Departmental Assessment Plan

Department of
Computer Science

posted: Fall 2006

Department of Computer Science

College of Engineering and Computer Science

Undergraduate Program Assessment Plan

August 24, 2005

Mission

The Computer Science Department at California State University, Sacramento will continue to be a department of choice for high-quality and innovative undergraduate and graduate degree programs in computer science, software engineering and computer engineering.

In addition to fulfilling the department's educational mission, faculty engage in research and professional development that allows them to remain current in their fields and to provide technological leadership to the university community and the Sacramento region. The department makes a conscious effort to evaluate and incorporate new areas and technologies into its programs, and to serve emerging educational markets for professional (certificate programs, distance education, etc.) and interdisciplinary programs. Through its interaction with industry, the department participates in the development of new technologies that drive the local, regional, and national economies.

The Purpose of Assessment

We regard the purpose of assessment to be the primary means by which thoughtful, constructive changes to our programs can be made with some confidence that these changes will result in improvements in our stated objectives. In the pursuit of program improvement, it is vitally important for students to be made aware of program objectives and receive feedback on their own progress relative to such objectives. Additionally, it is important for faculty to be aware of student achievement and the extent to which their efforts are contributing to that achievement. Consequently, relevant parts of the ongoing assessment data collected for this purpose are available to students and faculty for their personal use and improvement.

Brief History and Accomplishments of Department Assessment Development

In response to a strategic CSUS goal of university-wide assessment and the assessment-based criteria established by the ABET/CAC nationwide accreditation commissions, the Department developed its first draft of an outcomes-based assessment plan in AY 1996-97. Subsequently, an entry-level diagnostic exam was designed and implemented beginning AY 1998-99 that measures a student's preparation for the major and indicates the appropriate entry level course (Introduction, Programming I or Programming II) for each student.

Concurrent with this diagnostic exam, an introductory course was developed specifically for pre-computer science majors. The Department has now had many semesters of experience with assessing students' skills and placing these students in the appropriate lower division core programming classes. In addition, the Department gained, and continues to gain, valuable information about the level of preparation of students transferring from feeder schools. This information is of considerable importance in updating articulation agreements as well as the content of the foundation programming courses, Programming I and Programming II (CSc 15 and CSc 20).

In response to the need for an administrative mechanism to aggregate, distill and use assessment data for program improvement and to streamline Department administration, in AY 1998-99 the Department reorganized around program (undergraduate, graduate and service) committees. Each was assigned primary program responsibilities including but not limited to: curriculum, standards, outcomes, objectives, and instructional support needs. During that year, significant changes were made in all program areas.

The program committees were also charged with the responsibility of aggregating outcomes assessment data and distilling information to aid in evaluating program objectives and initiating changes intended for program improvement. Program committees continue to design and implement changes in their respective programs subject to the advice and consent of the Department.

Goals

The goals of the program are to produce graduates who are professionally competent, broadly educated, and who will:

- Be sought by organizations in a competitive environment.
- Succeed in graduate or professional programs in a variety of fields such as computer science, engineering, law, science, education, government or business.
- Appreciate the need for and pursue life-long learning and continual professional development.
- Undertake leadership roles in their chosen profession, communities, and society.
- Make valuable contributions to a wide variety of industries.
- Demonstrate an understanding of professional ethics and responsibilities, and the impact of the profession on society.

Objectives

The objectives of this program are to prepare students to:

1. Analyze, design, implement, and evaluate a computerized solution to a real life problem using appropriate tools.
2. Work effectively as a team member.
3. Enter a professional computer science position or an appropriate graduate program.
4. Communicate effectively through speaking, writing, and the use of presentation tools.
5. Adapt to technological changes and innovations in the discipline.
6. Be aware of ethical and societal concerns relating to computers and apply this knowledge in the conduct of their careers.

Assessment Strategy – Points of Assessment

- **Preparation for the major –** Each student is given a diagnostic exam upon entrance to the major in the first programming course to verify qualification and the level of entry into the program (Introduction, Programming I or Programming II).

- **Preparation for the upper division courses –** Students are evaluated for preparation to continue with the upper division courses by a diagnostic skills exam in the course CSC 130.
- **Evaluation of students during the junior year –** A junior seminar is being planned to evaluate students with regard to their ability to independently research a topic, write a paper, and provide a professional presentation on that topic during the junior year.
- **Senior Project –** Students are evaluated on their ability to use their knowledge gained during their tenure in the program by implementing a significant system. This requires that students work in teams, develop significant documents and conduct presentations. The assessment of this activity will be performed by 2-3 faculty who are NOT current senior project (CSC 190-191) instructors. The projects to be evaluated will be selected randomly.
- **Exit Surveys –** Student exit surveys are conducted by the Department at graduation to assess various aspects of the program, program objectives and courses.
- **Postgraduate employer interviews –** Focus group interviews of employers of graduates are conducted each academic year to determine the relevance of the education provided by our program. First implemented in spring 2000, the program is administered as a permanent assessment data-gathering tool.
- **Alumni surveys –** CSUS Institutional Research conducts surveys for individual university departments every five years. The most recent survey was conducted in spring 2000. The Department augmented the standard set of questions with ten questions intended to address the scope and depth of its program and courses. The results were evaluated and aggregated with other assessment data in the established and continuing process of program improvement. These data will be available every five years and employed similarly.

Assessment Process

The Department continuously reviews its program in an informal way that involves discussions among faculty and review of curriculum recommendations by professional organizations and industry advisors. The information obtained by faculty attending professional conferences also impacts the program. The department has identified coordinators for each course in the undergraduate curriculum and has grouped them into the following categories:

- Lower Division Core Courses 15, 20, 28, 35, 60
- Upper Division Core Courses 130, 131, 132, 133, 134, 136, 137, 138, 139
- Senior Project Courses 190, 191
- System Elective Courses 142, 148, 151, 159
- Database Elective Courses 174, 176, 177
- Software Engineering Elective Courses 170,171,179
- Graphics Elective Course 155
- Intelligent Systems 180

A committee for each group above consisting of course coordinators is responsible for reviewing the course content in the appropriate area. The coordinators meet at least once a year to discuss potential course revisions and make recommendations to the undergraduate curriculum committee using information obtained from professional organizations, industry advisors, and conference participation, as mentioned above.

It also uses a formal process through the following instruments:

- An upper division entrance exam given to students in CSC 130 to determine if students are achieving the expected outcomes of the lower division courses
- Senior Project document reviews
- Senior Project presentation reviews
- Exit surveys
- Postgraduate employer interviews
- Alumni surveys

A table showing the relation between the program objectives and these various instruments is provided below. The information gathered through these instruments is used to determine areas of the curriculum in need of potential improvement. The appropriate information is provided to the undergraduate curriculum committee for formal review. Upon review of the information, the committee prepares a report with appropriate recommendations to be presented to the entire faculty for curriculum revision.

Table 1: Relation of Program Objectives to Assessment Instruments

	Objective	How Measured	When Measured
Student 1	Analyze, design, implement, and evaluate a computerized solution to a real life problem using appropriate tools.	• Upper Division Exam in CSc 191, the capstone course, as measured by project advisor, industry sponsor and faculty evaluators. • Postgraduate employer interviews • Alumni survey	• Once a year each semester during the end of the semester presentations, for each team. • Once every year. • Once every five years.
Student 2	Work effectively as a team member.	• CSc 191, the capstone course, as measured by project advisor, industry sponsor and faculty evaluators. • Postgraduate employer interviews • Alumni survey	• Each semester during the end of the semester presentations, for each team. • Once every year. • Once every five years.
Student 3	Enter a professional computer science position or enter an appropriate graduate program.	• Exit survey. • Postgraduate employer interviews • Alumni survey	• Every semester • Once every year • Once every five years • Every year

		• GRE scores	
Student 4	Communicate effectively through speaking, writing, and the use of presentation tools	• CSc 191, the capstone course, as measured by project advisor, industry sponsor and faculty evaluators. • Postgraduate employer interviews • Alumni survey	• Each semester during the end of the semester presentations, for each team. • Once every year • Once every five years
Student 5	Adapt to technological changes and innovations in the discipline	• Postgraduate employer interviews • Alumni survey	• Once every year • Once every five years
Student 6	Be aware of ethical and societal concerns relating to computers in society and apply this knowledge in the conduct of their careers	• Postgraduate employer interviews • Alumni survey	• Once every year • Once every five years

Department of Computer Science
Outcomes and Implementation Strategies by Point of Assessment
July 7, 2005

Table 1. Sophomore Level (CSc 20 exit/CSc 130 juncture)

Objective	Student Outcomes	Implementation Strategy
1. Analyze, design, implement, and evaluate a computerized solution to a real life problem using appropriate tools.	• Given a problem, can interpret the problem specification and solve the problem using a computer. • Can implement a working program from a written specification for a moderately complex problem.	CSc 15, 20, 28, 35, 60
	• Can use an integrated development environment (IDE) to develop a program solution to a problem. • Can distinguish between syntax and semantics.	CSc 15, 20
	• Will understand and use modularity in both programs and data structure. • Will demonstrate understanding of good program code documentation procedures.	CSc 15, 20, 60
	• Will understand the relationship between high-level languages and their machine-code implementations. • Will understand the relationship between machine code instruction sets and machine architecture.	CSc 35, 60 CSc 28, 35

Table 2. Junior Seminar Level

Note: Student outcomes previously listed are subsumed under those listed here.

Objective	Student Outcomes	Implementation Strategy
1. Analyze, design, implement, and evaluate a computerized solution to a real life problem using appropriate tools.	• Will be facile in more than one computer language, more than one paradigm (procedural and object oriented), and more than one development environment, including hardware, operating system, and network. • Will understand various abstractions (*memory, control, procedure, and data)* and the informal definitions or descriptions of these abstractions.	CSc 130, 131, 133, Junior Seminar
4. Communicate effectively through speaking, writing, and the use of presentation tools.	• Can develop and present both an effective, complete, syntactically correct, oral presentation and a technical paper.	CSc 131, Junior Seminar (1 of 2 strategies/ points of assessment)

Table 3. Senior Project Level
(Completion of core courses and enrollment in 191)

Note: Student outcomes previously listed are subsumed under those listed here.

Objective	Student Outcomes	Implementation Strategy
1. Analyze, design, implement, and evaluate a computerized solution to a real life problem using appropriate tools.	• Will understand elements of the software development process from design to testing. • Can independently install new software packages, study new programming languages and tools, and use them in the development of software products. • Can independently carry out individual (personal) software projects. • Will understand the basics for playing a role as a "junior" software engineer in the entire software development process, rather than the role of a programmer only.	CSc 131, 132, 133, 134, 136, 137, 138, 139, 190, 191 (Senior Project)

	• Can apply basic techniques of requirements analysis and specification to real or close-to-real applications and be facile in various semi-formal specification notations for different purposes. • Can apply basic techniques of software design to real or close-to-real applications and be facile in various design notations. • Can implement, integrate, and test software products in a systematic fashion, rather than in an ad hoc fashion. • Can apply basic techniques of program verification to programs of real or close-to-real applications. • Can apply the basics of software/project management to real or close-to-real applications. • Can distinguish between the traditional software development process and object-oriented software developments. Can choose and apply the right techniques for the right applications.	
2. Work effectively as a team member.	• Can and will contribute significantly according to a pre-assigned role in a team project development effort.	Senior Project
4. Communicate effectively through speaking, writing, and the use of presentation tools.	• Can develop and present both an effective, complete, syntactically correct, oral presentation and a technical paper.	Senior Project (2 of 2 strategies/ points of assessment)

Table 4. Post-graduation Assessment

Note: Student outcomes previously listed are subsumed under those listed here.

Objective	Student Outcomes	Assessment Strategy
3. Enter a professional computer science position or an appropriate graduate program.	• Time to first professional employment after graduation is less than one month, or entrance to CSU or UC system (or other) graduate school is less than three months.	Exit surveys, alumni surveys

5. Adapt to technological changes and innovations in the discipline.	• Lateral job mobility not constrained by educational background.	Post-graduation employer interviews, alumni surveys
6. Be aware of ethical and societal concerns relating to computers and apply this knowledge in the conduct of their careers.	• Cognizant of impact of computers and automation on society, especially individual rights to privacy.	Post-graduation employer interviews, alumni surveys