

Strategic Plan

*Department of Computer Science
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Introduction Computer Science includes the study of all aspects of the design, implementation, and application of computer systems. It concerns general problem solving, emphasizing both the design of efficient solutions and the expansion of the capability of computers to solve even larger and more complex problems. This requires detailed understanding of the nature of algorithms, the software implementation techniques necessary to utilize these algorithms on computers, and a knowledge of how to develop modular software that can be combined to form highly complex software systems.

Computer Science is a rapidly evolving discipline. Therefore, a university education must give students the basic underlying fundamentals to enable them to keep up with the fast pace of both anticipated and unanticipated future developments in the field.

Mission The mission of the Computer Science Department encompasses education, scholarship, and service. We strive to:

- offer high-quality baccalaureate, masters and doctoral level computer science programs;
- provide computer and information technology coursework to the broader UNH community;
- perform scholarly research to advance the state-of-knowledge, the state-of-the-art, and the state-of-practice in computer science and related fields; and
- provide expertise to serve the UNH community, region, state and nation.

Core Values We believe expectations should be set high and clearly articulated for both students and faculty. We believe in a high level of engagement in learning and scholarship for both students and faculty. Students should be active learners; practicing skills is critical. Faculty should be active scholars and should make their scholarship accessible to students through their teaching and by incorporating students in their research. We believe continuous improvement is necessary for the department to be effective in a discipline that is continuously changing. Students, alumni and local industry need to be part of the improvement processes.

Overview The focus of this strategic plan is primarily on raising the department's enrollments in both its undergraduate and graduate programs. While there is clear evidence that the enrollments are rebounding from the recent "dot com" bust, which was a national phenomenon, we clearly have considerable untapped capacity and we are planning for how to more fully utilize that capacity.

On the undergraduate side we will primarily continue initiatives that have already been started concerning alternative degrees, outreach to prospective students, and improving retention. On the graduate side we envision several new initiatives, including a clearly articulated teaching-load policy to encourage more proposal writing and more funded graduate students, more aggressive marketing of a M.S. degree in the fifth year to our high-achieving undergraduates, identification of and cooperation with "feeder" schools for our graduate programs, and marketing our graduate programs to working professionals through a cooperation with UNH-Manchester.

Action Items

1. **Monitor, evaluate and improve the first-year experience for Computer Science majors.**

This is a continuation of the effort begun in AY 2007–2008 with the re-design of CS415/CS416 and the creation of the Programming Assistance Center (PAC). In AY 2008–2009 we will move

the PAC to a bigger room, which we believe will improve its effectiveness. In addition, first-year advising will be done by the CS415/CS416 instructor (Dan Bergeron) and the department chair (Phil Hatcher). The thought is that the CS415/CS416 instructor sees the students on a daily basis anyway, and the prestige of the chair position should send a clear message that the department is very interested in the success of the first-year students. We hope to include both career advising and curriculum advising, as well as opportunities for community service. A key goal is to better connect the students to the long-term benefits of being a computer science professional. The premise is that many of today's students, in order to commit to the field, need to better understand how computer science can be used to solve problems for people.

2. Continue and refine our high-school outreach programs.

We will work to sustain the efforts begun in the past several years. We hope to make the Explore High Technology Day and the Summer Tech Camp annual events that are very visible in the state. A key problem to be solved is how to make these efforts financially sustainable. A meeting took place in May 2008 between CEPS and the UNH Foundation to discuss this problem. At the very least Computer Science would like to see the funding of these outreach activities be included in the next capital campaign.

3. Review the B.S. in Computer Science program.

This review was begun in AY 2007–2008, in order to complete a self-study document for our next full ABET review scheduled for Fall 2008. We will continue to work on improving our assessment processes. We also will have to make decisions concerning our curriculum given that we anticipate a number of retirements in the coming five years. For example, we already have had one retirement announced for May 2009, one of our theory faculty, and this is a good time for us to re-think how we offer the theory component of the curriculum to see if there might be other ways to deliver it in order to better utilize the available faculty.

4. Develop the marketing and the implementation of the new B.S. in Information Technology.

A proposal for this new degree was approved by the CEPS faculty in May 2008. We anticipate USNH trustee approval will occur in Fall 2008. We plan to admit new students to the program for Fall 2009.

We will meet with Admissions in Summer 2008 to develop a plan to get the word out about the new program to prospective students. We also will meet with the Advising Center staff to educate them about the program.

We need to design and get CEPS approval for all new courses in the program. We also need to develop both a short-term and long-term staffing plan. And we need to make decisions about when we will start accepting internal transfers. These decisions will be determined by how fast we will be able to implement and offer the upper-level requirements of the program. We plan to do all these steps during AY 2008–2009.

5. Continue and expand the program of offering partial tuition scholarships as a means to attract self-funded graduate students.

We did a study of the effectiveness of the partial tuition scholarships (PTS) that we initiated four years ago. In the first three years we recruited twelve PTS students, of whom eleven were international students. Five students did well enough that we rotated them to teaching assistantships or research assistantships. Two students rotated to full tuition scholarships. Three students obtained academic-year industry internships in their second year (one with Intel; two with EMC).

Therefore, we concluded that we should continue this program. We plan to work more closely with the UNH Interoperability Laboratory to have these students apply for positions at the

lab before they arrive on campus. We also plan to work harder to assist students in finding internships in industry. American students can begin internships right away, but international students must wait until after completing two semesters of coursework. We will arrange to have UNH Career Services meet with these students during their first semester to learn how to find internships.

6. Implement a new teaching-load policy to encourage more grant-writing and other activity to enable the funding of more graduate students.

At the March 26, 2008 faculty meeting the following motion was passed:

Tenure-track faculty will be assigned a teaching load according to the following criteria:

- three courses per year:
 - regularly publish their research in refereed journals and conferences;
 - regularly advise graduate students;
 - actively involved in obtaining support for their graduate advisees, either through writing proposals or collaborating with other groups on or off campus that fund the students.
- four courses per year:
 - regularly publish their research in refereed journals and conferences
- five courses per year:
 - research is not being published

The chair is responsible for teaching assignments, but these assignments will be informed by the regular department review of faculty. A shift in teaching load, if called for, will normally be done at the completion of a faculty review.

The purpose of this motion is to allow the re-allocation of faculty time to address a high-priority need of the department to obtain more external funding for graduate students. The motion also recognizes the need to allow different work profiles for individual faculty to better match their strengths and interests.

7. Encourage more undergraduates to complete the M.S. degree in a fifth year.

After studying the matter, the department concluded that it already had a B.S./M.S. 4/5 program in place. This program will be promoted to our high-performing undergraduates who can qualify for early admission to the UNH Graduate School.

Early admission allows students to double-count two courses towards both degrees. Our M.S. thesis option would then require six additional courses plus a six-credit thesis. Our M.S. project option would require eight additional courses plus a three-credit project. We believe high-performing students can complete either of these options in two additional semesters plus either one or two summers.

We plan to foster this by connecting it to our Honors-in-Major program. For this program we require the students to do a B.S. honors thesis in their senior year. This experience can solidify a relationship between a student and a faculty advisor. The B.S. thesis can then be the foundation for a later M.S. thesis or project. We have found that identifying a faculty advisor is a pivotal problem for conventional M.S. students and usually consumes a full year. We hope with the 4/5 program that this problem will be solved during the junior year, allowing the B.S. thesis to be completed in the senior year, and a M.S. thesis or project to be completed in the fifth year.

We also believe that fostering a close relationship with a faculty member is a key factor for enticing a student to stick around for another year. It may also be a key factor in getting the parents to pay the tuition for the fifth year.

We believe in our Honors-in-Major program. The last four students who have completed it have all gone on to graduate school. Joel Daniels (2003) is a Ph.D. student at the University of Utah. David Noblet (2004) is a Ph.D. student at the California Institute of Technology. Lina Faller (2008) will be a Ph.D. student at Boston University in Fall 2008. Brad Larsen (2008) will be a M.S. student at UNH in Fall 2008 with a Space-Grant fellowship.

However, we need to re-assess our requirements for Honors-in-Major. They are currently too restrictive and are not appropriate for students in our bioinformatics option. We will also need to develop Honors-in-Major requirements for students in our new Information Technology program. This planning will be done in the context of the ongoing college-wide discussion of the Honors program. We are very interested in the possibility of bringing together CEPS honor students from all CEPS programs.

8. Identify potential “feeder” schools for our graduate programs.

We plan to investigate extending the approach that is currently being taken by CEPS with students from the India Institutes of Technology. In particular, we are talking with alumni and members of our industry advisory board who have close ties to other high-quality Indian schools. The goal is to build a “pipeline” to encourage students at these schools to apply to our graduate programs. We also plan to investigate recruiting students from India who have completed a three-year undergraduate degree. Accepting these students has recently been approved by the UNH Graduate School.

In addition we will continue to seek partnerships with American institutions. We think this will work with undergraduate-only or B.S./M.S. institutions. In particular, we will look for opportunities to write proposals with faculty at these institutions in order to fund joint projects with students spending time at both institutions, with the ultimate goal of eventually getting students enrolled in our Ph.D. program.

The goal is to increase both the quality and quantity of our graduate students. If we are going to be successful in funding more of our graduate students we need both the funding and students capable of doing the work being funded. We hope that over time the identification of “feeder” schools will provide a bigger pool of graduate students for staffing funded projects.

9. Cooperate with UNH-Manchester in the offering of the M.S. in Computer Science in Manchester.

We had extended discussions with UNH-Manchester about our proposed B.S. in Information Technology since they had a similar degree already in place in Manchester. These discussions were very productive because ultimately we realized that we would all benefit if we better coordinated our degree programs.

Since there is a strong push from both industry and government for there to be more technology offerings from UNH in Manchester, UNH-Manchester is preparing a proposal for a M.S. in Information Technology. We plan to assist them in this effort and coordinate it with our offering of the M.S. in Computer Science in Manchester.

We used to offer M.S. coursework in Nashua and later in Manchester in the 1980s and 1990s. This program died out, but we believe it is time to re-establish it. The number of students majoring in Computer Science declined sharply through the early years of the current decade, both here in New Hampshire and nationally, resulting in a shortage of computer science graduates. Consequently we anticipate many people being hired into software positions from other disciplines and without having adequate training. These people very likely will be looking to take courses to give them additional knowledge and credentials in the field. This replicates the situation in industry in the 1980s when our Nashua offerings were most successful.

A central reason to coordinate with UNH-Manchester is because they have been very successful in marketing the M.S.W. and M.B.A. programs that are offered by Durham faculty in Manch-

ester. We believe that they can be successful for us too. This is particularly important because we believe the Durham campus has limited ability to market our program due to the demise of continuing education in Durham. A second reason to coordinate with UNH-Manchester is that the two degrees are closely related and we may in fact be able to share courses and faculty.

We also plan to try to finish the design for a graduate certificate in software engineering. This effort was begun at the urging of our industry advisory board, but was tabled because of uncertainty around how to finance and market it. We believe these certificate courses may fit well into both an M.S. in Computer Science and into an M.S. in Information Technology.

We plan to work with UNH-Manchester during AY 2008–2009 to obtain the necessary approvals for their M.S. in Information Technology. Our joint goal is to begin offering courses for both M.S. programs in Manchester in Fall 2009.

Longer-Range View While this plan is focused primarily on steps we will take in the next one to two years, we do have a vision of where we are heading over the next five to seven years. Since this plan is primarily focused on enrollments, the vision articulated here focuses on enrollments.

By the end of this time period we expect the enrollments of the new B.S. in Information Technology to reach a steady state. At steady state we project there will be 140 students enrolled in Information Technology and 100 students enrolled in Computer Science. Since we currently have 120 students enrolled in a single major, Computer Science, this will represent a doubling of the size of our undergraduate population.

We expect graduate enrollments to also grow substantially over this time period. This growth will be based primarily on growth in the number of research assistantships and the number of self-funded students. (We also expect to see some growth in the number of teaching assistantship as our undergraduate enrollments grow.)

Our goal for research assistantships is to return to our previous high (in Fall 2000 and Fall 2001) of 24 research assistantships from the 11 that were funded in Fall 2007. This will require substantial growth in students funded directly by faculty through grants for which they are principal investigator, as well as students funded indirectly through entities such as the InterOperability Laboratory, the Institute for Earth, Oceans and Space, the Center for Coastal and Ocean Mapping, and the Hubbard Center for Genome Studies.

Our goal is to see the number of new full-time students supported on partial tuition scholarships double from the current level of 3–4 to 6–8 per year. We expect to have 1–2 students paying their own way in the fifth year of the B.S./M.S. 4/5 program. (This is less than the total number of our own undergraduates who will continue on to our graduate programs, since some of these students will move directly into teaching assistantships or research assistantships.) Finally, our goal is to be offering two courses per semester in Manchester with 15–20 students in each class.