

PROGRAM REVIEW 1998-2003 COMPUTER SCIENCE DEPARTMENT OKLAHOMA STATE UNIVERSITY

Executive Summary

Computer Science focuses primarily on the development and application of software (i.e., computer programs) to problem solving. The proliferation of computers throughout industry, home and consumer electronics has increased the demand for information technology professionals, many of whom are Computer Scientists:

The OSU Computer Science Department (CS) offers three programs:

- (1) Bachelor of Science in Computer Science;
- (2) Master of Science in Computer Science;
- (3) Doctor of Philosophy in Computer Science.

The Department has been faced with many challenges in the last five years. The first and most significant one is that the department was told in June 1998 to start a Bachelor's degree program in August 1998 at OSU-Tulsa. There already was a Master's degree program that started in 1988 in Tulsa.

The department was allowed to hire one new faculty member for the undergraduate program in Tulsa for the fall 1998 semester. There already was one adjunct faculty member who had been teaching graduate classes in Tulsa. Several faculty from Stillwater traveled to Tulsa to teach during the first year of the Tulsa B.S. program.

Some of the challenges for the first year were:

1. Hiring Faculty and providing office space, furniture and computer equipment.
2. Deciding on what classes to offer.
3. Coordinating courses with Tulsa Community College (TCC) so that our students could get the lower division mathematics and computer science courses they needed to be prepared for OSU's program. We developed a 2+2 plan with TCC.
4. The student body in Tulsa consists primarily of non-traditional students who are working; consequently, most classes had to be offered at night. There are two time optimal periods for planning classes – one from 4:30-7:10 pm and 7:20 – 10:00 pm. Classes meet only Monday through Thursday nights.
5. Almost all of Computer Science students in Tulsa are transfer students with many courses from other institutions. This requires more advising resources than continuing students in Stillwater require.
6. Hiring an Academic Counselor in Tulsa became important to our program as the Stillwater Academic Counselor has a large load and could not advise in two locations.
7. In the fall 1998, OSU started several undergraduate programs in Tulsa, so employees in Tulsa were new and there was a steep learning curve for everyone.

8. The department started offering more classes by compressed video between Stillwater and Tulsa to utilize our faculty better.

The department faced some problems with the technology recession that started in 2002. Many of the companies in Tulsa that hired computer science students and graduates started downsizing. Some companies moved out of Tulsa. This hurt the graduate enrollment in Tulsa. Since many of these students were able to go to graduate school only because their companies paid their tuition. When the students lost their jobs they also lost ways to pay their tuition. This did not affect the undergraduate program as much as it affected the graduate program..

International student enrollment decreased substantially after the 9/11 incident. All computer science programs have a significant number of international students. This affects the enrollments in both Stillwater and Tulsa.

The CS department graduated its first African-American Ph.D. student in 1998. Another African student who is now a citizen (formerly African, now African-American) graduated earlier from the Ph.D. program.

The first undergraduate student graduated from OSU-Tulsa in Spring 2000. He had been a student in the Computer Science program in Stillwater, but dropped out to work in Tulsa. The program in Tulsa gave him the opportunity to complete his degree.

By 2003, 34 Computer Science B.S. degrees had been awarded through OSU-Tulsa.

The department gained space on the second floor of the Mathematical Sciences building. It has adequate space in Stillwater for equipment for research at the present time, but anticipates a need for more space as the number of faculty increases.

The department has been able to hire more faculty for our programs in both Stillwater and Tulsa, even though more faculty will be needed to meet ABET/CSAB accreditation standards.

OVERVIEW

A. Description of the Departmental Program Review Process

The program review process for Computer Science started in November, 2003 and continued through March, 2004. The period from November, 2003 through February, 2004 was used for information gathering and collating. The time in March was used for writing this document. Most information gathering was conducted by the two advisors, Dr. Judith Edgmand and Ms. Terri Blevins, through past assessments and other means such as informally interviewing faculty. Dr. Blayne Mayfield also contributed to information gathering. Dr. Edgmand participated in writing the final document as did the department head and Dr. Mayfield.

B. Recommendations from the previous program review

Recommendation 1: Increase the number of tenure track faculty in the department.

The number of tenure track faculty increased from 9 at the last program review to the present 15. There still is a need for additional faculty so class sizes are within the limit specified by ABET/CSAB.

Recommendation 2: Obtain additional space for offices and laboratories.

This has been done in Stillwater with the acquisition of the entire second floor of MSCS except for room MSCS 203 and the use of several offices on the third floor of MSCS. There still is a need for laboratory space at OSU-Tulsa.

Recommendation 3: Increase the departmental maintenance and operations budget.

This has not been accomplished due to the inability of the OSU administration to increase departmental budgets while state funding shrinks or is stagnant.

CRITERION I

Program Centrality

A. Goals and Objectives of Degree Programs

The following are goals and objectives for all programs in Computer Science.

Goals

1. Offer programs that attract and motivate students and prepare them for careers related to computer science.
2. Offer a well-rounded education to undergraduates requiring general and liberal education along with technical skills needed to compete in the job market.
3. Provide programs for graduate students that will prepare them for industry or the educational setting upon graduation.
4. Utilize technology in programs that are used in industry.

Objectives

1. Prepare students for varied careers in the computing field.
2. Equip students with critical thinking skills and abilities to solve problems that arise in industry.
3. Provide guidance in areas of ethics and social responsibility as professionals in computing.
4. Provide opportunities to enhance communication skills--both oral and written.
5. Prepare graduate students to contribute to scientific knowledge in the computing area.
6. Prepare graduate students for industry or educational careers.

Degree Program: Bachelor of Science in Computer Science

Program Clientele: The department serves three different student populations. In Stillwater, there are mainly those who are traditional students. These students are full time students who are here on campus most of the time. The Tulsa program serves primarily non-traditional students. These are those who are working full time and only take a few classes each semester. There is a third group of students—those who work full time and take classes at locations other than Stillwater or Tulsa. Most classes in Tulsa are offered in the evening. They usually meet one night a week for three hours. Most classes in Stillwater meet during the day and three times a week. In order to meet the needs of all groups, the department offers several courses on TV so they can be taught to all groups of students at the same time.

Expected Student Outcomes: Students should be able either to obtain a job in a computer related company or a computing unit of another type of company and be able to perform that job well. They also should be prepared for graduate school in a strong computer science program if that is their choice.

Degree Program: Master of Science in Computer Science

Program Clientele: Most of the students in Tulsa are working full time and take one or two classes a semester. Stillwater has more full time students who are in a computer science program.

Goals specific to the Masters Program

1. To train students to be computer programmers, computer systems analysts, computer systems managers, and to occupy similar occupations in industry, government, and academia.
2. To prepare students for possible doctoral study, mainly in this department but sometimes at other institutions.

For goal #1, the student must be mathematically competent and an excellent programmer in several computer languages. He/she must have a good grasp of the principles of algorithm design and analysis, data structures, operating systems, computer architecture as well as theoretical foundations of computer science. This broad basis allows the M.S. graduate to take a broader view of problems in the workplace than merely a low level programmer's view, and enables the person to adapt much better to new technologies.

For goal #2, the student must acquire a good grounding in theoretical areas such as formal language theory, as well as mathematics, programming, and other skills.

Program Objectives: Prepare graduate students to contribute to scientific knowledge in the computing area and prepare graduate students for industry or educational careers.

Expected Student Outcomes: Students should be able to work in industry or continue to a Ph.D. program in Computer Science.

Degree Program: Doctor of Philosophy in Computer Science

Program Clientele: Students who either want to pursue a research career or become a professor.

Goals specific to the Ph. D. Program

The Ph.D. program prepares students to be instructors of computer science at the university level, and to perform original research in a university, an industrial or a government laboratory. The ability to perform research of publishable quality is essential both to advancing knowledge in the field of computer science, and also in enabling the graduate to maintain a level of teaching that is at the forefront of current developments.

Program Objectives: Students will find a job in academia or work in a research laboratory.

Expected Student Outcomes: Students will be able to find a good job in either a University in order to teach, do research, or both.

B. Linkage of Program to Institution's Mission

Oklahoma State University's mission is proud of its land grant heritage. Oklahoma State University advances knowledge, enriches lives, and stimulates and enhances economic development through instruction, research, outreach, and creative activities.

The Computer Science Department (CS) is involved in providing academic experiences for students at all degree levels (Bachelor's, Masters, and Ph.D.). The department is also involved in scholarly research through the graduate programs.

The department is involved in extension involving educating people in the state and also nationally by offering courses by the following means: through National Television University; working with corporations offering Masters classes that are presented at corporate locations. These last programs are offered on compressed video. The department also is involved in M.S. and Ph.D. programs in Tulsa. The undergraduate program began in Tulsa starting in Fall, 1998. The Masters program in 1986, and the Ph.D. program in 2002.

The Computer Science Department is also involved in a Master's and Ph.D. level Telecommunications Degree program with two other colleges at OSU. The program involves Engineering and Business colleges also. The Computer Science department provides faculty for the computationally intensive applications for these programs.

CRITERION II

Program Curriculum and Structure

A. Program Structure

The Computer Science Department has three degree programs: B.S., M.S., and Ph.D. Each of the curricula is discussed separately.

BACHELOR OF SCIENCE PROGRAM

The Bachelor of Science in Computer Science degree consists of 120 credit hours. A copy of the degree plan is attached (appendix A). A Four Year plan and the flow chart for Computer Science and mathematics classes for the undergraduate degree are included in appendix A .

All required Computer Science classes are offered in Stillwater each semester. The elective Computer Science classes are offered once a year. In Tulsa, required courses are offered only once a year. Most elective classes are taught on TV so they can be offered in both Stillwater and Tulsa simultaneously.

MASTER OF SCIENCE PROGRAM

Many applicants to the Computer Science M.S. program have a bachelor's degree in an area other than computer science. The M.S. curriculum is arranged to aid these students in making up missing prerequisites, then move on to graduate study proper. A copy of the brochure on the graduate program is attached (appendix B).

As noted elsewhere, there is an increasing amount of delivery between Stillwater and Tulsa and other remote sites by interactive televised lecturing.

PH.D. PROGRAM

Zero-ending courses such as CS 6300, 6400, etc, usually do not have sufficient enrollment in any one semester to warrant offering formal lecture sections, nor does the department have sufficient faculty to do so. These courses are taught as seminars or on an individual study basis with multiple weekly student/faculty office conferences. The Ph.D. program is offered on both campuses.

A brochure with the Ph.D. requirements is attached (appendix C).

B. Distance Education

The Computer Science Department offers many classes on compressed video. One class is taught through National Technological University (NTU). We offer several classes each semester by compressed video in order to be able to cover all of the classes in both Stillwater and Tulsa simultaneously. These also are offered through OSU Extension to students at other locations throughout the state of Oklahoma.

Unfortunately, it has been more difficult to get many students from outlying locations to take the classes since sometimes they do not have the prerequisite classes. To address this we have tried to offer certain undergraduate classes that would be prerequisites for graduate students on TV.

The CS department has a tentative three-to-four year schedule of courses that will be offered in OSU-Tulsa. Some of the courses are taught on compressed video. One such tentative schedule for OSU-Tulsa is attached.

The department tries to follow a pattern in offering courses on TV. At the undergraduate level, there are two junior-level required courses on TV every other semester. The department usually offers elective classes on TV once a year.

In the graduate program, the department tries to schedule one required graduate class each semester and one elective graduate class each semester by TV.

Teaching TV classes takes extra preparation for the faculty. The workload to prepare, deliver, and administer one distance learning course is 150% to 200% that of a traditional course. This is a list of courses we offer by compressed video:

- CS 3373 – Object Oriented Programming and Visual C++
- CS 3423 – File Structures
- CS 3443 – Computer Systems
- CS 3613 – Theoretical Foundations of Computing
- CS 4143 – Computer Graphics
- CS 4273 – Software Engineering
- CS 4283 – Computer Networks
- CS 4793 – Artificial Intelligence
- CS 4154 – Computer Migration
- CS 5113 – Computer Organization & Architecture
- CS 5273 - Advanced Software Engineering
- CS 5283 – Computer Network Programming
- CS 5313 – Formal Language Theory
- CS 5413 – Data Structures & Algorithm Analysis II
- CS 5793 – Artificial Intelligence

The compressed video courses are those that are shaded on the attached tentative schedule for OSU-Tulsa (attached, appendix D.)

C. Articulation Agreement

The department has had a 2+2 plan with Tulsa Community College (TCC) since the program in Tulsa began. OSU depends on TCC for students to get their lower-division prerequisite classes for transfer to OSU. The main concerns are the calculus sequence and the first two computer classes.

We tried to utilize certain computer courses from TCC as equivalent to OSU's Computer Science I and Computer Science II when the program in Tulsa first started. One of the courses did not prepare our students sufficiently. After visiting with the full-time faculty members at TCC that teach the computer classes, we found other classes that prepared our students adequately.

After the CS program in Tulsa started, the department hired a full-time adviser for our program. She met with many of the advisers on the different TCC campuses both to explain the 2+2 plan to them and to build good relations with the advisers.

The adviser in Tulsa also arranged a lunch meeting for the TCC computer science faculty and our faculty. We discussed our content of our first two classes and what we needed in them. The TCC faculty were able to give us some suggestions as to which courses would match our needs. We made changes in the suggested transfer courses based on their suggestions. TCC students are prepared more effectively for the OSU B.S. curriculum now.

The 2+2 plans are very useful both to advisers and to students. This information is on the department Web site. Unfortunately, these plans are not simultaneously updated every year on the OSU Web site. They should be updated each year as there are usually changes in the plans each year.

The department has been involved in the articulation matrix between the other schools in the state since it began.

A copy of the latest OSU-TCC Computer Science 2+2 plan is attached. A flow chart of the TCC mathematics and computer science classes together with OSU classes is also attached. This is a tool available to the students and advisers.

D. Multidisciplinary programs

The Computer Science Department has been involved in the **Telecommunications Management** Masters program since it started. This is a degree that includes the Business College, the Arts & Sciences College and the Engineering College. Courses are taught by the various departments. The CS department teaches a few of the classes in this degree. It also participates in the Telecommunications Management Ph.D. program.

CRITERION III

Program Resources

Program Finances

Two Tables: Departmental Expenditures, and Grants, Contracts, Gifts, that summarize departmental finances appear on the following 12 pages.

A. Facilities and Capital Equipment

The Computer Science Department has two Sun Servers: Sunfire v880 and the Enterprise 3000. These are the department's primary computing resources. These systems are available to Computer Science students, faculty and staff for both course assignments and research work. Most of the course work is handled by the Sunfire.

The Sunfire v880 has two UltraSparc 3+ 900 Mhz processors, 4GB of RAM, 120GB of disk space and uses the Solaris 9 operating system. The Enterprise 3000 has two UltraSparc 250 Mhz processors, 512Mb of RAM, 70GB of disk space and also uses Solaris 9 operating system. All CS Department systems are accessible through OSU's campus data network, from the IT laboratories located around campus, as well as via Telnet and FTP from off campus. The department also operates three laboratories, Mathematical Sciences 222, Mathematical Sciences 206 and Mathematical Sciences 214. The MS 222 lab contains 6 Sun Ultra 10 3D workstations and 12 Sun Blade 150 workstations and is available for all Computer Science students with an emphasis for our graduate students. The MS 206 and MS 214 labs are reserved for funded research projects. Similar space and equipment is unavailable at OSU-Tulsa.

B. Academic and administrative Efficiencies:

B.1. Administrative efficiencies

The department is very efficient administratively. The department head receives ½ of his salary from the administrative budget while carrying a full teaching load. The only other administrative salaries are for a Sr. Secretary and for an office assistant. Other administrative costs are for supplies and office equipment. It would be most difficult to realize additional administrative efficiencies.

B.2. Academic efficiencies

The department does its best to deliver its programs to its students efficiently. The greatest efficiencies are achieved by utilizing talkback compressed video. A single faculty member can lecture to as many as three sections of the same class by using the compressed video network. Although teaching via compressed video requires a substantial extra time commitment on the part of the faculty involved, the university saves a substantial sum by not hiring the additional faculty that would be required to lecture to each section individually.

Another academic efficiency is realized by having relatively large class sizes on the Stillwater campus. We must realize that this efficiency will be lost when the department applies for professional accreditation. (ABET/CSAB standards do not permit sections with more than 30 students.)

Finally, the department saves the university salary money by using teaching assistants to be in charge of two courses: CS 2133-Computer Science II and CS 2432-C Language Programming. The department views this as an undesirable situation and would like to be able to assign faculty for these tasks, but it is an academic efficiency nevertheless.

CRITERION IV

Productivity

A. Headcount Enrollment for Majors in Computer Science

Headcount for CS Majors Fall 1998 to Fall 2002				
Fall Semester	BS	MS	Ph.D.	Total
1998	225	194	11	430
1999	264	148	5	417
2000	277	152	9	438
2001	308	164	9	481
2002	272	170	5	447

A graph showing CS Majors for these years is appendix E.

Grade Point Average of Computer Science Majors Fall 1998-2002			
Fall Semester	BS	MS	Ph.D.
1998	2.90	3.53	3.84
1999	2.80	3.51	3.86
2000	2.91	3.51	3.84
2001	2.92	3.54	3.90
2002	2.94	3.47	3.67

B. Degrees Conferred

These are based on graduates for Summer, Fall, and Spring (such as Summer 98, Fall 98, and Spring 1999) semesters for the school year.

Year	Degrees Conferred			
	B.S.	Master's	Ph.D.	Total
1998-1999	46	35	2	83
1999-2000	50	48	1	99
2000-2001	43	32	1	76
2001-2002	55	17	0	72
2002-2003	52	28	1	81

A graph of Computer Science Degrees conferred is in appendix F.

C. Program Non-Completers

The department was not supplied with the data for this chart and do not have access to this information.

D. Student Demand for Academic Unit's Offerings

Year	Number of Student Credit Hours				Total
	Lower	Upper	Masters	Doctorate	
1998-1999	4,457	3,566	2,360	138	10,521
1999-2000	4,197	3,755	1,846	95	9,893
2000-2001	4,208	4,367	1,517	100	10,192
2001-2002	4,016	4,186	1,761	130	10,093
2002-2003	3,763	4,282	1,729	147	9,921

CRITERION V

Program Quality

A. Program Faculty

Table 1 on Faculty Qualifications follows this page.

B. Evidence of Regional/national reputation and ranking

The OSU Computer Science Department was one of 108 Ph.D. granting computer science and computer engineering departments (our of approximately 168 Ph.D. granting CS/CE departments) identified as a research department by the CRA (Computing Research Association) in 1995. At that time, the CRA ranked the OSU department as 108/108. A more recent ranking by www.phds.org in 2002 ranked the OSU department as 86/108. The department anticipates a somewhat higher ranking the next time the rankings are published sometime after 2005. One should be aware that these rankings are highly subjective and usually favor departments at universities near either U.S. coast. One also should be aware that the data used to compute these rankings are not necessarily accurate.

The OSU M.S. degree in Computer Science widely is recognized as one of the strongest Computer Science Master's degrees in the country. Faculty from other Ph.D. granting departments (Iowa State, Texas A&M, etc.) have commented on how strong OSU M.S. graduates are when entering their Ph.D. programs. Both the course requirements and the thesis requirement contribute to the strength of the OSU M.S. degree.

The OSU B.S. degree in Computer Science also is recognized for giving graduates of the program strong preparation either for positions in industry or for graduate school. Approximately 89% of the graduates responding to the most recent assessment survey considered themselves to be either well-prepared or very well-prepared for their current position in industry or graduate school.

Although programming is a small part of the entire B.S. degree in Computer Sciences, it is an essential skill for computer scientists. OSU participates regularly in local, state, and regional programming contests. The department normally sends two teams to these contests. In the most recent state wide contest OSU's first team finished in first place among all competitors and OSU's second team finished in third place. Although OSU teams have won the regional (Arkansas, Louisiana, Oklahoma, Texas) contest once, they regularly finish in the top 10%-15% of competing teams including multiple third place finishes. The members of the OSU programming teams are recognized as outstanding problem solvers and programmers.

C. Methods used to evaluate students achievement of program outcomes for each degree program.

Degree program	Assessment methods used	Years
B.S.	Alumni Survey	2001, 2002, 2003
B.S.	Graduating student survey	1998, 1999, 2000, 2001
B.S.	Employer evaluations	1999, 200, 2001
M.S.	Research Presentations	1998, 1999, 2000, 2001, 2002, 2003
M.S.	Theses	1998, 1999, 2000, 2001, 2002, 2003
M.S.	Student satisfaction survey	2002
M.S.	Alumni Survey	2002, 2003
Ph.D.	Research presentations	1998, 1999, 2000, 2001, 2002, 2003
Ph.D.	Dissertations	1998, 1999, 2000, 2001, 2002, 2003
Ph.D.	Alumni Survey	2002, 2003

D. Overview of results from Program Outcomes assessment

The 2001 outcomes assessment report included employer evaluations. 100% of the employers responding indicated that the attitude of our students and graduates exceeded their expectations. 80% of the employers indicated that the OSU Computer Science students and graduates exceeded their expectations in all 13 areas of performance evaluation. The other 20% said that the OSU students/graduates met their expectations in all areas.

The 2002 graduate student satisfaction survey shows that more than 60% of the graduate students are satisfied or somewhat satisfied with their graduate program while only four students indicated dissatisfaction with their experience in the graduate program.

The 2002 outcomes assessment indicated 96% of the department's graduates felt prepared for their current position while a single student did not. Likewise, 96% of the graduates were satisfied (very satisfied-30%, satisfied-57%, somewhat satisfied-9%) with their OSU experience.

In 2003, there were two surveys to assess the B.S. program: a graduating senior survey and a survey of recent B.S. graduates. The students indicated the strengths of the department are advising, availability of instructors, and the instructors' knowledge of computer science. Students indicated a desire for additional programming experiences, apparently believing that would improve the overall quality of instruction in the department.

All of the B.S. graduates working in the computing field reported the courses they took for their degree prepared them extremely well or fairly well for their current position. They indicated a desire to have had more instruction in dealing with office politics.

The 2003 graduate alumni satisfaction survey reported that all of the M.S. and Ph.D. graduates were either satisfied or very satisfied with their graduate programs. Only one, now in law school, indicated that her computer science degree did not prepare her adequately for additional graduate or professional school.

E. Feedback from program alumni/documentated achievements of program graduates.

Several alumni commented on the Computer Science programs after receiving solicitations requesting their input regarding ways the curriculum could be improved. The following is an edited list of their comments.

1. Funding for international students is unsatisfactory.
2. Provide money for student travel.
3. Have cost of living increases for TAs.
4. Provide computers and software for non-academic use.
5. Provide more research funding for graduate students.
6. There should be a limit on the time a student can occupy a TA position.
7. Recruit more new Ph.D.s for the faculty.
8. Hire more teachers.
9. Open more classes.
10. Have additional class sections for OSU Tulsa students.
11. Provide more research opportunities for graduate students.
12. Add options for the graduate degrees.
13. Have more live seminars.
14. Eliminate the thesis requirement.
15. Make admission decisions faster.
16. Provide LaTeX for thesis preparations (2 comments the same).
17. The department requires a 3.5 for an international student to be accepted into a graduate program, but only a 2.2 for American students.

Some of the above indicate inadequate information dissemination by the department. The department does have a limit on the time one person can occupy a TA position. Departmental seminars are live, but on talk-back TV so remote students and faculty can participate in them. The department provides TeX/LaTeX for student use.

Several other items can be achieved only through an increase in funding: more faculty, additional class sections, cost of living increases, additional TA/RA positions, etc.

The department will try to accelerate its recommendations for graduate admissions to the graduate school. It will not eliminate the thesis requirement for the M.S. since that is recognized as contributing to the strength of the degree.

The comment about the difference in admission requirements for international students and Americans is inaccurate.

F. Other program evaluations

None.

The B.S. Program

Most of our B.S. graduates accept positions in industry upon graduation. In the last two years, the job market has not been as good as the preceding years due to the recession in telecommunications, and the Internet. Many companies have been struggling and are not looking for more graduates; however, the starting salaries are good and this is an area where students with a bachelor's degree still can find jobs.

About 20% of our B.S. graduates continue in graduate school. Some of them enter OSU graduate programs while many others have gone to other universities.

The M.S. Program

The M.S. Program is the oldest degree program in the department, dating from 1969. The requirement of a thesis has traditionally strengthened the program. It is neither a one-year program, nor is it a consolation prize for Ph.D. candidates who drop out of the doctoral program. The graduates of the M.S. program have been highly successful in industrial jobs, and the program is widely recognized in industry as a strong program. OSU Computer Science graduates have little difficulty in obtaining excellent high-paying jobs in industry. OSU Computer Science graduates with graduate degrees have also been successful in Ph.D. programs, both at OSU and at such large and excellent institutions as Texas A&M University and the University of Illinois. As a result, the M.S. program can only be rated as being of very high quality and effectiveness.

The Ph.D. Program

The Ph.D. program is relatively new but the faculty has endeavored to make it one of high quality. All of the graduates of this program have found good jobs either in academia or in industry. Some graduates are international students who return to positions of teaching and/or research in their home countries, and are effective ambassadors for the state of Oklahoma and for OSU to their countries.

The published research produced by the faculty and Ph.D. students has appeared in many prestigious refereed journals and conference proceedings, and includes work of high quality. The faculty are working to attract more grants and contracts, although the understaffing problem in the Department hampers this effort.

CRITERION VI

Program Demand/Need

A. Student Demand for Program

Majors in the undergraduate program have averaged about 274 in the last five years ranging from a high of 308 B.S. majors to a low of 241 B.S. majors in 2003. The numbers have decreased slightly as a result of the technology recession. Many undergraduate computer science courses are taken by majors in Engineering, and Management Science and Computer Systems, and Management Information Systems as well as computer science students.

The Master's program has an average of 156 students each year for the last five years. The number in the Fall 2003 was 147 and reached 170 in the Fall 2002. Enrollment in the M.S. program also has decreased slightly due to the technology recession. There presently are 147 M.S. students in the department.

There are now about 14 Ph.D. students in the program. This is an increase of 3 Ph.D. students since the last program review.

B. Occupation Manpower Demand

A few of the companies who have hired our students in the past and still do now are looking for more employees. Others indicate a desire to hire more of our graduates after the economy improves.

According to the 2003 computer industry salary survey, the number of information technology jobs, including computer science jobs, tripled from the late 1980s to the year 2000. There are now over 2.5 million jobs in the information technology industry. Even though this is a large number of jobs, there was a historically high unemployment rate of 6% within the industry. The unemployment arose primarily from companies such as WorldCom and WilTel adjusting their commitment to information technology. There still is a strong demand for computer scientists in the areas of security and networking.

The Bureau of Labor statistics (BLS) expects a continuing expansion of computer technology according to softwarejobs.com. This should cause a resumption of the demand for computer scientists, computer engineers, and systems analysts. The BLS projects that jobs for computer support specialists and systems administrators to be in the most demand over the next ten years.

Annual salaries for computer scientists specialists ranged from \$29,760 to over \$120,000. The median starting salary for various jobs held by computer scientists are given in the table below.

Position	Median salary
Schools (K-12)	\$ 33,480
Help desk support staff	\$ 42,000
System administrator (school, K-12)	\$ 48,350
Sr. Technical staff	\$ 59,125
Systems administrator	\$ 59,625
Chief security officer	\$ 111,000
Computer Support specialist (telecommunications)	\$ 114,000

Overall, there seems to be a balance between supply and demand for entry level computer scientists with a bachelor's degree.

PH.D. Program

The need for new faculty in Ph.D. granting departments in the United States has slackened considerably in the last few years, as the stream gradually filled a demand that was at one time very strong. Nevertheless, our Ph.D. graduates still find good jobs at U.S. educational institutions. No graduate of this program has faced the long and arduous search for a position that has faced Ph.D.s in other academic areas in recent years.

Many of the students in the Ph.D. program are international students. Some of these choose to return home to their countries, where demand for computer science Ph.D.s in the local universities remains very strong.

C. Societal Needs for the Program

Computers are used in every aspect of our daily lives. Modern companies are utilizing technology. In spite of the recession in the telecommunications and the Internet sectors, a need for people with computing skills still exists. The Taulbee Survey that was published in 2002 indicates there is a good balance between supply and demand for computer scientists after several years of demand greatly exceeding supply. The department anticipates a continuing need for its graduates; however, the demand will not be great in geographical areas, such as Tulsa, that still are recovering from the recession. It will be necessary for many graduates from the department to take positions out of state.

CRITERION VII
Program Duplication

Program Duplication within Institution

Bachelor of Science Degree

For each of the institution's degree programs that have the same 2-digit HEGIS as the program under review, provide the following information:

Degree Program Name: Management Information Systems - BS

Instructional Program Code: 243

HEGIS Code: 0702 CIP Code:

Degree Program Objectives: The Management Information Systems Degree is offered through the OSU Business College. The core Business courses are required. The degree promotes the study of information systems development and maintenance focusing on both the applications of computer systems technology to business and the understanding of data and information flows.

This particular degree is much less technical in nature than the Computer Science degree. Less mathematics is required (no more than College Algebra). The MIS degree requires CS 2113-Computer Programming, and two one hour modules from Computer Science. MIS students also must take a course on using microcomputer software. Also two COBOL programming classes taught in the Business College have been required for MIS students. Students in this degree do not have a strong mathematical computing background.

There are no options in this degree program nor are there any in the CS degree program.

No business courses are required in the CS degree. There is no overlap between the two degrees.

Master of Science Degree

The possible source of duplication of this program is in the Department of Electrical Engineering and Computer Science (ECEN). The M.S. program in Computer Science emphasizes software-whereas, the ECEN programs emphasize hardware. The two departments cooperate in cross-listing courses, but there is virtually no duplication of any aspects of the respective degree programs.

Ph.D. Degree

The possible source of duplication of this program is in the Department of Electrical Engineering and Computer Science (ECEN). No other program in the university offers depth in computer science proper, and there is no duplication for that reason.

SUMMARY AND RECOMMENDATIONS

A. Strengths

This program review shows that the department is strong in several areas. It has a strong and capable faculty who provide three strong degree programs for students. B.S. graduates who seek it find employment at good salaries in industry. The M.S. program is recognized as one of the country's strongest masters' programs. All of the departments Ph.D. graduates find employment in academia or industry.

B. Areas for improvement

There are three main areas in which improvement is desired: the level of funding for maintenance and departmental operations, the number of tenure track faculty, and laboratory space at OSU-Tulsa.

C. Recommendations for action

Recommendation 1: Increase the departmental maintenance and operation budget to at least what it was in 1992 (\$120,000 per fiscal year).

Recommendation 2: Increase the number of tenure track faculty to meet ABET/CSAB criteria (no section size larger than 30 students).

Recommendation 3: Acquire adequate laboratory space for faculty and graduate students at OSU-Tulsa.

D. Five year goals for the program

The following are goals and objectives for all programs in Computer Science.

Goals

1. Offer programs that attract and motivate students and prepare them for careers related to computer science.
2. Offer a well-rounded education to undergraduates requiring general and liberal education along with technical skills needed to compete in the job market.
3. Provide programs for graduate students that will prepare them for industry or the educational setting upon graduation.
4. Utilize technology in programs that are used in industry.

Objectives

1. Prepare students for varied careers in the computing field.
2. Equip students with critical thinking skills and abilities to solve industry problems.
3. Provide guidance in areas of ethics and social responsibility as professionals in computing.
4. Provide opportunities to enhance communication skills—both oral and written.
5. Prepare graduate students to contribute to scientific knowledge in the computing area.
6. Prepare graduate students for industry or educational careers.

Goals specific to the Masters Program

1. To train students to be computer programmers, computer systems analysts, computer systems managers, and similar occupations in industry, government, and academia.
2. To prepare students for possible doctoral study mainly in this department, but sometimes at other institutions.

For goal #1, the student must be a competent programmer in several computer languages, but more importantly must have a good grasp of the principles of algorithm design and analysis, data structures, operating systems and computer architecture. This foundational analysis will allow the M.S. graduate to take a broader view of problems in the workplace than merely a low level programmer's view, and will enable the person to adapt much better to new trends in technology.

For goal #2, the student must acquire a good grounding in theoretical areas such as formal language theory, as well as programming and other skills.

Goals specific to the Ph.D. Program

The Ph.D. program prepares students to be instructors of computer science at the university level, and to perform original research in a university or in an industrial or government laboratory. The ability to perform research of publishable quality is essential both to advancing knowledge in the field of computer science and also in enabling the graduate to maintain a level of teaching that is at the forefront of current developments.

Outcome Assessments

1998-1999

We changed a beginning class for non-majors in our curriculum in Fall 1998. We changed it to Visual Basic as this was more popular and many employers asked for it.

Department was involved in articulation agreements with other schools in the State of Oklahoma.

The Computer Science Department developed a 2+2 plan with Tulsa Community College (TCC) so students would know exactly what they needed in order to obtain their degrees from OSU after attending TCC. This was a significant project in coordination with the two schools.

Computer Science was given permission to start their undergraduate program at Tulsa. Some considerations we used were to put some classes on TV either in Tulsa or Stillwater so we can utilize our faculty more effectively.

Put information on the departmental Web pages about the programs in Tulsa and Stillwater.

1999-2000

The Computer Science Department made one curriculum change for 2000-2001. It eliminated one of the lower division classes, CS 2653- Discrete Mathematics I, and added an upper division elective. This change will strengthen degree requirements and allow the department to better serve the needs of the Tulsa students.

The CS Tulsa adviser worked very carefully with the TCC advisers in order to help students get the proper courses from TCC so they could be prepared for OSU. We used our departmental Web site to help keep students and advisers informed. The 2+2 plan was listed there along with a list of CS classes and Math classes needed at TCC.

Many CS faculty had to start teaching courses on TV with compressed video. These were more difficult to teach and has taken coordination between Stillwater and Tulsa and the Educational Television department.

2000-2001

The Computer Science Department made one curriculum change for 2000-2001. It changed the number of hours from 127 to 120. The Oklahoma State Regents were suggesting that departments change to 120 hours when they can. The reason for this is that students could then complete a degree in four years –with 15 hours a semester. It was taking students about 5 years to complete a degree before.