HSU Academic Department Reports – Computing Science
October 10, 2008 - Program Prioritization

The departmental reports provide context for the academic programs administered by the department, and will be considered in conjunction with the program reports for final program ranking.

I. Departmental History, Mission, and Goals

MISSION

The mission of the Humboldt State University Department of Computing Science is to provide excellent instruction in computer information systems and computer science; to prepare graduates to be effective computing professionals; to meet broad university and community needs for computing literacy and utility; to encourage scholarly activities among faculty and students that foster currency and exploration in new and changing capabilities used in computing science; and to promote socially responsible applications of the discipline.

GOALS

Goal 1: To serve with equal respect and attention all student constituencies.

Goal 2: To deliver a degree-oriented curriculum which reflects the recommendations and standards of professional associations.

Goal 3: To position students to continue the learning process indefinitely and independently;

Goal 4: To transfer knowledge and technology in a manner that emphasizes its place within the liberal arts;

Goal 5: To support the discovery, creation, and development of knowledge within the discipline;

Goal 6: To foster an appreciation of the role which computing plays in the processes of social integration and democratization, even as it allows access to large geographical and cultural diversity of knowledge and opinion;

Goal 7: To achieve recognition from within and without the University for the quality of its education program; and

Goal 8: To reach out to students locally, regionally, statewide and internationally.

DEPARTMENTAL HISTORY

The original proposal for a B.S. degree in Computer Information Systems (CIS) at HSU was based extensively on the curriculum models being promulgated in the late 70s by the ACM (Association for Computing Machinery) and the DPMA (Data Processing Management Association). Developed from 1980 through 1984 and approved in 1984, our CIS program from its inception was distinguished from mainstream MIS (Management Information Systems) programs by the depth and breadth of its technical requirements and by the built-in pedagogy of the "structured laboratory", common now but atypical of Information Systems education two decades ago.

A minor in CIS was added defined from existing coursework in 1988.

During the 1990 program review cycle, the faculty was able to consider how courses articulated with one another and to adjust course coverage. At this time, the department also eliminated the several concentration areas suggesting specialization within the degree in favor of a more comprehensive core of courses and a few electives. In our 1995 program review, we found that the requirement for 18 units of courses related to Business Administration was too strict and inflexible. We therefore modified it so that a student could select an 18-unit area of secondary study of interest to him or her, with the provision that it be pre-approved and that it exemplify an application area for computing.

Over time, faculty became concerned that too many CIS students were not selecting areas of secondary study in the spirit intended – to exemplify an application area for computing. At the same time, the department was concerned about how to further strengthen the technical rigor of the CIS program while still staying under the state-mandated 120-unit limit for majors, and how to do so in such a way that students could have some flexibility in what additional areas of CIS they would study. To address these concerns, in 2002 the department decided to drop the mandatory 18-unit area of secondary study and replace it with 6 additional hours of CIS-approved electives, increasing the number of CIS-approved required electives from 9 units to 15 units. This gives students a stronger basis in CIS topics with flexibility in which topics they study – which have ranged from Network Security, Robotics and Computer Gaming to proficiency with more-modern programming languages such as Perl and Python to computing-related courses in other departments such as introduction to Geographic Information Systems and Numerical Analysis.

Through its curricular evolution, the program has retained the attributes that distinguished it in 1984: an emphasis on programming and the development of applications; an insistence that foundations of computing be understood by graduates; and a pedagogy that requires students to get their hands dirty.

Naturally, given the pace at which technology has been changing over the past three decades, the detailed content of all departmental courses has been continually modified by the faculty members with primary responsibility for course delivery and by the department as a whole. This continual individual course modification occurs within the context of the evolving overall program.

In 1997, the department faculty began working on a proposal for a B.S. degree in Computer Science. It was approved in July 2001. A Computer Science program is characterized by the study of computers and computational systems: their theory, design, development, and application, while Computer Information Systems dedicated to the study and development of generalized computer applications. In short, Computer Science is more theoretical; Computer information systems is more practical. The Computer Science degree provides more technical and theoretical depth for students wishing to become engineers and scientists. Based on mathematical principles, Computer Science not only advances knowledge in its own right but also serves the scientific disciplines directly. The original CS curriculum was based on recommendations by the Accreditation Board for Engineering and Technology (ABET).

At the time of our last program review in 2001, we had just had the Computer Science program approved, and all signs seemed to suggest that enrollment should blossom for the new program, as well as continue robustly in CIS. Other CSU institutions had impacted Computing Science programs, and anecdotal evidence suggested that students interested in computing were bypassing consideration of HSU because they were only looking to see which CSU's had Computer Science programs, not really knowing about the existence of Computer Information Systems as a computing option. Our guess was that students would consider HSU for computing since we had a Computer Science degree, and those who really wanted to study CIS, but didn't know yet what that was, would switch majors as desired, and both degrees would benefit. We have indeed had students switch from CS to CIS (and from CIS to CS, for that matter). But, we did not attract the large numbers of students we expected – but the decrease in enrollment in computing was not limited to HSU, nor even to the CSU, but has been seen nation-wide.

II. Departmental Faculty and Staff

Computing Science Dept Instructors -- AY Average Count of Appointments facpos_CS report generated: 22-FEB-08						
Appt Category	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
Lecturer	3	1	0	4	0	1
Assist Prof	2	2	2	1	1	0
Assoc Prof	2	1	1	2	2	3
Professor	4	5	5	5	5	4
Volunteer	0	0	1	0	0	0
Total	**11**	**9**	**9**	**12**	**8**	**8**

Computing Science AY average FTEF (time base totals) facpos_CS report generated: 22-FEB-08						
Appt Category	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
Lecturer	1.03	.22	.00	.79	.00	.11
Assist Prof	2.00	2.00	2.00	1.00	1.00	.00
Assoc Prof	2.00	1.00	1.00	1.50	1.50	2.50
Professor	3.50	4.50	4.00	4.50	4.50	4.00
Volunteer	.00	.00	.22	.00	.00	.00
Total	**8.53**	**7.72**	**7.22**	**7.79**	**7.00**	**6.61**

Computing Science department release/assigned time facpos_CS report generated: 22-FEB-08						
Assignment Description	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
Excess Enrollment (=>75)	.00	.00	.00	.00	.03	.00
Instr-Related Services	.00	.00	.00	.00	.00	.05
Advising Responsibilities	.00	.00	.00	.00	.13	.00
Instr-Related Comm Assignmts	.10	.20	.70	.35	.00	.00
Curricular Planning or Studies	.00	.00	.00	.60	.10	.00
Dept Chair AY, Leaders/Dir.	.18	.18	.18	.18	.18	.00
Dept Chair - 12mo	.13	.13	.13	.13	.13	.00
Proj/Prog Leaders, Dir., Coord	.00	.00	.00	.20	.40	.40
Other State Funds	.00	.00	.00	.30	.00	.00
Grant: Academic	.00	.00	.00	.00	.20	.40
Total	**.41**	**.51**	**1.01**	**1.76**	**1.17**	**.85**

Personnel (At least .5 FTE)

Name	**Position**	**Description of Specialty and Key Contributions** **(no more than 100 words per person)**
Guy-Alain Amoussou	Professor	**Computer Science** Directing six interdisciplinary National Science Foundation and Department of Defense funded research and education projects related to Design, Undergraduates Research and Minority Education in STEM. Teaching capstone courses in software engineering and Knowledge Management to senior students. Leading the internationalization of the campus for the past four years.
Scott Burgess	Associate Professor	**Artificial Intelligence and Algorithms** Research in artificial intelligence published in internationally recognized conferences. Teaches rigorous core computer science courses across a wide range of sub disciplines and develops many of the department's new courses. Key department representative in efforts to develop bioinformatics certificate and robotics degree options.
Ann Burroughs	FERP (.5)	**Database, Networking, and Security** Teaches a variety of courses; leads developer of core upper division courses for the proposed degree completion program through distance education; directs the internet technology laboratory and supervised its move and reconfiguration to the BSS building.
Hal Campbell	Professor	**HSUOnline** Authored and directed the creation of HSUOnline in support the department's effort to offer the Computer Information Systems major exclusively online, via distance education. Professor Campbell presently serves as the Program Coordinator for HSUOnline and also teaches classes in critical thinking with computers, electronic commerce, systems analysis, and computer law.
Sandra Casassa	ASC II	**Mathematics and CS Department ASC II** Coordinates the joint office for Mathematics and Computing Science, provides faculty support for almost 30 FTEF.
Chip Dixon	Professor	Faculty coordinator for the department's two international exchange agreements, one with the University of Technology Troyes, France, and the other with the University of Applied Sciences Bremen,

		Germany. Primarily teaches programming courses in both majors as well as database and computer architecture.
Mr. Craig Kuramada	ASC I	**Math and CS Department ASC I** Provides support coordination for the joint department office for Mathematics and Computing Science.
Dale Oliver	Professor (Math)	**Department Chair**
Sharon Tuttle	Professor	**Introductory Programming and Programming Languages** Served as CS Department Chair 2005-2006 and 2006-2007. Teaches a wide variety of courses in both the CS and CIS majors, including introductory programming, data structures, database design, database application programming, programming languages, Java, Perl, and Python. Is especially interested in improving how introductory programming is taught, and has served as Papers Chair and Editor for the Consortium for Computing Sciences in Colleges - Northwest (CCSC-NW). Have also worked with Dr. Amoussou's Coalition for American Indians in Computing (CAIC) and Science of Design (SoD) National Science Foundation-supported programs.

III. Recruitment and Retention

Describe any specific actions (other than HOP or similar standard efforts) the department has taken to recruit and/or retain students, particularly diversity students and/or students who are underrepresented in your discipline. What have been the results of those actions?

Recruitment: The Computing Science department, through Professor Amoussou, is a partner with the departments of Engineering and Mathematics in the SLS Program. The SLS (Scientific Leadership Scholars) was a program that began with the 2007-2008 academic year to recruit diversity students to Engineering, Computing Science, and Mathematics, to a 4-year scholarship program at HSU. RESULTS?

Potential Recruitment: Under the direction of Professor Amoussou, with support from professors Burroughs and Tuttle, the Computing Science department is a partner in the Coalition for American Indians in Computing. For the past two summers, and for one additional summer, the program brings high school and undergraduate students from native tribes to HSU’s campus for an intensive program of computing. It is too early to tell if this program will produce tangible results that contribute to recruitment and retention of students to the CIS or CS programs.

IV. Learning, Curriculum, and Assessment.

List the student learning outcomes for your academic programs. Then for each learning outcome that has been assessed, provide a summary paragraph that includes the methodology and results of the assessment.

STUDENT LEARNING OUTCOMES FOR THE CIS PROGRAM

Outcome 1: (Decision Making/Problem Solving) Students demonstrate confidence and effectiveness in decision making and problem solving, including the ability to:

- 1.1 articulate the nature, usefulness, and mechanics of major quantitative techniques for decision making;
- 1.2 discuss the proper roles of intuition, creative insight, and analytical procedures in the decision making process;
- 1.3 apply independence of thought and skills needed for self-directed and thorough examination of bodies of knowledge.

Outcome 2: (Technical Competence) Students demonstrate an ability to use Data Processing and Programming as effective tools in decision making and solve problems, including the ability to:

- 2.1 process data using computer systems;
- 2.2 articulate the fundamental techniques and constructions of computer files and communications systems, their associated hardware, organization and structure, including the database concept;
- 2.3 analyze and solve complex functional problems and construct data processing algorithms in their solution using high level computer programming languages and database systems.

Outcome 3: (Information Systems) Students understand the design and structure information systems and are able to analyze and improve these systems, as demonstrated in their ability to:

- 3.1 articulate the nature and limitations of theoretical models of institutional and individual behavior;
- 3.2 describe the nature and construction of technological functions using the systems approach;
- 3.3 detail the basic components of computer system architecture, their relationships, and interactions;
- 3.4 use database information systems in solving information systems problems;
- 3.5 discuss the interrelationships and interdependencies of organizations, their information needs and ways and means (particularly computer based) for satisfying the needs; and
- 3.6 view organizations, functions, and their problems (particularly from the informational standpoint) from the holistic view of top management.

Outcome 4: (Communication) Students demonstrate written and oral fluency in technical contexts, particularly in relation to the discipline of information systems, including the ability to:

- 4.1 answer questions and give written and oral reports in a classroom setting;
- 4.2 write system documentation; and
- 4.3 independently create a technical presentation of individual work.

STUDENT LEARNING OUTCOMES FOR THE CS PROGRAM

Outcome 1: (Problem Solving) Students demonstrate effectiveness in identifying computational problems and appropriate methods for addressing those problems, including the ability to:

1.1 differentiate between a purely mathematical problem and a computational one;
1.2 solve problems in core mathematical areas related to computer science: probability and statistics, calculus, and discrete mathematics; and
1.3 identify crucial elements of a problem that limit solutions.

Outcome 2: (Technical Competence) Students can construct significant software artifacts, with documentation, including the ability to:

2.1 understand and explain basic software artifacts;
2.2 develop fundamental programs to solve problems; and
2.3 read and implement solutions found in the computing science literature.

Outcome 3: (The Science of Computing) Students identify computational problems and appropriate methods for addressing those problems, including the ability to:

3.1 choose from different data structures and algorithms the most appropriate for a problem;
3.2 apply mathematical analysis to better understand software and system performance (e.g., analysis of algorithms, or mathematical analysis of process scheduling);
3.3 independently analyze a problem, find an appropriate solution, and develop the necessary software artifact to implement the solution; and
3.4 implement solutions that require a deeper understanding of the relationship between hardware and software (such as systems programming tools like threads and synchronization mechanisms);

Outcome 4: (Communication) Students demonstrate written and oral fluency in technical contexts, particularly in relation to mathematical models of and about computation, including the ability to:

4.1 answer questions and give written and oral reports in a classroom setting;
4.2 construct convincing arguments and simple mathematical proofs;
4.3 write program documentation; and
4.4 independently create a technical presentation of individual work.

Assessed Student Learning Outcomes

Computing Science: To assess outcomes 2 – 3 (Technical Competence, and The Science of Computing), the department has administered the Educational Testing Service (ETS) Major Field Test in Computer Science in each of the last three academic years (spring semesters). The results of this test show that overall our graduates compare reasonably to students nationwide. We have not identified any particular weakness or strength in student preparation.

Computer Information Systems and Computing Science: Outcome 4 (Communication) is assessed each year for each of the academic programs in the department through the capstone courses CIS 492 and CS 435. Each course requires students to submit a substantial written project with a formal presentation component. Faculty in the department act as reviewers, attending the presentations and reviewing the written products of students. Student success (a passing grade) in these capstone courses indicates sufficient attainment of learning outcome 4 for our graduates.

The department has yet to devise and carry out assessments in the CIS curriculum for outcomes 1 – 3.