction (HC)	25 (40%)	2 (3%)	23 (37%)
Networks (NW)	63 (100%)	11 (17%)	53 (84%)
Operating Systems (OS)	63 (100%)	57 (91%)	12 (19%)
Parallel Computing (PC)	34 (54%)	1 (2%)	33 (52%)
Programming Languages (PL)	59 (94%)	49 (78%)	14 (22%)
Robotics (RB)	19 (30%)	-	19 (30%)
Software Engineering (SE)	62 (98%)	41 (65%)	22 (35%)
Simulation (SI)	25 (37%)	-	25 (40%)
Theory of Computation (TH)	52 (83%)	36 (57%)	18 (29%)
VLSI Design (VL)	17 (27%)	3 (5%)	14 (22%)

Table 11. Upper-Level Courses

Seventeen percent of departments indicated offering some course(s) through distance learning. Table 13 shows the delivery methods in use for those courses. (The percentages shown are based on the number of schools that use a particular delivery method out of all schools that provide courses through distance learning.)

Web	Interactive Web	Streaming Video	Compressed Video	Broadcast Video
5 (45%)	3 (27%)	-	1 (9%)	2 (18%)

Table 12. Method of Delivery of Courses Offered Through Distance Learning

Table 13 shows that co-ops and internships are required in only a small number of degree programs.

Co – op or Internship Required?	
Yes	3 (5%)
No	60 (95%)

Table 13. Co– op or Internship Requirements

Student Information (Tables 14 -18)

This section presents information on degree production and enrollment figures in terms of number, gender, and ethnicity of students. Nineteen departments did not have easy access to gender or ethnicity information, thus, the large numbers of students listed in *Unknown* fields.

The next two tables pertain to the awarding of degrees in accredited programs. Table 14 provides a breakdown of graduates according to ethnicity; Table 15 shows the breakdown in terms of gender.

Ethnicity	Number of Degrees
Nonresident Alien	106 (4%)
African American	39 (2%)
Asian	255 (11%)
Hispanic	105 (4%)
Native American	3 (0%)
White	1088 (45%)
<i>Other</i>	18 (1%)
<i>Ethnicity Unknown</i>	793 (33%)
Total	2407 (100%)

Table 14. Degrees Awarded in 1998-99 by Ethnicity

Gender	Number of Degrees
Males	1814 (75%)
Females	404 (17%)
Unknown	189 (8%)
Total	2407 (100%)

Table 15. Degrees Awarded in 1998-99 by Gender

The following tables display enrollment information for academic year 1998-99. Table 16 displays enrollment figures according to ethnicity; Table 17 displays enrollment figures according to gender.

Ethnicity	Number Enrolled
Nonresident Alien	592 (3%)
African American	749 (4%)
Asian	1591 (9%)
Hispanic	745 (4%)
Native American	56 (0%)
White	7030 (39%)
<i>Other</i>	180 (1%)
<i>Ethnicity Unknown</i>	6941 (39%)
Total	17884 (100%)

Table 16. Ethnicity of Enrolled Students in 1998-99

Gender	Number of Enrolled
Male	11403 (64%)
Female	2429 (14%)
Unknown	4052 (23%)
Total	17884 (100%)

Table 17. Gender of Enrolled Students in 1998-99

Table 18 provides a class breakdown for enrolled students.

Freshmen	Sophomores	Juniors	Seniors	Unknown/Did	Total
4233 (24%)	3360 (19%)	3348 (19%)	4603 (26%)	2350 (13%)	17884 (100%)

Table 18. Class Breakdown of Enrolled Students in 1998-99

Faculty Information (Tables 19 - 36)

This section provides information on teaching faculty.⁸ This information focuses on gender, rank, ethnicity, salaries, new appointments, and workload requirements in departments offering accredited degree programs.

⁸ These are full-time faculty who have a regular teaching assignment in the accredited degree program.

Table 19 displays faculty numbers according to gender and rank for all surveyed programs. The count of 953 faculty members in 63 departments indicates that department size, in terms of numbers of full-time faculty, averages 15 faculty members per department.

Rank	Male	Female	Total by Rank	Male/Female Ratio
Full-Professors	270 (88%)	34 (11%)	304 (32%)	8:1
Associate	236 (82%)	53 (18%)	289 (30%)	4:1
Assistant Professors	164 (80%)	42 (20%)	206 (22%)	4:1
Instructors	86 (56%)	68 (44 %)	154 (16%)	1:1
Total by Gender	756 (79%)	197 (21%)	953 (100%)	4:1

Table 19. Gender & Rank of Faculty at All Institutions

For comparison purposes, Table 20 shows faculty counts by gender for previous survey years [2, 3, 4, 5].

Year	Male	Female	Did not indicate gender	Total Faculty	Male/Female
1995-96	687 (84%)	132 (16%)	-	819	5:1
1996-97	589 (81%)	140 (19%)	-	729	4:1
1997-98	663.5 (82%)	136 (17%)	9 (1%)	808.5	5:1
1998-99	1,039 (82%)	227 (18%)	-	1,266	5:1
1999-2000	756 (79%)	197 (21%)	-	953	4:1

Table 20. Faculty Counts by Gender in Previous Survey Years

The next three tables provide a breakdown of faculty by gender & rank for departments according to the highest computer science degree that they offer: Bachelor’s degrees (Table 21), Master’s degrees (Table 22), and Doctor of Philosophy degrees (Table 23).

Rank	Male	Female	Male/Female Ratio
Full-Professors	26 (90%)	3 (10%)	9:1
Associate Professors	23 (88%)	3 (12%)	8:1
Assistant Professors	28 (80%)	7 (20%)	5:1
Instructors	14 (45%)	17 (55%)	2:1
Total	91 (75%)	30 (25%)	3:1

Table 21. Gender & Rank of Faculty in 17 B.S.-granting Departments

Rank	Male	Female	Male/Female Ratio
Full-Professors	64 (89%)	8 (11%)	8:1
Associate Professors	54 (73%)	20 (27%)	3:1
Assistant Professors	41 (85%)	7 (15%)	6:1
Instructors	7 (26%)	20 (74%)	1:3
Total	166 (75%)	55 (25%)	3:1

Table 22. Gender & Rank of Faculty in 19 B.S. and M.S.-granting Departments

Rank	Male	Female	Male/Female Ratio
Full-Professors	178 (89%)	22 (11%)	8:1
Associate Professors	153 (84%)	29 (16%)	5:1
Assistant Professors	88 (76%)	28 (24%)	3:1
Instructors	61 (70%)	26 (30%)	2:1
Total	480 (82%)	105 (18%)	5:1

Table 23. Gender & Rank of Faculty in 27 B.S., M.S. and Ph.D.-granting Departments

Table 24 provides information on faculty counts according to rank and ethnicity.

Ethnicity	Full	Associate	Assistant	Instructor	Total
Nonresident Alien	1 (0%)	3 (0%)	22 (2%)	5 (1%)	31 (3%)
African American	4 (1%)	2 (0%)	3 (0%)	10 (1%)	19 (2%)
Asian	52 (5%)	52 (5%)	32 (3%)	12 (1%)	148 (16%)
Hispanic	6 (1%)	6 (1%)	4 (1%)	4 (1%)	20 (2%)
Native American	-	-	1 (0%)	1 (0%)	2 (0%)
White	234 (25%)	217 (23%)	134 (14%)	114 (12%)	699 (73%)
<i>Other</i>	4 (1%)	2 (0%)	3 (0%)	2 (0%)	11 (1%)
<i>Unknown/Did not indicate</i>	3 (0%)	7 (1%)	7 (1%)	6 (1%)	23 (3%)
TOTAL	304 (32%)	289 (30%)	206 (22%)	154 (16%)	953 (100%)

Table 24. Ethnicity & Rank of Faculty

Table 25 displays data on actual and estimated numbers of full-time faculty positions in departments for academic years 1994-95 through 1999-2000. The number of departments providing information for specific years varied and thus is included in the table.

Year	# of Departments	Positions	Positions Per Department
1994-95	54	722	13
1995-96	54	720.5	13
1996-97	56	729	13
1997-98	52	808.5	15
1998-99	82	1,266	15
1999-2000	62	953	15
2000-01 (projected)	62	1010	16
2001-02 (projected)	62	1084	17

Table 25. Faculty Positions Per Department

Table 26 provides nine-month salaries, effective January 2000, for faculty in all departments. Specifically, it provides statistics on the minimum salaries across ranks by identifying the minimum, mean, and maximum of all reported salary minimums. Also, it provides statistics on the maximum salaries at each rank by identifying the minimum, mean, and maximum of all reported salary maximums. Finally, it identifies the average nine-month salaries at each rank based on the average salary for a rank and the number of faculty at that rank for whom such data were reported. For comparison purposes, Table 27 shows average faculty salaries for the past survey years. The data indicate that salaries increased at all ranks from 1996-97 to 1997-98 and again in 1998-99.

Rank	Reported Salary Minimums			Average of Salaries	Reported Salary Maximums		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
Full Professors	\$39,918	\$69,488	\$101,250	\$83,626	\$50,544	\$91,237	\$150,500
Associate	\$42,616	\$59,134	\$74,800	\$66,919	\$51,551	\$70,122	\$96,000
Assistant	\$32,703	\$54,252	\$68,400	\$58,425	\$47,039	\$60,625	\$82,300
Instructors	\$16,000	\$37,120	\$64,512	\$41,758	\$16,000	\$45,456	\$77,545

Table 26. Nine-Month Salaries for All Departments

Rank	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000
Full Professors	\$70,400	\$70,315	\$75,139	\$81,800	\$83,626
Associate	\$57,711	\$56,992	\$61,570	\$65,659	\$66,919
Assistant	\$50,491	\$46,234	\$53,327	\$57,379	\$58,425
Instructors	\$35,041	\$35,497	\$39,181	\$42,839	\$41,758

Table 27. Average Faculty Salaries Over Past Four Years According to Rank

The next three tables display faculty salary data, reported this year, according to the highest computer science degree offered by the department: bachelor’s degree(s) (Table 28), M.S. degree(s) (Table 29), and Ph.D. degree(s) (Table 30).

Rank	Reported Salary Minimums			Average of Salaries	Reported Salary Maximums		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
Full Professors	\$39,919	\$64,957	\$101,250	\$70,868	\$56,100	\$74,221	\$101,250
Associate	\$50,000	\$57,796	\$67,680	\$61,800	\$51,551	\$62,105	\$76,250
Assistant	\$38,000	\$50,084	\$61,000	\$53,925	\$47,039	\$54,234	\$61,000
Instructors	\$21,200	\$36,329	\$53,460	\$40,951	\$30,000	\$43,367	\$56,000

Table 28. Nine-Month Salaries for Departments Offering Only Bachelor’s Degrees

Rank	Reported Salary Minimums			Average of Salaries	Reported Salary Maximums		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
Full Professors	\$50,544	\$64,246	\$78,332	\$71,895	\$50,544	\$73,854	\$96,100
Associate	\$46,036	\$56,631	\$68,165	\$60,871	\$54,733	\$64,601	\$72,612
Assistant	\$44,000	\$52,263	\$64,650	\$54,408	\$50,000	\$56,701	\$67,900
Instructors	\$16,000	\$34,161	\$64,512	\$35,731	\$16,000	\$37,377	\$64,512

Table 29. Nine-Month Salaries for Departments Offering Bachelor’s and Master’s Degrees

Rank	Reported Salary Minimums			Average of Salaries	Reported Salary Maximums		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
Full Professors	\$52,898	\$74,852	\$98,000	\$89,576	\$76,627	\$111,139	\$150,500
Associate	\$42,616	\$61,404	\$74,800	\$70,133	\$63,000	\$76,781	\$96,000
Assistant	\$32,703	\$57,045	\$68,400	\$61,337	\$48,000	\$65,722	\$82,300
Instructors	\$23,400	\$39,296	\$59,081	\$44,869	\$31,200	\$50,952	\$77,545

Table 30. Nine-Month Salaries for Departments Offering Bachelor’s, Master’s, and Ph.D. Degrees

For comparison purposes, Table 31 shows the average salaries at each rank in 122 out of 145 departments offering the Ph.D. degree in CS in the U.S. as recorded in the 1998-99 Taulbee Survey [6]. The Taulbee survey includes only Ph.D.-granting institutions, some of which may not have accredited undergraduate degree programs and thus would not be included in our survey.

Rank	Average of All Salaries
Full Professors	\$95,526
Associate Professors	\$72,177
Assistant Professors	\$64,244

Table 31. Average Nine-Month Salaries Reported in 1999-2000 CRA Taulbee Survey

Table 32 and Table 33 display additional salary data from our survey. Table 32 provides average faculty salaries across all ranks in departments categorized according to the highest computer science degree offered. Table 33 shows the average faculty salary for all faculty across all ranks reported during the five years of this survey [2, 3, 4, 5].

Highest Degree Offered	Average of All Salaries
B.S.	\$56,679
M.S.	\$60,301
Ph.D.	\$71,615
All Departments	\$66,624

Table 32. Average Salaries Across All Ranks According to Degrees Offered in Departments

Academic Year	Average of All Salaries
1995-96	\$55,792
1996-97	\$57,324
1997-98	\$61,301
1998-99	\$67,677
1999-2000	\$66,624

Table 33. Average Salaries by Survey Year

Table 34 shows salary figures for newly-hired, new Ph.D.s that began work in 1999-2000. The Taulbee survey reported an average nine-month salary of \$64,283 for new Ph.D.s hired into tenure-track positions in Ph.D.-granting departments [6].

Rank	Reported Salary Minimums			Average of All Salaries	Reported Salary Maximums		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
New Ph.D.'s	\$44,000	\$56,927	\$72,000	\$58,160	\$44,000	\$58,996	\$72,000

Table 34. Nine-Month Salaries of New Ph.D.s Hired for 1998-99

Year	Number of Departments	Number of New Ph.D.s Hired	Average Salary
1995-96	14	23	\$49,768
1996-97	13	17	\$50,197
1997-98	17	24	\$53,291
1998-99	31	68	\$55,145
1999-2000	28	49	\$58,160

Table 35. Data for Newly-Hired, New Ph.D.s

Table 36 displays workload information in terms of job requirements in teaching, research, and service.

Responsibility	Minimum	Average	Maximum
Teaching	30%	57%	80%
Research/Scholarly Activity	10%	29%	50%
Service	0%	14%	34%

Table 36. Faculty Workload Requirements

Summary & Future Directions

This report presented the results from the fifth annual survey of departments offering CSAC/CSAB-accredited degree programs. We believe that these results are of interest and use to many accredited and non-accredited departments. This is because they facilitate monitoring and comparing individual programs to other programs in the nation in terms of faculty composition, student enrollment and graduation rates, faculty salaries, and curriculum issues.

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