Objectives & Assessments

Assessment

INTENT: The program has documented, measurable objectives, including expected outcomes for graduates. The program regularly assesses its progress against its objectives and uses the results of the assessments to identify program improvements and to modify the program's objectives.

The Intent must be met in order for a program to be deemed accreditable. One way to meet the Intent of this criterion is to satisfy each one of the Standards listed below. To do this, answer the questions associated with the Standards. If one or more Standards are not satisfied, it is incumbent upon the institution to demonstrate and document clearly and unequivocally how the Intent is met in some alternative fashion.

If you are having more than one program evaluated, particularly if the programs are on separate campuses, the answers to these questions may vary from one program to another. If this is the case, please use separate copies of this section for each program, and clearly delineate which program is being described.

Objectives

Standard I-1. The program must have documented, measurable objectives.

Standard I-2. The program's objectives must include expected outcomes for graduating students.

Please attach items that support or precede the objectives, e.g.,

- Mission statements from institution, college, department, program
- Plans (institution, college, department, etc.)
- All objectives including student outcomes (itemize)
- Process for assessments
- Who is involved in assessment and improvement?
- Data from assessments
- Inputs from any supporting Office of Assessment

1. Indicate below or attach to this document your educational objectives for this program. These objectives must include expected outcomes for graduating students.

Goals:

The Bachelor of Science in Computer Science program was one of the first Bachelor of Science programs implemented at Utah Valley University in 1993. Our goal has been to provide a quality program that meets accreditation standards while providing the students with a skill set that allows them to succeed in computing careers.

Using the Association of Computing Machinery model curriculum as our guide for the theory necessary in computing programs, we have provided students with two (three) major areas of specialization: Computer Science, Software Engineering and Networking. We incorporate state-of-the-art hardware and software in our program to allow students to enter the job market with a usable skill set and we emphasize the theory to provide the basis for additional learning in an ever-changing work environment.

We require the students to demonstrate communications skills and to have a background in the liberal arts. Science and math form a major part of the curriculum and students are required to take part in ethics classes as part of the general education and in their chosen area of specialization.

The curriculum emphasizes the three major categories related to capabilities and skills of computer science graduates described in the ACM CC2001 report.

Cognitive capabilities relating to intellectual tasks specific to computer science

Practical skills relating to computer science

Additional transferable skills that may be developed in the context of computer science but which are of a general nature and applicable in many other contexts as well

The structure of the curriculum recognizes the following areas of Computer Science in which clearly defined ``core topics'' have been acknowledged by the ACM Computing Curricula 2001.

Discrete Structures
Programming Fundamentals
Algorithms and Complexity
Architecture and Organization
Operating Systems
Human-Computer Interaction
Graphics and Visual Computing
Intelligent Systems
Information Management
Net-Centric Computing
Programming Languages
Social and Professional Issues
Software Engineering
Computational Science and Numerical Methods

Objectives: Each graduate should be able to:

1. Analyze, design, implement and test a computerized solution to a "real life" problem
2. Be able to accomplish objective #1 in two different computer languages
3. Demonstrate an understanding of how computing components fit into systems as a whole, including the human-computer interaction
4. Demonstrate a general background in the theory of Computer Science and understand how that theory influences practice
5. Communicate effectively orally and in writing
6. Be involved in at least one major project that involves group development and implementation

Objectives: Each faculty member should:

1. Teach a variety of courses in the core and specialization areas
2. Continue to improve in effective teaching by:
    1. Setting high expectations
    2. Creating synthesizing experiences
    3. Promoting active learning
    4. Encouraging collaborative learning and
    5. Providing assessment with prompt feedback.
3. Be engaged in scholarly works and share the results of those works with the Computer Science or Computer Science Education community

Keep up-to-date in the field in general and in areas related to normal teaching assignments in particular:

2. Describe how your program's objectives align with your institution's mission.

College Mission Statement

Utah Valley University is comprised of two interdependent divisions. The lower division embraces and preserves the philosophy and mission of a comprehensive community college, while the upper division consists of programs leading to baccalaureate degrees in areas of high community demand and interest. Utah Valley University is dedicated to providing a broad range of quality academic, vocational, technical, cultural, and social opportunities designed to encourage students in attaining their goals and realizing their talents and potential, personally and professionally. The University is committed to meeting student and community lower division and upper division needs for occupational training; providing developmental, general, and transfer education; meeting the needs for continuing education for personal enrichment and career enhancement; and providing diverse social, cultural, and international opportunities, and student support services.

Our Student Community

Students are the major focus and first priority of UVU. All decisions are examined to determine whether the results assist students in attaining their goals and maximizing their potential and talents both personally and professionally.

Our Faculty and Staff Community

Our dedicated faculty members are enthusiastic about the satisfactions of teaching and giving generously of their time to students.

UVU is committed to maintaining an atmosphere for faculty and staff, which encourages innovation, experimentation and entrepreneurial investigation relative to college programs and interests.

Our Diverse Community

UVU strives to provide an environment, which encourages a diverse population to participate in a broad range of educational opportunities, social enrichments and cultural experiences that reflect the value of diverse voices and disparate opinions.

Our Industrial Community

UVU is committed to developing, broadening, and strengthening mutually beneficial partnerships with business and industry to provide an increasingly educated work force and to enhance economic growth and development in the community.

Our Global Community

Global awareness, understanding, and responsibility on campus and in the community are sought through internationalizing curriculum, lectures, seminars, and international exchanges.

The term "Community" is defined not only as a region to be served but also as a climate to be created.

The occupational emphasis of the CS curriculum has been developed to match the goals of UVU and the charge given to UVU by the Board of Regents and the State Legislature. While we recognize the role of theory and abstraction in the curriculum, our primary goal is to provide graduates ready to assume a productive role in the local computer related industries.

Note: On the following page is a table, which can be filled out with pertinent information relating to objectives, their measurement, and their effect on the implementation of program improvements.

Implementation of Objectives

Objective	How Measured	When Measured	Improvements Identified	Improvements Implemented
S1	Senior Project	Each time the course is taught for each student	Heavy load on faculty members	Courses established for load issues.
S2	Requirement of 2nd language	Each time the course is taught for each student	Too many language options.	C++ required for all core classes. Other languages taught at advanced level. One additional language required, Java suggested.
S3	Courses in Software Engineering	Each time the course is taught for each student	Industry demand for more emphasis than found in core courses.	Separate courses created in Human Factors and RAD, allowed for electives
S4	Computational Theory, Discrete Structures	Each time the course is taught for each student	Heavy occupational emphasis discouraged theoretical involvement	Use of faculty with heavy industry experience teaching theory classes to show relevance.
S5	Course requirements (including the senior project) include written papers and oral presentations	Each time the course is taught for each student	Grading of work involving writing excessive.	Reduction of workload and increase in grader hours.
S6	Software Engineering and Senior Project	During the senior project course and at the time the student makes the senior project presentation.	Senior projects were individual projects and time requirements were too great	Additional faculty were hired & Software Engineering and Senior Project classes re-designed
F1	Teaching schedules are adjusted for student needs and faculty interest	Each semester	Many students work and cannot make day schedule	Heavy emphasis given to night program. All faculty encouraged to teach one night course/year
F2	Student evaluations of courses	Each semester, every course	Some problems not discovered in timely fashion. Adjunct evaluation techniques need improvement	Summative required for all faculty in every class.
F3	Publications, presentations	Ongoing	Incentives not sufficient. Workload too high.	Inclusion as part of rank and tenure policy. &#65533;Workload reduced. Additional faculty hired.
F4	Attend conferences, consulting,	Ongoing	Workload too high	Workload reduced to ABET standards

	journals			

Assessments

Standard I-3. Data relative to the objectives must be routinely collected and documented, and used in program assessments.

Standard I-4. The extent to which each program objective is being met must be periodically assessed.

Standard I-5. The results of the program's periodic assessment must be used to help identify opportunities for program improvement.

C. Assessments. Describe your procedure for periodically assessing the extent to which each of the above objectives is being met by your program.

Include:

- Frequency and timing of assessments
- What data are collected
- (Should include information on initial student placement and subsequent professional development)
- How data are collected
- From whom data are collected
- (Should include students and computing professionals)
- How assessment results are used and by whom

Attach copies of the actual documentation that was generated by your data collection and assessment process since the last CSAC visit (or for the past three years if this is the first visit). Include survey instruments, data summaries, analysis results, etc.

Informal

Our department consists of 13 full-time faculty members working in close cooperation to deliver the various programs in our department. All of our offices are in one suite and there is regular communication concerning all aspects of the department. In addition to the informal discussion that takes place between faculty members, we have a meeting every Monday of all full-time faculty members, department advisor and department secretary where issues are discussed. In scheduling our classes we maintain a block of time on Mondays and Wednesdays where no full-time faculty are assigned to a class and that insures that all are available for the discussion of department issues. The block of time on Wednesday is reserved for the discussion of curriculum issues. We have created curriculum subcommittees for each of the areas of specialization and one faculty member has been designated to coordinate the efforts of those committees for the entire department. Because of the communication that takes place in and out of the meetings, faculty members are aware of deficiencies that exist in the curriculum and efforts are put in place to correct those deficiencies as soon as they appear.

As a result of the communication that takes place during the process described above, we have implemented a three-semester sequence of courses that terminate in a capstone project. All areas of specialization are required to take a semester of Software Engineering where design specifications are introduced. The second semester of the sequence varies according to the area of specialization. For those in the Software Engineering specialization the students examine various software engineering methods and determine a project for their capstone assignment. These assignments may be completed as a group project with up to three students in each group. During the third semester of the sequence the Software Engineering students complete the coding, testing and documentation and present their projects in a seminar setting.

For those students in the Computer Science area of specialization, the second semester focuses on:

1. Software Specification - How to do it and what it means
2. Object-Oriented Analysis - Finding classes
3. Object-Oriented Design - Finding Data, Method Chasing, & Expansion/Elimination of Classes
4. Rapid Application Development - Designing User Interfaces & Determining Classes
5. Object-Oriented Programming - Fleshing out the methods
6. Testing

In preparation for the third semester where they are required to write a compiler.

Formal

Our major assessment procedures include:

1. Student course evaluations
2. Community Advisory Committee.

Student Course Evaluations are required for each course, every semester. Faculty members are provided with the option of administering a Formative Evaluation in their classes at the middle of each instructional term. The results of the Formative Evaluations are seen only by the faculty member and are intended to give early direction for improvement of the course. Each faculty member in each course administers a Summative Evaluation during the final four weeks of the term. The Summative Evaluation consists of eight questions and room for two questions created by the instructor. Comments are also encouraged. The results of the Summative Evaluation are provided to the Department Chair who discusses the results with each faculty member after the term has ended Formative and Summative Evaluations forms are standard forms used on the entire campus. The Summative Evaluations are used to evaluate faculty members.

An Advisory Board, consisting of representatives from various business and educational institutions in Utah County, meets once a semester to discuss the curriculum. Changes in the curriculum recommended by this board are given serious consideration.

Program Improvement

D. Program Improvement. Describe your use of the results of the program's assessments to identify program improvements and modifications to objectives.

Include:

- Any major program changes within the last five years
- Any significant future program improvement plans based upon recent assessments

Program Improvement

E. Program Evolution.

1. Describe in what respect, if at all, the philosophy and direction of computer science education has changed at your institution during the last five years (or since the last evaluation, whichever is the shorter duration).

   Five years ago the Computer Science program was part of the Computer Science/Information Systems department in the School of Business. The core courses were essentially the same as now but the three major areas of specialization were Computer Science, Networking and Information Systems. Due to the dynamic nature of the field, minor adjustments have been made on a regular basis. Such changes included changing the language for the first programming course from C to Java and increasing the number of hours for the data structures course from three to four to allow for additional file structure concepts to be discussed. Three years ago two additional areas of specialization were approved: Software Engineering and Computer Engineering. Two years ago,

an administrative decision was made to create a new School of Computer Science and Engineering. The decision was also made to separate the Information Systems specialization from the other areas of specialization. The Information Systems program stayed in the School of Business and the other specializations moved to the new School of Computer Science and Engineering. ABET accreditation had been discussed in the School of Business and movement of the programs to the School of Computer Science and Engineering was based partially on the better fit for ABET accreditation. Since the establishment of the new school, curriculum adjustments have been made to better facilitate the ABET accreditation efforts.

2. Describe any major developments and/or progress made in connection with the program in the last five years (or since the last evaluation, whichever is the shorter duration) that is not included in your response to I.C.

Program Current Status

F. Program Current Status.

In addition to the associate degrees, the CS department offers a Bachelor's Degree in Computer Science with four areas of specialization: Computer Science (traditional), Software Engineering, Computer Engineering and Computer Networking. Curriculum content is based on the 2001 ACM Curriculum Report and includes courses to meet the charge given to UVU by the Board of Regents to prepare students for the local job market.

1. List the strengths of the unit offering the computer science program.

   In 2001 the administration approved higher salaries, facilitating the hiring of five new faculty members in the CS department. Two had PhDs in Computer Science and three had PhDs in related areas with significant experience teaching computer science. This year, the CNS department hired one additional faculty member with a PhD in a related area and an MS in Computer Science. Our faculty has a wide range of experiences in industry and education and is dedicated to a quality educational experience for our students.

   In 2001 the newly created School of Computer Science and Engineering moved into a new building with classrooms and laboratories designed for Computer Science education. Our hardware is state-of-the art and software licenses represent a variety of environments and latest releases.

   At this point (Fall 2002) the CS department offers one Bachelor's Degree in Computer Science with four areas of specialization. The areas of specialization are: Computer Science, Computer Engineering, Computer Networking and Software Engineering. Our introductory core courses remain essentially the same as they have been for the past five years with the following changes to be implemented Fall 2003:

   1. CS1030 (Foundations of Computer Science) Like many Computer Science programs, we have always experienced a large (50%) failure rate in our introductory programming course. CS1030 is a course that is being introduced with the hope that students will get a feel for what computer science is before entering the sequence of CS classes leading to a degree. The course introduces Computer Science concepts and an easy introduction to programming. The course is designed to be of value to any student in the School of Computer Science and Engineering. This course is not a required course for any of the Computer Science areas of specialization.
   2. CS1410 (Object Oriented Programming) We have changed the language in this class from Java to C++ and the hours will be reduced from 4 to 3 Fall 2003. Students are required to pass CS1410 or test out of that class before enrolling in CS2420.
   3. CS1350 (Object Oriented Programming II) The language will remain C++ in this course but the hours will be reduced from 4 to 3 Fall 2003. Some of the introductory material from the old Data Structures will also be included in this course.
   4. CS2400 (Data Structures) The hours in this course will be reduced from 4 to 3 Fall 2003 while the language will remain C++.

5. The three hours gained by shortening the above classes will be used to add a class for senior projects. Each of the areas of specialization has determined how that class will be implemented. These changes will be in place Fall 2003.

Our program continues to offer the theoretical foundations of Computer Science along with those subjects that prepare our students for employment in the community upon graduation.

2. List any weaknesses or limitations of the institution or unit offering the computer science program. As salaries were increased to attract additional faculty members the CS department has experienced some degree of salary inequity. There are cases where those previously employed earn less than new faculty members having less experience and comparable qualifications.
3. List any significant plans for future development of the program. Plans are in place to either create a separate degree in Computer Engineering within the CS department or to create a separate Electrical Engineering Department and place the Computer Engineering degree in that department.

New areas of specialization are always being considered and courses are offered under the xxxR designation to check student demand. One area currently being considered for development is the development of entertainment software, primarily gaming software.

As our program continues to expand we anticipate hiring additional faculty members.