IOWA STATE UNIVERSITY
Department of Computer Science

Strategic Plan 2011-2015

Faculty Approved August 19, 2011
Vision

The Department of Computer Science advances computational and information sciences through: 1. educational and research programs within and beyond the university; 2. active engagement to help define national and international research, and 3. educational agendas, and sustained commitment to graduating leaders for academia, industry and government.

MISSION

Computer Science - the theory, representation, processing, communication and use of information - is fundamentally transforming every aspect of human endeavor. This makes excellence in Computer Science central to the mission of a modern university, especially one with an emphasis on science and technology such as Iowa State. The mission of the Department of Computer Science encompasses:

Undergraduate Education (U)

Our undergraduate programs are designed to train computer scientists, information technologists, and software engineers for productive, life-long careers. Such education equips students with a sound knowledge of the foundations of computer science, and problem solving and system design skills necessary for designing and building robust, efficient, reliable, scalable, and flexible software systems. The department offers strong undergraduate programs leading to a B.S. in Computer Science, and a B.S. in Software Engineering. It also participates in the Bioinformatics and Computational Biology undergraduate program.

Goal

U: Produce highly skilled graduates in computer science and software engineering who will become the most sought-after recruits for employment with high-tech companies or for advanced study at this and other academic institutions.

Objectives

U_O_1: All graduates seeking employment will have at least one job offer to join the workforce immediately after graduation.
U_O_2: Graduates interested in advanced study will be admitted into a graduate school, either at ISU or elsewhere.
U_O_3: The department will focus on achieving higher student retention rates.

Measures

U_M_1: Percentage of graduates who have received a job offer prior to graduation.
U_M_2: Percentage of graduates who have been admitted to graduate schools prior to graduation.
U_M_3: Percentage of graduates who have a definitive job placement within 3 months after graduation.
U_M_4: Retention rates for students in the Pre-Computer Science stage.
Graduate Education (G)

The department offers a graduate curriculum to provide research-based training leading to M.S. and Ph.D. degrees in Computer Science. The department also plays a pivotal role in interdepartmental graduate majors and minors in Bioinformatics and Computational Biology, Information Assurance, Human-Computer Interaction and Neuroscience.

Goal

G: Produce highly capable, globally minded professionals who are among the top-tier specialists in the computer field and computing industry.

Objectives

G_O_1: PhD graduates will be hired into academic positions at NRC ranked universities.
G_O_2: Graduates will be hired into prominent positions at research labs.
G_O_3: Graduates will be hired into prominent positions in reputable companies.

Measures

G_M_1: Percentage of graduates who have successfully entered reputable graduate programs including our own.
G_M_2: Percentage of graduates who are hired into academic positions in NRC-ranked graduate programs.
G_M_3: Percentage of graduates who have experience in grant writing.
G_M_4: Percentage of graduates who have received competitive national or industrial fellowships.
G_M_5: Percentage of graduates who have published top-tier journal or conference papers.
G_M_6: Percentage of graduates who are hired into national or industrial research labs.
G_M_7: Percentage of graduates who are hired into major industrial companies.

Commitment and Focus of Discovery, Research and Creative Work (R)

The department is committed to sustaining and expanding strong research programs in Computer Science and emerging informatics-enabled disciplines; contributing to those fundamental advances in Computer Science needed to address challenges in environment, food, health, energy, and security; and increasing the economic competitiveness of Iowa and the nation.

Goal

R: To engage in world-class research pursuant to the faculty’s expertise and produce high-impact research results that will influence future trends in both research and economic development.
Objectives

R_O_1: All faculty will regularly participate in top-tier international conferences.
R_O_2: All faculty will regularly publish in top-tier research journals.
R_O_3: All faculty will diligently pursue external research funding from either federal agencies or industry.
R_O_4: Some faculty will proactively engage in economic development activities in the State of Iowa and in the world economic arena.
R_O_5: Some faculty will receive research or innovation awards and prizes for their recent or cumulative scholarly work and publications.

Measures

R_M_1: Percentage of faculty who routinely (e.g., once a year) attend reputable international conferences in his or her main expertise area.
R_M_2: Percentage of faculty who regularly (e.g., once per year) publish in reputable research journals.
R_M_3: Percentage of faculty who are active in attracting at least one significant (e.g. $100K) external grant during a period of five years.
R_M_4: Percentage of faculty who are involved in the patenting process, SBIRs, start-up companies, and other form of economic development inside and outside the State of Iowa under the ISU approved management plan.
R_M_5: Percentage of faculty who receive major external recognitions or are elevated to the Fellow grade of major professional associations such as ACM, AAAI, AAAS and IEEE.

Contribution to Outreach, Engagement and Public Service (E)

Computer science faculty, staff and students contribute to the community at large in a number of ways including: technology transfer, open source software, partnering with Iowa K-12 teachers and students, broadening participation of underrepresented groups in Science, Technology, Engineering, and Mathematics (STEM) disciplines, and advising industry, government, and non-profits.

Goal

O: To collectively build passionate faculty, staff and students as change agents in all of the above dimensions to influence the world surrounding our academic environment.

Objectives

E_O_1: Many faculty, staff and students will serve on the committees and task forces at the university and college level.
E_O_2: Some faculty will serve in executive or advising roles to the state and federal governments, relevant industry and not-for-profit organizations.
E_O_3: Many faculty will engage in dissemination of profound knowledge and cutting-edge technologies to benefit the public.
E_O_4: All faculty and staff will strive to achieve greater diversity in our workplace.

Measures

E_M_1: Percentage of faculty and staff members who actively serve on committees and task forces beyond the department level.
E_M_2: Percentage of faculty who take offices in governmental posts, professional associations, NGOs, etc..
E_M_3: Percentage of faculty and staff members who receive major service awards and recognitions
E_M_4: Percentage of faculty who publish open source materials or code, promote technology transfer, etc..
E_M_5: Percentage of faculty and staff members who work with K-12 teachers to reach out to middle and high school students.
E_M_6: Percentage of faculty who work with underrepresented students.
E_M_7: Percentage of faculty and staff members who participate in STEM related promotional and development activities.
About Computer Science at Iowa State University

Computer Science — the theory, representation, processing, communication and use of information — is fundamentally transforming every aspect of science, technology, and society. Computer science provides the foundation for information sciences and technology. There is no aspect of life in the 21st century that has not been transformed by advances in computing. Every modern university, especially one emphasizing Science and Technology like Iowa State does, must have a strong department of computer science. The Iowa State University 2010-15 Strategy Plan laid out its vision that "Iowa State University will lead the world in advancing the land-grant ideals of putting science, technology, and human creativity to work." The Department of Computer Science embraces its pivotal role in the promotion of the computational sciences at ISU and fulfillment of the department’s three-part mission in research and graduate education (discovery), undergraduate education (learning) and outreach (engagement). The department supports other academic and research units to collaborate and integrate their knowledge with ours to advance science and technology in this modern, computing-driven era.

Academic research in computer science has been, and continues to be, critical to our understanding of computation, information, and communication on the one hand and the development of advanced information technologies on the other. The department pursues its research mission through strong research programs in several key areas of Computer Science including Algorithms, Artificial Intelligence, Computational Complexity, Database Systems, Data Mining, Distributed Systems and Networks, and Software Engineering and Programming Languages. Given the central role of computer science and the information technologies enabled by it in our modern society, there is a critical need for training of the next-generation researchers and educators in this area. Our graduate curriculum seeks to address this need. The department offers research-based graduate training leading to M.S. and Ph.D. degrees in computer science. Computer science plays a central role in the interdepartmental graduate programs: Bioinformatics and Computational Biology, Information Assurance, Human-Computer Interaction and in the Center for Computational Intelligence, Learning, and Discovery.

With the increasing reliance of our society on advanced information technologies in almost every aspect of our lives, there is a critical national need for preparing the scientific and technological workforce of the 21st century through education in computer science. Such education should equip students not only with a sound knowledge of the foundations of computer science, but also the problem solving and system design skills necessary for designing and building robust, efficient, reliable, scalable, and flexible software systems. Our undergraduate curriculum seeks to address this need. The department has a strong undergraduate program leading to a B.S. in computer science. Computer science has been playing a central role in the establishment and continuous development of the undergraduate program in software engineering, as well as notably contributing to both graduate and undergraduate programs in bioinformatics.

Computer science faculty and students contribute to the community at large in a number of ways including: technology transfer to industry, dissemination of knowledge and expertise to the general population, mentoring of pre-college students, and consulting and advising activities for industrial, government, and non-profit organizations.
The Department of Computer Science is central to Iowa State University's research and educational mission. The constant flow of students and researchers armed with the concepts and techniques from computer science courses into virtually every discipline, department, and research center at Iowa State University testifies to the department's pivotal role in the research and education programs across the university. The department offers nationally and internationally recognized research and educational programs in several areas of Computer Science and plays a central role in nationally recognized interdisciplinary programs such as Bioinformatics and Computational Biology. The constant flow into the department of some of the brightest students, researchers, and faculty from around the world and the high demand for our graduates and their success in leadership positions in both academia and industry bear testimony to the effectiveness of our research and educational programs.

The Department of Computer Science was established at ISU in 1969. Although it offered B.S., M.S., and Ph.D. degrees from the very outset, it was only around 1984 that the department began to emphasize graduate education and research. In AY2011-12, the department is staffed with 26 full-time tenured and tenure-track faculty, assisted by five full-time lecturers, to serve about 400 undergraduate students. The faculty includes a Presidential Young Investigator and eight NSF Career Awardees, editors of several key scientific journals, as well as recipients of several other honors and distinctions. The department had unusually large undergraduate majors (relative to the size of its faculty) until a few years ago, resulting in unusually high teaching loads (for a research-intensive department) on a relatively young faculty. In the past five years, the fall in undergraduate enrollment (in line with national trends), has allowed the department to significantly expand and strengthen its research and graduate programs. The department currently has 80 PhD students funded by research grants, training grants, or teaching assistantships. Recently, again following national trends, undergraduate enrollments also have risen.

The growth in the size of our faculty (which has doubled during the past 20 years), the dramatic increase in external funding for research programs, and the expansion of our Ph.D. program have put tremendous stress on the department’s space and support infrastructure. The infrastructure has grown only marginally during the same period, and continuous budget cuts and reversions in recent years have hampered the department's efforts to further strengthen this program. Every recent external review of the department has singled out the space crisis as one of the major hurdles faced by the department. Sustaining and expanding the phenomenal growth in the Computer Science research and educational programs and the department’s contributions to university’s research initiatives and strategic goals in information sciences calls for increased support from the university to avert the space crisis in the short term, and a comprehensive plan to establish the physical and support infrastructure needed to promote excellence in computer science education and research at Iowa State University in the long term.