Strategic Plan
Computer Science Department
College of Sciences

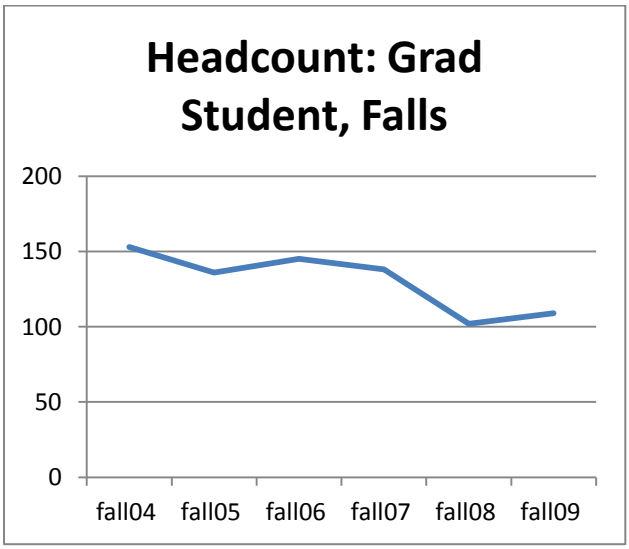
Goals

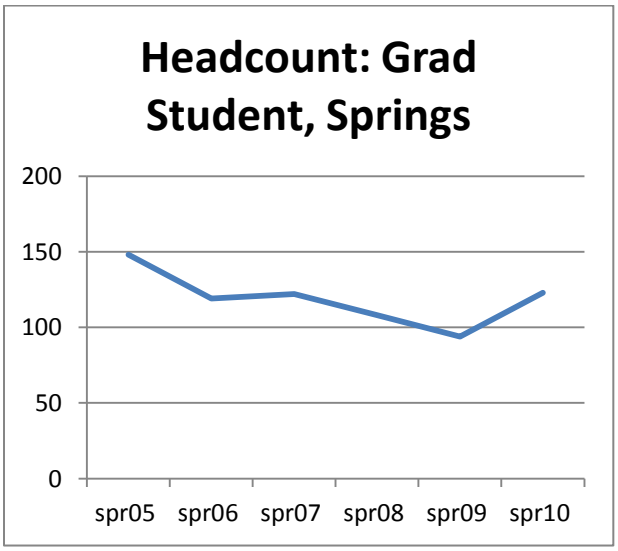
The overall goals of the Computer Science department are structured by its mission as graduate and undergraduate department to contribute to body of knowledge in computer science through research, to add members to the corps of computer science researchers, to train workers in the disciplines of computer science, to educate students in the university at large in the perspectives of computer science and to contribute as computer scientists to the world beyond the university. The goals in which we choose to focus are largely a product of recent history, which has not been kind to the department. In this section we first discuss the history of the department emphasizing the changes in the past 5 or 6 years and then formulate goals in the light of those trends.

History

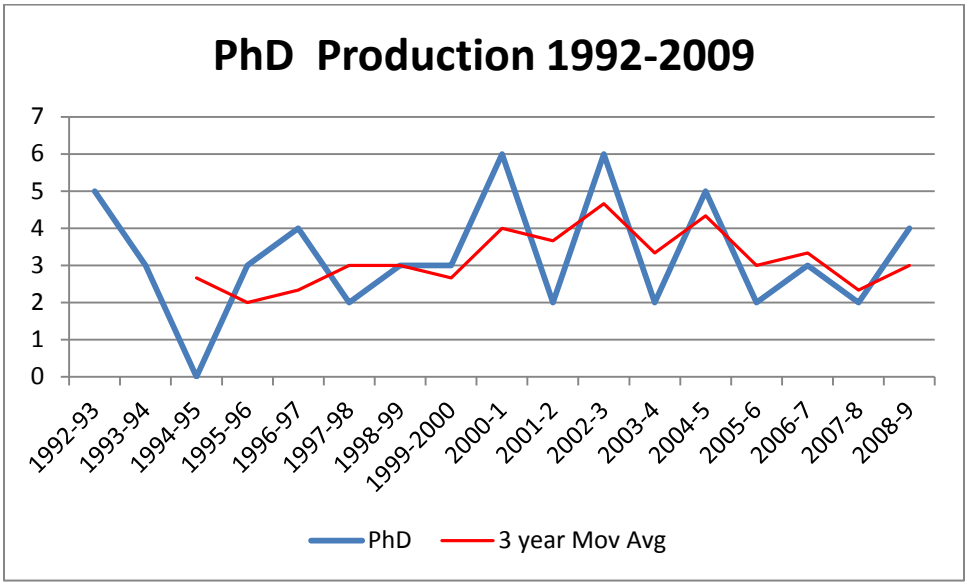
For well over the past 15 years the graduate program in Computer Science at ODU has been strong in both teaching and research. In recent years it has suffered something of a setback in that significant numbers of faculty were lost to attrition and retirement while only two new faculty were retained and the numbers of students in the graduate program declined. As this occurred, the department was without a permanent chair for two years. Quite recently this decline appears to have been stemmed as an outside chair and a new faculty member have been recruited and graduate student enrollments at both the MS and PhD levels have begun moving up.

Graduate Program. The CS graduate program requirements remained essentially unchanged for well over 15 years. During that time the primary clientele of the program has been international students, mainly Indian students enrolled in the MS program; the smaller PhD program is much more diverse. Over the past six years the number of students in the graduate program has declined. This decline can be attributed in part to several external factors: there are more opportunities for graduate education in India; the United States is less welcoming to international students post 9/11; there is more competition for international students both from United States institutions and from those in Europe and Canada. This decline can be seen in the following graphs which track the headcount of students taking any graduate course (except those commonly used solely to maintain student status for visa purposes), without regard to level (MS/PhD), over the past 6 years, by Fall and Spring semesters:

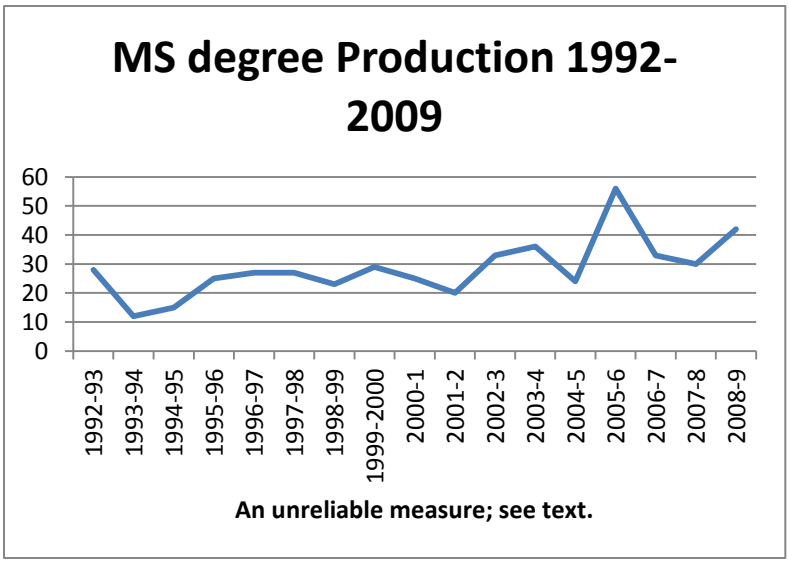




The downturn seems to be reversing this year. There has also been a bit of a decline in the department's production of PhDs in recent years but not of a disastrous nature. There have been 2 or 3 PhD graduates each year recently, whereas the range was 2 to 6 earlier in the decade. This Fall and Spring, however, an unprecedented number of new PhD students have joined the department so we feel that this trend has been reversed.



Master's Program. We include a graph of MS degree productivity, but hasten to note that this is a much less reliable measure of the MS program health than the headcount enrollment shown above. The reason is that many MS students failed to get their degrees in a timely manner. When they had only their projects to complete students would secure employment through the Curricular Practical Training program and several years later make arrangements to complete their degrees just before the Statute of Limitations had run out. Sometimes they did not complete their degrees at all, having acquired green cards or returned to their countries in the meantime. At several times, there was a rush to secure the degree because of changes in immigration law or policy. Consequently the numbers of graduates in the following graph have little to do with the numbers of courses taken in the immediately preceding years. In particular, a large number of the MS students who graduated in 2008-9 had not been in residence the previous year.

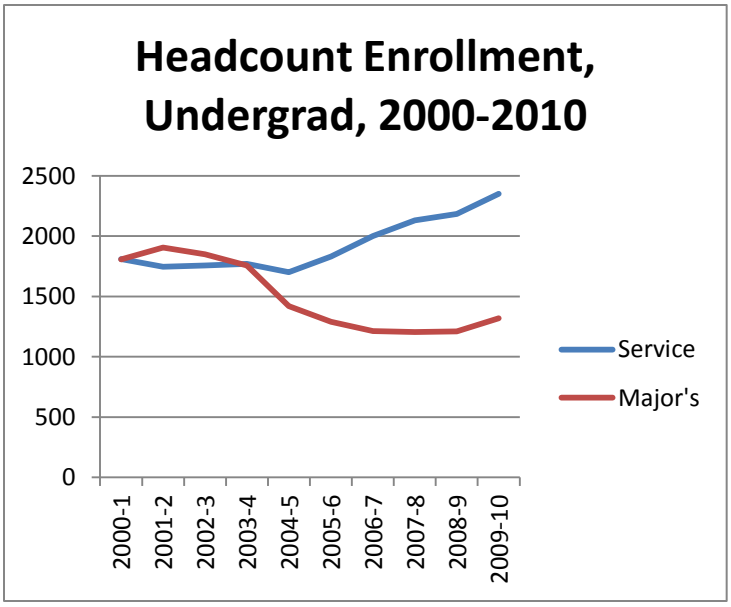


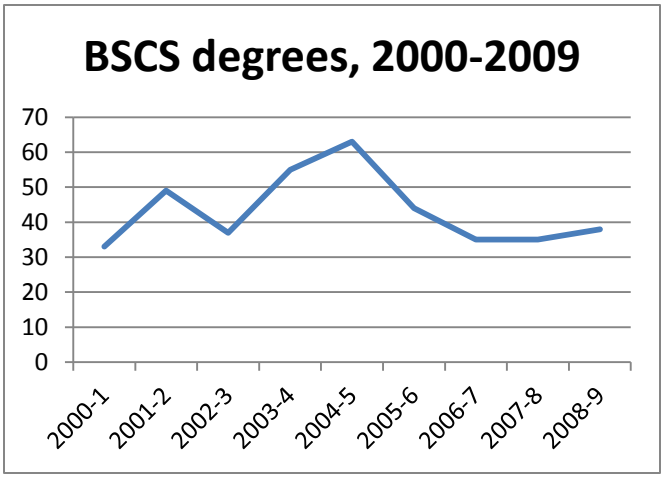
Graduate Course Offerings. The loss of graduate faculty in recent years has reduced both course offerings and opportunities for graduate support at the master's and PhD levels. The loss of variety in course offerings makes the program less attractive for recruiting purposes and makes it more difficult for students to find courses to take to complete their programs. Table 1. shows the decline in variety of courses offered over the last four years, a drop of almost 30%. This drop is largely accounted for by the loss of graduate faculty actively teaching courses. In Fall 2004 there were 14 such faculty. By Fall 2008, two had left the department and three had retired. Of the latter, two still taught one or two courses a year as adjuncts, mainly undergraduate courses. Additionally, one faculty member had been assigned administrative duties. On the other side of the balance sheet, only one new faculty member had been recruited and was actively teaching. The recruiting of new faculty members is essential to the teaching of a wider variety of courses. In addition this recruitment is essential to the growth in the funded research which provides support essential to the overwhelming majority of our graduate students, who otherwise cannot afford the costs of attending ODU as out of state students.

Academic Year Graduate	**2004-2005**	**2008-2009**
Fall		
500-Level Courses	9	6
Upper Level Courses	9	5
Grad Fac Teaching	14	9
Spring		
500-Level Courses	7	6
Upper Level Courses	10	7
Annual Total	35	24
Annual Distinct Courses	28	20
Annual Distinct Upper Level	16	10
A course is counted once in the 'Annual Distinct' rows even if it is offered both Fall and Spring. 700-level courses are also offered at the 800 level but these are not considered separate courses here.		

Table 1. Variety in Graduate course offerings.

Undergraduate Program. Although the overall numbers of undergraduate student credit hours show a continuing pattern of growth, the undergraduate program in computer science has shown certain signs of weakness over the past several years. The percentage of SCH due to service courses has increased while enrollment in major's courses has declined. At the beginning of the decade, half the annual undergraduate headcount enrollment was in service courses, half in major's courses. Now, nearly two-thirds of our enrollments are in service courses. The change is due to two factors. The first is the decline in the number of students completing CS degrees. This follows national trends and the same general pattern can be seen in the degree production of our allied program, the Bachelor's of Engineering in Computer Engineering. The second is the great success of the department in promoting its service courses in Computer Literacy, Problem Solving and Programming, Elements of Computer Science, and Computers in Society to the rest of the University. The undergraduate program has no doubt lost some vitality because the department has seen the departure of quite a few more faculty than have been hired, leading to the dependence of the





undergraduate program more and more on lecturers and instructors. Furthermore, the department was without a permanent chair for two years. Recently we have acquired an energetic chair and begun to hire new faculty. Nationally enrollments in computer science have begun to rise.

Service courses in detail. For well over 15 years the Computer Science Department has served the same constituencies of the university apart from those departments with which it shares programs. It provides instruction in Computer Literacy to those students whose departments do not provide it in their programs through CS 101D Computers: an Introduction, CS 126D Honors: Computers-An Introduction, and CS 149D Elements of Computer Science. It provides a first course in programming to the students of the College of Engineering with CS 150 Programming and Problem Solving I. And it provides an outside-the-major elective or a cluster course with CS 300 Computers In Society. Taken together, these courses provide the overwhelming bulk of student credit hours to the department. Table 2 shows the totals for Fall 2009:

CS 101D	1776	27%
CS 126D	51	1%
CS 149D	468	7%
CS 150	1232	19%
CS 300	252	4%
Service total	3779	58%
Other undergraduate	1986	31%
Graduate total	711	11%
Total SCH	6476	100%

Table 2. Contribution of Service Courses to total department SCH, Fall 2009.

The largest generator of SCH among the service courses, CS 101D, consumes relatively few resources. It is taught in a section size of about 150 students and 4-6 TAs are allocated altogether to the four sections of the course that are taught each semester. This is possible because over the years many software tools have been developed to automate the management of the 600 students who take the course each semester. CS 150, the next largest contributor, is much more expensive. The three lecture sections are only about 100 in size and 8 TAs are allocated to service the labs and recitations. CS 149D is also relatively expensive because it is taught in sections of size 40.

Recent Requirements Changes The University recently overhauled its general education requirements for undergraduate students and dealt a major blow to the department's smooth-running service course program. The Computer Literacy requirement was scrapped, replaced by a totally differently conceived requirement for Information Literacy.

Goals for the Strategic Plan. The problems that the previous survey reveals are these. The department has suffered a decline in research productivity as evidenced by the reduced numbers of PhDs graduating. It has become less attractive to graduate students overall as evidenced by the reduced headcount over the past several years. Although its undergraduate SCH has grown, the proportion due to service courses has grown from 50% to nearly two-thirds and the number of graduates has significantly declined. The service course segment will become more expensive to offer in the near future. These trends are due in part to external forces including national trends in undergraduate interests, a more competitive environment nationally and internationally for graduate students, US post-9/11 policies, and university changes in requirements. However a major factor in general has been the loss of faculty members in the department. Since the arrival of a new chair and one new faculty member, some of these trends seem to have been mitigated as the plans described below have begun to be put into place. The department's goals for the strategic plan are broadly distinguished by program level.

The department has established the following goals for the graduate program:

1. Increase the production of PhD graduates while maintaining quality.
2. Return the enrolment of the master's program to earlier levels.
3. Increase the quantity of funded research in the department.

The department has established the following goals for the undergraduate program:

4. Increase the number of majors by improving recruitment, retention and persistence of majors.
5. Improve the quality of graduating majors.
6. Maintain or increase levels of service to the university through service course offerings.

Before discussing these in detail, it must be pointed out that there is one *sine qua non* for accomplishing most of the above, and that is:

7. Hire several new faculty members, including a distinguished scientist for the Cheng Chair.

Brief Discussion. PhD students cannot be attracted without full support and full support cannot be had without increased research funding. The latter is dependent on the formation of strong research groups which, because of faculty attrition, require both formation and strengthening. The undergraduate program lacks vitality because it lacks variety and stimulation from new courses: the faculty is strained to offer the bare minimum needed to support the program.

II. Strategic Plan

The Computer Science Department Strategic Plan is a work in progress. Some parts have been put into play; some parts have been designed; and some are being developed. The following sections describe the plan.

Faculty Recruitment

The recruitment of new faculty is essential in the department's efforts to regrow the master's program, strengthen the PhD program, revitalize the undergraduate program, and increase funded research. The loss of graduate faculty in recent years has reduced course offerings as show in Table 1 above and reduced opportunities for graduate. The loss of variety in course offerings makes the program less attractive for recruiting purposes and makes it more difficult for students to find courses to take to complete their programs. The acquisition of new faculty is essential also to the department's goal of increasing the quantity of funded research. Successful CS research depends on the existence of strong research groups in the department, each supporting several graduate students and creating a track record of outstanding research.

In 2008-9 the department advertised three tenure track positions and the chair position, but was able to fill only the chair position and one tenured Associate Professor position. This year, 2009-10, we originally advertised for 5 tenure track positions as well as the Cheng Chair position. However the financial exigencies of the commonwealth have forced us to reduce our expectations and we will be fortunate if we are able to secure one tenure track faculty member and a scientist for the Cheng Chair. It will be necessary to continue faculty recruitment as circumstances permit.

Separation of the PhD and Master's Programs

Since the inception of the graduate program in CS, the students have been supervised by a single graduate program director. Now that the two programs will be treated entirely separately with more attention focused on the PhD program than before, each one will be supervised separately, by its own GPD.

Renovation of the PhD Program

Recruitment Efforts. Recently the department has made efforts to increase the numbers of students applying to the PhD program at ODU. These efforts included personal recruiting trips to Europe, the Middle East, and China as well as a formalization of our long-standing relationship with Hefei University in the People's Republic of China. This year we have gained an unprecedented number of new PhD students, including one from Hefei University of Technology, a gain that is attributable to this effort. In addition, several PhD students have transferred to ODU following our new Chair, Dr. Desh Ranjan, and new Associate Professor, Dr. Jing He. We expect that Hefei will be a source of two or more new students annually because of our newly formalized relationship (see below).

Changes in Requirements. Ever since its inception, the PhD program required students to achieve a high pass on the 8-hour written Diagnostic Examination within a year and a half of their admission to the program. This examination covered 6 courses from the CS MS program (Database, Networks, Software

Engineering, Algorithms, Computer Architecture, and Operating Systems) of which the student chose 4 to write plus a selection of technical papers on which a student chose one. The student's breadth of knowledge in computer science was again tested in an oral Candidacy examination when questions on both the thesis topic and any area of general computer science were permitted. The Diagnostic examination has been replaced this year with a 'Qualifying Process' consisting of Breadth and Research examinations and course requirements. The Breadth examination, to be passed within 12 months of admission, is a 2-hour oral examination on core computer science topics taken from the undergraduate curriculum, to wit, Problem Solving and Programming, Computer Architecture, Data Structures and Algorithms, and Theoretical Computer Science. The Research examination, to be passed within 18 months, is a 2-hour oral examination on one of several research area reading lists. Both the Breadth and Research examinations are individual exams, unlike the old Diagnostic, given at the candidate's request. The Candidacy examination will no longer include general computer science questions but will focus entirely on the student's research proposal. In order to facilitate our relationship with Hefei University of Technology, Hefei students will be able to take both the Breadth and Research examination by video conference while remaining in China before traveling to ODU for their coursework and dissertation.

Progress Monitoring. In the past, PhD students, once funded, were virtually guaranteed support of some sort. Now, students' progress is regularly monitored. Each semester, every PhD student reports on his/her progress through the Qualifying Process noted above, the acquisition of a research area and sponsoring professor, and academic performance. Continued funding is predicated on continued progress. Already, two students have left the program due to a lack of adequate progress and performance.

Formalization of Research Areas. In line with the establishment of the Research examination, we have begun the formalization of department research areas. This will better guide PhD students through the process of selecting an area, an advisor, and a thesis topic. The areas that have been established are *Networks* (including sensor networks and vehicular adhoc networks), *Parallel/High Performance Computing, Bioinformatics,* and *Digital Libraries.*

Renovation of the CS Master's Program

Changes in Requirements. Various aspects of the Master's Program have made it less competitive compared to those at other institutions, namely its extremely demanding written Diagnostic Examination and its requirement for a Thesis or Project. The department has addressed both issues recently, and, perhaps coincidentally, headcount enrollments have picked up in the past year. Historically, the capstone examination for the Master's program was the same 8 hour written Diagnostic Examination required for admission to the PhD program, a lower level of proficiency being accepted for completion of the Master's degree. Typically, students spent two to three months preparing for the examination and faced it with high levels of anxiety and dread. Interviews revealed it was one of the facets of the program that was most hated. It has been replaced with a much gentler combination of written and oral examination whose first instance will occur this spring. The Master's examination process has been completely separated from the PhD track except for those students desiring admission to the PhD program.

A second change has removed a great burden from many current and prospective MS students. The Master's program until recently had only two tracks, labeled Thesis and Project. Thesis required a mini-dissertation but three fewer credit hours. By far most students chose the Project track, which required a substantial programming project, report and oral presentation. However this track's requirements have proven quite troublesome to many students because it has become more and more difficult to find both a worthy project and a faculty member willing to sponsor it. Students employed or volunteering on research projects or working in significant positions for companies or government agencies might easily find projects, but students without support or those who had been supported as lab instructors or graders were unlikely to have a project fall into their laps. Even if they did have the ingenuity to conceive the germ of a worthwhile idea, it has become more and more difficult to persuade a faculty member to sponsor such a project. This reluctance is due to there being little reward for such sponsorship and to most faculty members already being sponsors of MS project developed in connection with research programs or already working with PhD students. One consequence has been that the department has many 'orphan' MS students who were 'all but project' and never completed their degrees. To remedy this imbalance, the department recently added a third MS option, one in which neither Thesis nor Project is required. Students are required to take the same number of credits as in the Project option but instead of 3 credits of MS Project, complete 3 credits of another 600 or 700 level course. This option is quite common among CS master's programs elsewhere and should increase our competitiveness.

Consideration of Distant Learning Master's Degree. We are currently beginning to consider whether to offer a Master's Degree in Computer Science on a Distant Learning basis. This option is now possible because of the new non-thesis/project track which requires less one-to-one. The advantage of this option is the creation of a new source of students in addition to our apparently declining base of foreign recruits. The disadvantages are the diversion of resources and faculty time to the creation of non-classroom courses (satellite television being discouraged by the distant learning division) and the unavailability of distant students for employment on research projects.

Revitalization of the Undergraduate Degree Program

Recruitment. The number of CS undergraduates entering as freshmen has remained stable over the past five years. This figure can be assessed by investigating the number of students enrolled in CS110: Introduction to the Computer Science Profession required of all new traditional first year students. (Enrollment numbers are 67, 68, 68, 69, 70 for Fall 2005-9). To meet the demands of industry, and to improve our program, the numbers should show a gradual increase. Nationally, recruitment of CS majors is not meeting the demands of industry, as shown in Figure 1.

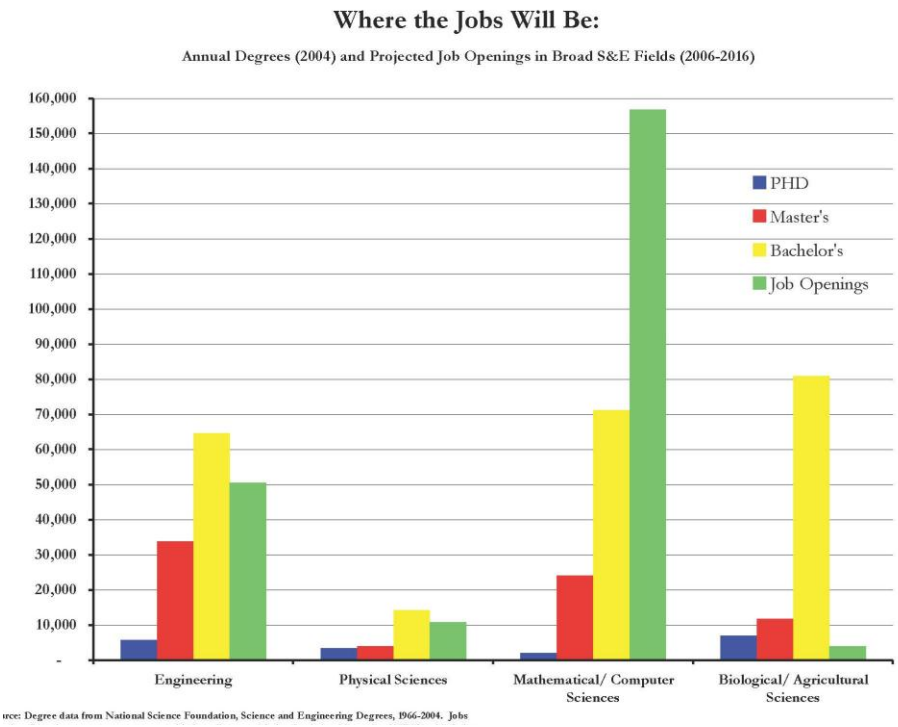
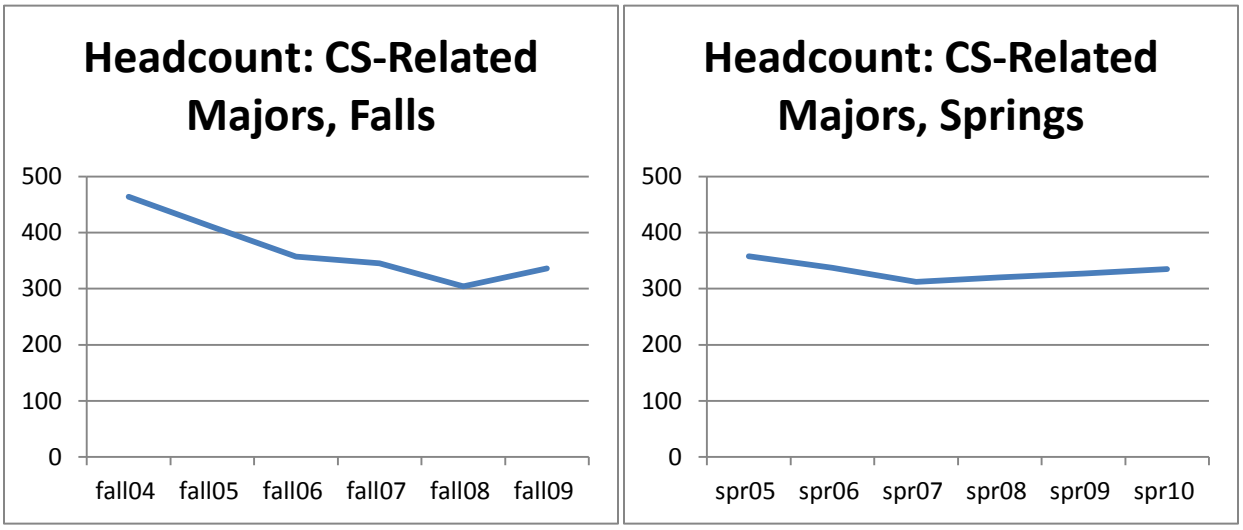


Figure 1

National Trends. The recent Taulbee Survey (http://www.cra.org/CRN/articles/may09/taulbee.html) reports that the number of CS degrees awarded continued to decline nationally. 2008-9 produced 20% fewer than 2007-8 which in turn was down 16% from the year before. On the bright side, there was a reported increase of new majors of approximately 6 or 7%, the first increase in six years.

ODU CS-related Major enrollment. It is often difficult to get an accurate count of CS majors so we have developed a proxy measure: a head count of students enrolled in at least one majors' undergraduate course. This proxy will also count students who are actually enrolled in Computer



Engineering and Computer Engineering Technology as well as those few who are actually pursuing a minor in Computer Science.

It is evident that last fall and the past several springs have seen an increase in the number of CS-related majors, in line with the data reported in the Taulbee survey.

Outreach to Local High Schools. Two faculty in the CS Department have recently been instrumental in the creation of a local (Hampton Roads) Chapter of the Computer Science Teachers Association, which unites high school and higher level CS educators. The goal of this national organization is to increase the exposure of CS in high schools, to influence students to major in CS in higher education. As the organization grows in numbers and strength, recruitment of CS majors will increase. Additional faculty will be invited to join CSTA.

The ODU student chapter of the ACM has developed a bi-annual programming competition for local college students. The contest format and technical support has proven to be sound and expandable to allow ODU ACM to host high school programming contests.

Recruiting Opportunities. Opportunities for additional outreach to local area high schools should be investigated, to include Landstown and Ocean Lakes academy programs, for summer internships programs required of all students. ODU faculty have mentored such students in the past and these mentorships have led to the recruitment of outstanding students.

Annually, the Dean's office provides the names and addresses of the students who have been admitted into ODU and have indicated CS as their intended major. The CDA mails a welcome letter, and curriculum brochure to all. ODU has recently begun to purchase student information obtained from SAT and PSAT examinations. The CS dept should investigate opportunities to directly market our program to these students prior to the application deadlines. The Dean's office supports an annual Science Fair for local middle school students; the CS ACM could investigate participation in the program, with demos of the department's newly purchased robots.

Improve retention and persistence of current majors. The entering freshman class numbers approximately 70 each fall, with fewer than five additional new freshmen entering in a typical spring semester. Each year we graduate about 35 students with bachelor's degrees in computer science. The totals over the past 4 years were 29, 36, 39, and 35. Surprisingly, the students that we graduate are mostly not those who start with us. Approximately 30% of the students who are taking CS major courses appear to be transfer students. These students are not only our majors but also students in shared programs such as Computer Engineering, Computer Engineering Technology, and Modeling and Simulation as well as those minoring in Computer Science. This figure is reflected in the students reaching our first capstone course, CS 410. Over the past 6 years, about 33% appear to have been transfer students. Of these, distant learning students have made a surprisingly large contribution. Fully 10% of those reaching CS 410 began their CS studies in a DL class. Furthermore, another 20% of those who reach CS 410 appear to be students who have changed majors to CS, probably from a shared program.

In its endeavors to improve retention, the department created a required freshman course, CS110, Introduction to Computer Science. This course gives us a means of identifying students planning to major or already majoring in CS in their freshman year and thus an ability to determine whether they persist in their original intention. Such students will take both CS110 and CS150, the first programming course. CS 150 is also required by the College of Engineering and CS 110 is sometimes taken by students needing a 1-credit course. By and large it appears that students do not persist in their intention to major in Computer Science. CS 110 was instituted in Fall 2004 so we have cohorts who have had time to reach various milestones in their CS career: CS 250, the second programming course; CS 361 or CS 330 their first theory-laden programming course; CS 350 which involves a major group project; and the CS 410 course mentioned above. Table 3 shows the numbers of intended majors identified in CS 110

Fall	**CS 110/150**	**CS 250**		**CS 361 or 330**		**CS 350**		**CS 410**	
2004	31	23	74%	16	52%	13	42%	11	35%
2005	54	33	61%	24	44%	17	31%	13	24%
2006	54	38	70%	32	59%	24	44%	17	31%
2007	57	31	54%	19	33%	15	26%		
2008	55	29	53%	21	38%				
2009	60	26	43%						

Table 3. Numbers of CS 110 students in the designated semester who were also enrolled in CS 150 and later in the milestone courses shown.

advancing to those milestones. It appears that there is a steady attrition as the difficulty of the material increases so that only 25 to 35% make it to the capstone course.

This is unfortunate because CS is not an easy field to switch into. The major requires at least 60 credit hours of mathematics and computer science courses and many students require additional hours of mathematics to make up their deficiencies. The only likely sources of majors by switching are Computer Engineering and Computer Engineering Technology because of the overlap of programming courses required in those programs. It is reasonable to infer that students who appear in CS 410 and who have taken CS 150 at ODU but have not taken CS 110 took CS 150 because they were in another program and then subsequently changed majors to CS. Based on this inference, about 20% of recent CS 410 participants changed majors to CS from another major at ODU.

It thus appears that the majority of our graduates are not those who evince an interest in Computer Science in their freshman year, but those who transfer to ODU, who come to us from other disciplines, and who get their degrees via distance learning. Perversely, a substantial majority of those who start with us appear to find the program too difficult or unappealing and fail to finish.

Current Retention Efforts. The department's current efforts to increase retention are focused on both the academic and social aspects of the students' experience. The department created a required freshman course, CS110, which provides a realistic summary of the CS profession and major and therefore motivate the students with respect to their careers. This course is taught by the Chief Departmental Advisor so the students have an opportunity to form bonds with the department.

In a multi-year experiment with the Psychology Department, the introductory programming courses, CS 150 and 250 doubled supervised laboratory time and introduced 'pair programming', a proven success strategy for college students, in which pairs of students, rather than individuals, complete programming assignments. This strategy provides the opportunity for peer learning and teaching as well as opportunities for forming social bonds.

Tutoring support is provided by the University through a paid student position, 15 hours per week, for CS150. The ACM is providing student volunteers to support tutoring for courses taken primarily by CS majors at the 200 and 300 levels. Honors college students have been granted approval to count volunteered tutoring hours as the service component for the Honors College requirement. The volunteered tutoring recently began – and no assessment has been performed to determine success.

All of these efforts attempt to increase the percentage of initially interested students who remain in CS.

Future Retention Efforts. Prior to outlining possible future efforts it is necessary to remark that the department has limited resources both in terms of faculty time and budgetary capacity.

Recitations were recently added to the introductory programming courses to provide additional tutoring support via the teaching assistants. The Department should investigate opportunities to allow the recitations to remediate, confirm, or provide advanced exercises related to the programming practices introduced in the lecture component of the courses. That is, different recitation sections can be used for different purposes. (Any student can go to any recitation section.) Some recitations could be major-specific. This approach could be extended to the labs in CS 150 as well.

Participation in the living learning communities introduced by student housing, possibly combined with the learning community idea already in use is another possibility. The department participated in the learning community initiative of the university several years ago but found the students unresponsive to the program and ultimately dropped out. Perhaps it can be revived with a different focus.

Revitalize the undergraduate program by involving the senior faculty. This issue is discussed more fully elsewhere in this report under the heading of quality. However it should be noted that undergraduates rarely interact with other than a few senior faculty members, especially since the Department has come to be housed in two widely separated buildings, one of which houses the primary classroom, labs, and the offices of the lecturers and instructors and the other of which houses the research labs and the offices of the senior faculty. A small step in this direction would be the involvement of the senior faculty with the activities of the student ACM chapter.

The Math placement exam is no longer required for all students. Instead, students are placed into a math course based upon SAT and/or ACT scores. An investigation of this process should be performed to determine the impact on course enrollment and student success. The degree plan should be re-evaluated and redesigned to support adequate math success and progress toward timely graduation. This will likely require that students delay taking CS150 until the second semester of their first year, pushing back all other CS courses due to prerequisites.

Most retention efforts have focused on campus freshmen. Distant learning students have a high non-completion rate. Only about 10-12% of the students who enroll in CS 333, the entry point for the CS distant learning program, ultimately enroll in CS 410. Elsewhere in this report, under the heading of Quality, we discuss the need to renovate the distant learning curriculum. We have no statistics on transfer students' success rates so we have no idea whether they need attention or not.

Improvement in the Quality of Graduating Majors. There are a variety of ways to evaluate the quality of our majors. One may consider the students' performance on standardized examinations or employer satisfaction with their performance. Another standpoint is to evaluate the quality of the curriculum with which we provide them.

Performance on CS exit exam. Every semester seniors enrolled in CS 411W: Professional Workforce Development II, the second course in the capstone sequence, take the ETS Major Field Test in Computer Science. This test is similar to the GRE achievement test in Computer Science but is designed to assess departmental performance. Our goal is to remain above average among the 193 participating institutions. In the past two semesters, Fall and Spring 2009, 21 students each time took the exam with scores averaging 148.57 and 151.86. According to the summary, the departmental mean on the assessment is 148.6 and the median is 150 with a standard deviation of 9.7. Our performance over the past 5 years has been consistently at the 50% mark. Some of our outstanding students have scored in the 90th percentile or above. We are unlikely to improve our average performance on this test unless we discourage our worst performing students from continuing or recruit more students of higher caliber.

Employer Evaluation. The department has not surveyed the employers of its graduates to determine their satisfaction with its 'product' and their recommendations for ways to improve the curriculum. This would be a good step to take. As a proxy for current satisfaction we obtained the results of surveys of supervisors of the 20 students who held internships or coop positions during the 2009-2010 academic year. This group cannot be said to represent the average graduate inasmuch as only half of our graduates participate in these opportunities and it is possible that one or more students was represented in both fall and spring cohorts. Furthermore we do not know the circumstances of the surveys, so it is possible that some supervisors were 'being nice' to the students because they thought that the surveys would have an effect on the students' grades.

With those caveats in mind, the surveys indicate that the supervisors had an overwhelmingly positive experience with Computer Science intern and coop students. They rated 80% or more of them as in the top 10% or above average in Quantitative Skills, Critical Reasoning/Problem Solving, Other (than computer) Technical Skills, Ability to Learn, Responsibility, Attitude, Met Expectations, Quality of Work, Overall Performance and Attendance. Nearly as many (between 70 and 79%) were rated in the top 10% or above average in Collaboration/Working with Others, Computer Skills, Knowledge of Relevant Subject Matter, Initiative/Drive, and Value of Work to the Site.

Where are our students lacking? Writing Skills (33% average or below), Speaking/Presentations (40%), Interpersonal Communication (35%) and Leadership (65%). Only in Speaking/Presentations were any students rated Below Average. Our capstone course sequence, CS 410-411W Professional Workforce

Development I and II, addresses these very issues. Inasmuch as this is a sequence typically taken just before graduation, it is likely that the interns/coop students had not had the benefit of these courses. Surveying our graduates' employers will provide us with a better picture of the effectiveness of our curriculum.

Improving the Quality of the Curriculum. The quality of our graduating majors might be improved by attracting better students and keeping them once they arrive. These issues have been discussed under the goals of recruitment and retention. The third leg of this stool is the improvement of the undergraduate curriculum. An improved curriculum may have several effects: it should improve the quality of those students who graduate; over time its reputation may attract better students; but if it is a more difficult curriculum it may have a negative effect on retention. Improving the curriculum requires considering the curriculum itself, who teaches it, and the circumstances under which it is taught.

Revision of Curricular Content. We plan to maintain the ABET curriculum standards, or higher. It has been several years since the curriculum was examined in the light of ABET requirements. In the late 1980s the department was accredited for 6 years by the CSAB. The department elected not to seek reaccreditation because we perceived no benefit that had accrued, because reaccreditation would interfere with our innovative curricular plans and limit student opportunities to take interesting electives, and because we noted that many outstanding CS departments were not accredited. In as much as our curriculum has changed little in the past decade or more, these arguments no longer carry much weight. Even if we do not seek accreditation, we should examine our curriculum in the light of current standards to see where we are lacking. Indeed, one reason for our students failure to perform beyond the 50th percentile on the nationally standardized CS exit exam may well be that we do not teach all of the content that is tested.

Modification of undergraduate role in the department. Students may be better students if they feel they are part of a community rather than simply consumers of education or purchasers of a degree. Some of these issues are discussed under the heading of retention elsewhere in this document where it is noted that the separation of the department into two buildings has separated the undergraduate program from the notice of the graduate faculty. Some efforts to bridge that gap may include

a. More participation of graduate faculty in the undergraduate program (see below).
b. Increased involvement of undergraduates in research programs. Currently 3 to 5 undergrads participate in funded research programs.
c. Increased opportunities for independent studies. Simply standardizing a procedure for developing an independent study would encourage undergraduates to develop their interests.
d. Increased participation of Graduate faculty in student ACM activities.
e. More promotion of the accelerated BS MS in CS. This program, which allows undergraduates to take graduate courses toward a master's degree in CS, has gained popularity among undergraduates because of the elimination of the GRE requirement and the rapid time scale.

Involvement of tenured and tenure-track faculty in the undergraduate core. Teaching in the required "core" of the CS undergraduate program has been relegated increasingly to instructors and lecturers. In the 2009-2010 academic year, for example, the Department offered 40 sections of these

core courses, of which only 7 were taught by tenured or tenure-track faculty. Four of those seven were taught by one tenured faculty member (2 of them being single-credit courses), so only 4 tenure-track faculty were directly involved in the core of the undergraduate program. Participation by the tenure-track faculty is somewhat higher for senior-level electives, although relatively few of these are offered due to the large number of unfilled positions.

This state of affairs has several disadvantages. Undergraduate students are cognizant of their lack of contact with a substantial portion of the Department. A typical undergraduate student may see the same instructor for a substantial fraction of his or her courses, an unfortunate loss of variation in perspective and style. The courses are deprived of the special vitality that arises when active researchers fold their expertise and state-of-the-art research into their teaching. The most successful researchers among the faculty are quite likely to "buy out" of their undergraduate teaching assignments by applying release-time funds from their grants. Scheduling is made difficult – with so few people responsible for such a wide range of courses, many courses have become bound to a single teacher. There is limited flexibility for the Department to respond to changes in enrollment, student requests, or the desire of those who do teach the core to pursue more varied assignment.

The Department needs to seek mechanisms by which the tenure-track faculty can be encouraged to take a more active role in teaching the undergraduate core. Such mechanisms must be compatible with the Department's emphasis on maintaining a vibrant research program. One possibility might be to explore alternatives to the current practice of using release funds to buy entirely out of a teaching obligation. For example, a mechanism might be sought whereby a faculty member could retain lecture responsibilities, in part or in full, while using release-time funds to purchase additional aid in grading and preparation. This might have the additional benefit of providing a support mechanism for Ph.D. students in new and under-funded research areas.

Renovation of the Distant Learning curriculum. As noted in the section on Retention, Distant Learning students form an important portion of our graduates. If the undergraduate curriculum revised, there will necessarily be an impact on the DL students as well. On-campus students will also be affected, since most of them enroll in at least one section of a course that is concurrently offered to DL students, either on television or via the web. The CS department offers its entire upper-division BS degree program via distance learning. To achieve this with a limited set of timeslots available from ATS, many courses are offered in a web-delivery format. Most of these web courses were created nearly 10 years ago and many are showing their age. A further complicating factor is that at the time when these courses were developed, the available technological base provided by ODU was considerably less sophisticated than it is now, so many of these courses included tools and technology originated in-house by Department faculty, some of whom have now retired, making it difficult for other faculty to take over the maintenance and offering of these courses.

These courses need to be updated, not just once, but on a continuing and predictable basis. Some mechanism must be found to support a continuing process of review and revision of the web offerings. This must start with an assessment of the technological base provided by OCCS, an identification of where this base is sufficient and where it is insufficient to the needs of our courses, and the porting of

course materials, where the base is sufficient, to that common base so that faculty can easily pick up one another's web-based materials and update them to reflect changes in the field.

Provide service to the University through course offerings. The university recently overhauled its general education requirements for undergraduate students and dealt a major blow to the department's smooth-running service course program that provides two-thirds of the department's undergraduate headcount enrollment. The Computer Literacy requirement was scrapped, replaced by a totally differently conceived requirement for Information Literacy. The department has responded by designing a new set of courses to meet this requirement: CS 120G Introduction to Information Literacy, CS 121G Introduction to Information Literacy for Scientists, and CS 126G Honors: Introduction to Information Literacy. There are several important consequences that the department must deal with:

a. CS 101D and CS 149D will be phased out as CS 120G and 121G are phased in.
b. CS 120G and CS 121G will be rather more expensive to offer:
    a. Students require more attention so the sections cannot be so large
    b. The material resists automation so more TAs are required
    c. CS 120G and 121G are not finished products and so bear the costs of continued development and refinement.
    d. These courses will continue our tradition of high levels of guided support in laboratory-based recitations.
    e. Because the concepts involved are of a higher order than that taught in CS 101D, the TAs supervising the recitations will require substantially more training than in the past.
c. Although the requirement for Computer Literacy has been abolished, the need for proficiency in office software is highly likely to continue so the department will need to offer a replacement for CS 101D, possibly in the form of 1-credit courses.

Consequently the department has sought, and received, funding for course development for Summer 2010 and will seek additional funding to support the increased number of TAs needed for these courses as more sections are offered. It may be necessary to seek an addition instructor or lecturer position if the demand rises to a high enough level.

III. Conclusion

This document has outlined the historical context within which the Strategic Plan for the Computer Science Department was conceived. The Graduate PhD program has been radically refocused to increase the progress of PhD students toward their degrees and to increase funded research. The MS program has been redesigned to attract more students and bring enrollment to its former levels. Plans are under weigh to revise and revitalize the undergraduate degree program. All of these efforts require the hiring of additional faculty members. Finally, the department is meeting the challenge of changing its service offerings to support the new Information Literacy requirement.