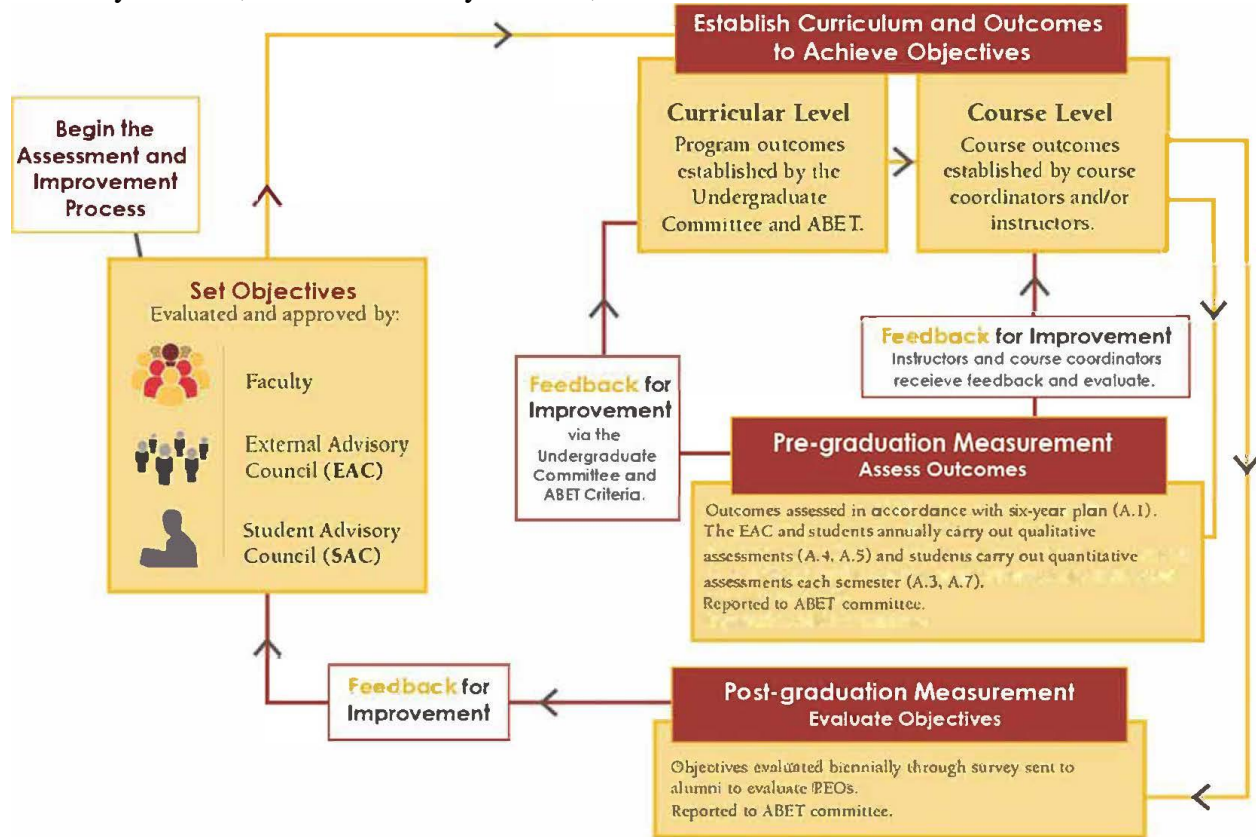


Process to assess outcomes and evaluate program educational objectives

The continuous improvement process to assess outcomes and evaluate program educational objectives is described in Figure 1 below. The objectives are periodically by faculty, External Advisory Council, Student Advisory Council, and alumni.



**Figure 1: ISU Computer Science (B.S.) Program: Continuous Improvement Process**

The methods used to assess the student outcomes are described below.

**A.1:** A direct assessment of each student outcome is carried out in accordance with a six-year plan whose implementation was started in AY 2021-22. Two ABET outcomes are assessed every year starting with AY 2021-22. In a six year cycle all six outcomes would have been assessed twice in required courses. The assessments are conducted by the instructors of the courses and reviewed by the ABET committee. A report on this assessment will be made available in the self-study report.

Year	ABET Outcomes Assessed	Courses	Status
AY 2021-22	Outcomes 1 and 2	SO1: 311, 327 SO2: 309, 342	Done. Outcomes are satisfactory

AY 2022-23	Outcomes 3 and 4	SO 3: 309, 402C SO 4: 101, 309	Done. Outcomes are satisfactory
AY 2023-24	Outcomes 5 and 6	SO 5: 309, 402C SO 6: 331, 352	Done: Outcomes are satisfactory
AY 2024-25	Outcomes 1 and 2 (course numbers changed since F 2024)	SO 1: 2300, 2270 SO 2: 2270, 3090, 3420	To be done
AY 2025-26	Outcomes 3 and 4	SO 3: 3090, 4020C SO 4: 1010, 3090	To be done
AY 2026-27	Outcomes 5 and 6	SO 5: 3090, 4020C SO 6: 3310, 3520	To be done

**A.2:** The Iowa Legislature passed a bill in 2012 (HF 2284) that requires the implementation of “a continuous improvement program in every undergraduate program offered by an institution of higher education governed by the board.” The implementation of this plan was started by the university in Fall 2013. Courses are required to annually complete an assessment as part of the Iowa Continuous Improvement Program (IA-CIP). Because of the Covid-19 pandemic, this assessment process has been put on hold by the university since Spring 2020. Hence the department implemented a new six-year plan in Fall 2021 (described in section A.1) above to carry out periodic assessments of the student outcomes.

**A.3:** Prior to graduation, all graduating seniors are required to complete an exit questionnaire and an outcomes assessment survey. This provides students with the opportunity to assess, from their personal learning experiences, the effectiveness of the program in achieving the student outcomes relative to their own expectations.

**A.4:** Another assessment mechanism is an informal assessment through student interviews conducted by the External Advisory Council members when they visit us annually. Typically student members of the Student Advisory Council are interviewed by the EAC during each visit for a qualitative assessment of the student outcomes and the program educational objectives.

**A.5:** Student Forums: Students are encouraged in an open, friendly manner to comment on strengths and to express concerns. The department chair and academic advisors facilitate this meeting. While the format is anecdotal, the intent of the forum is to find out where problems exist in a way that we simply could not do otherwise. Meeting notes from these forums are given to the ABET committee for further action if needed.

**A.6:** Faculty members compare ideas regularly, and the undergraduate committee facilitates this comparison. Members of the undergraduate committee carry forward ideas to the larger group of faculty when appropriate. Problems are generally not allowed to continue. A similar facilitation also happens with our equipment committee for continuous improvement of instructional laboratories.

**A.7:** Each course and instructor are evaluated by students registered in that course every semester and the results are made available to the instructor of the course and the department

chair. The department chair reviews these reports with the faculty member during the annual review.

**A.8:** Recommendations from ABET are used to periodically guide changes to our curriculum and program. The Bachelor of Science program is accredited by the Computing Accreditation Commission of ABET. The process of accreditation requires periodic external reviews of the undergraduate program by computer science educators and professionals. The content and quality of subject matter in each course required of majors is ascertained through an examination of course descriptions, textbooks, and sample homework and examinations. From personal vitae, university data, classroom and laboratory visits, and interviews with students, faculty, advisors, and administrators, the quality of the supporting infrastructure is examined – including required supporting coursework in other disciplines, faculty resources, and laboratory space and equipment. The objectives and outcomes are also periodically evaluated by the External Advisory Council. The quality of the program is contrasted with nationally established standards for accreditation. In addition, Iowa State University is periodically accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools.

**A.9:** The department chair speaks with graduating seniors each semester and takes their comments to the various departmental committees for any action to be taken.

Table 1 below describes most of the above assessment processes and the frequency with which they are carried out. Direct measurements indicate that the assessment data source is faculty member or EAC member. Indirect and informal measurements include senior exit surveys, student forums, and course assessment by students.

Assessment Processes	Direct	Indirect	Quantitative	Qualitative	Source	Frequency
ABET Review (A.1)	X		X		Faculty	Annually in accordance with six-year plan
IA-CIP Assessment (A.2)	X		X		Faculty	On Hold since the Covid-19 pandemic in 2020
Senior exit survey (A.3)		X	X		Students	Each semester
External Advisory Council (A.4)	X			X	EAC	Annual
Student Forums (A.5)		X		X	Students	Annual
Course Evaluation by students (A.7)		X	X		Students	Each semester

**Table 1: Assessment Processes for Student Outcomes**

Expected Level of Attainment of Student Outcomes (from senior exit survey A.3)

In analyzing the outcomes assessment data from senior surveys, the responses are converted to numerical values according to the scale: Very Well = 3, Well = 2, Adequately = 1, Not at All = 0. Let  $response(i, q)$  denote the numerical value of student  $i$ 's response to question  $q$ . Let  $N(q)$  denote the number of respondents responding to question  $q$ .

For each semester, an average score,  $score(q)$ , was computed for each survey question, by summing up the numerical responses of all respondents divided by the number of respondents:

$$score(q) = \frac{\sum_i response(i, q)}{N(q)}$$

The expected level of attainment of an outcome is at least 1 (Adequate). It is an on-going goal of the department, as a result of continuous improvement to strive to achieve a level for each outcome between Adequate and Well (that is, 1.5).