

Weber State University
Biennial Report on Assessment of Student Learning

Cover Page

Department/Program: Computer Science
Academic Year of Report: 2021/22 (covering Summer 2019 through Spring 2021)
Date Submitted: Nov 15, 2021
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We have updated the Institutional Effectiveness website, which includes an update for each program page. All Biennial Assessment and Program Review reports will now be available on a single page. Please review your page for completeness and accuracy, and indicate on the list below the changes that need to be made. Access your program page from the top-level [results](#) page. Select the appropriate college and then your program from the subsequent page.

A. Mission Statement

Information is current; no changes required.

Update if not current:

B. Student Learning Outcomes

Information is current; no changes required.

Update if not current:

C. Curriculum (please note, we are using Google Sheets for this section so that updates are easier to make)

Information is current; no changes required.

Update if not current (you may have access to the Google Sheet if that is easiest, or we can make the updates):

D. Program and Contact Information

Information is current; no changes required.

The Computer Science program employs a technical, scientific approach, requiring a solid foundation in mathematics and natural science. The program blends scientific and engineering principles implemented through actual, practical, and applications-oriented

experience as well as the intellectual study of computation. It is designed to provide a sound fundamental understanding of logic and of digital computer organization as well as the interaction between hardware, software, and the interconnection of system components. Also emphasized is software engineering which includes understanding operating systems design, implementing the theory of computing, analysis of algorithms, simulation design, and the development of knowledge-based systems. The objectives of the Computer Science program are to provide students with an education that will help them achieve their academic and career goals while simultaneously meeting the needs of industry partners.

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E. **Assessment Plan** (please see our website for details on how to develop a [program assessment plan](#))

___ **Information is current; no changes required.**

We continue our course assessment rotation as stated in the current sheet. A complete assessment of all our courses takes 6 years.

Course	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2026-2027
CS1030 Foundations of Computer Science			CA/RI	Imp		
CS2130 Computational Structures			CA/RI	Imp		
CS3230 Object Oriented User Interface Development with Java			CA/RI	Imp		
CS4110 Concepts of Formal Languages and Algorithms for Comp.			CA/RI	Imp		
CS1400 Fundamentals of Programming				CA/RI	Imp	
CS2550 Database Design & Application Development				CA/RI	Imp	
CS2705 Network Fundamentals and Design				CA/RI	Imp	
CS3030 Scripting Languages				CA/RI	Imp	
CS1410 Object-Oriented Programming	Imp				CA/RI	Imp
CS2450 Software Engineering I	Imp				CA/RI	Imp
CS3100 Operating Systems	Imp				CA/RI	Imp
CS4450 Advanced Software Engineering Methods	Imp				CA/RI	Imp
CS2350 Web Development	CA/RI	Imp				
CS2420 Introduction to Data Structures and Algorithms	CA/RI	Imp				
CS3550 Advanced Database Programming	CA/RI	Imp				
CS4230 Java Application Development	CA/RI	Imp				
CS2810 Computer Architecture/Organization		CA/RI	Imp			

CS3750 Software Engineering II		CA/RI	Imp			
CS3280 Object-Oriented Windows Application Development		CA/RI	Imp			
CS4790 N-Tier Web Programming		CA/RI	Imp			

CA/RI – Course Assessment and Recommended Improvements (to be approved by CS Faculty and CS Industry Advisory Council)

Imp – Implement Improvements

New: High Impact Educational Experiences in the Curriculum

In response to the recent USHE requirement that all students have at least 1 HIEE in the first 30 credit hours and 1 HIEE in the major or minor we are asking programs to map HIEEs to curriculum using a traditional curriculum grid. This helps demonstrate how and where these goals are accomplished.

Courses	Department/Program use of High Impact Educational Experiences				
	HIEE 1	HIEE 2	HIEE 3	HIEE 4	Etc...
CS 2450 - Software Engineering I	In the last 3 modules, students work in teams on a final project using Agile Development practices. The teams rotate roles between a team member or team leader.				
CS 4230 - Java Application Development (Capstone)	Most activities for a capstone course are in teams. The teams work in full-stack projects, including the documentation,				

CS 4450 - Advanced Software Engineering Methods (Capstone)	implementation and deliverable. Some of these projects directly benefit organizations in our community.				
CS 4790 - .NET Web Application Development (Capstone)					
CS 4850 - Faculty Directed Research	This is a one on one research with a faculty member. Students can practice all the skills from the program and demonstrate competence.				
CS 4890 - INT Cooperative Work Experience	Students can experience and practice their skills in industry.				

HIEEs include capstone courses or experiences, community-engaged learning, evidence-based teaching practices, internships, project-based learning, study abroad/away, supplemental instruction, team-based learning, undergraduate research, pre-professional/career development experiences.

Additional information (HIEE planning, assessment, or other information):

F. Report of assessment results since the last report:

There are varieties of ways in which departments can choose to show evidence of learning. This is one example. The critical pieces to include are 1) learning outcome being assessed, 2) method(s) of measurement used, 3) threshold for 'acceptable – that is, the target performance, 4) actual results of the assessment, 5) interpretation/reflection on findings 6) the course of action to be taken based upon the interpretation, and 7) how that action will be evaluated.

A. Evidence of Learning: Courses within the Major

(this is a sample page for purpose of illustration only; a blank template can be found on the next page or at [this site](#))

Evidence of Learning: General Education, Creative Arts Courses

CS 1010 Fall 2020

Gen Ed Learning Goal Students will:	Measurable Learning Outcome Students will demonstrate their understanding by:	Method of Measurement Direct and Indirect Measures*	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Students will create works of art and/or increase their understanding of creative processes in writing, visual arts, interactive entertainment, or performing arts.	Learning Outcome 1.	<u>Creative Assignment Projects:</u> High Concept Document Signature Assignment - Game Design Document	85% of students will earn a C or higher on their projects.	44 of 48 (91.6%) students earned a C or higher.	Students are performing nominally near the threshold for evidence of student learning.	No action required at this time.
		<u>Individual Design Practice Questions & Discussions:</u> Games & Video Games Designing & Developing Games Understanding Your Machine Making Money From Your Game Game Worlds The Major Genres	85% of students will earn a C or higher on their assignments.	43 of 48 (89.6%) students earned a C or higher.	Students are performing nominally near the threshold for evidence of student learning.	No action required at this time.

		Understanding Your Player Game Concepts Creative & Expressive Play Character Development Storytelling Gameplay Core Mechanics Game Balancing Creating the User Experience				
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GE Learning Goal	Measurable Learning Outcome	Method of Measure.	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Students will demonstrate knowledge of key themes, concepts, issues, terminology and ethical standards employed in creative arts disciplines. They will use this knowledge to analyze works of art from various traditions, time periods, and cultures.		<u>Demonstrate Knowledge in Individual Game Reviews:</u> Game Review 1 Game Review 2 Game Review 3	85% of students will earn a C or higher on their projects.	44 of 48 (91.6%) students earned a C or higher.	Students are performing nominally near the threshold for evidence of student learning.	No action required at this time.
		<u>Demonstrate Knowledge in Individual Exercises:</u> Character Development Cheese & Quackers	85% of students will earn a C or higher on their projects.	38 of 48 (79.2%) students earned a C or higher.	Findings fall short of the threshold objective. The students who did not reach the stated threshold were students who didn't submit 1 of the 2 exercises. The omitted assignments earned zero points and significantly impacted the overall collective grade for these assignments.	For the Character Development and Cheese & Quackers assignments students will be encouraged to complete and submit to maximize the credit earned.

		<u>Creative Assignment Projects:</u> High Concept Document Signature Assignment - Game Design Document	85% of students will earn a C or higher on their projects.	44 of 48 (91.6%) students earned a C or higher.	Students are performing nominally near the threshold for evidence of student learning.	No action required at this time.
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*At least one measure per objective must be a direct measure.

ETC 2001 Fall 2020

Discussion:

GEN ED SS Outcome 1

Outcome:

Students will describe how individuals and groups influence and are influenced by social contexts, institutions, physical environments and/or global process.

Method of Measurement:

The following essay question was administered to the students at the end of the fall 2017 semester and at the end of the spring 2018 semester:

In a paragraph or two, provide some concrete examples where the course deepened your understanding of the relationship between individual engineers and larger social forces like the engineering profession, government, universities, or private industry.

Threshold:

The threshold for acceptable performance is a 60%.

Findings:

The average score on this assignment was 81% in fall 2017 and 80% in spring 2018.

Approximately 81 percent met the threshold for acceptable performance in this outcome in Fall 2017. Approximately 84 percent met the threshold for acceptable performance in this outcome in Spring 2018.

Action Plan:

Overall, students did well in this category, with the clear majority of students exceeding the threshold for acceptable performance. While

I was happy with the outcome as reflected via this measure, my plan to improve this outcome is to continue to emphasize how individuals are interpolated, and to some extent shaped by the society and institutions in which they live. Students often emphasize their individuality, their self-reliance, and the ability to determine their own fates. While these are dispositions worth cultivating, they often eclipse the ways that individuals are shaped by larger social forces. Just as the individual shapes society, society shapes the individual. Going forward, I need to emphasize this dialectic more and to show how it manifests itself in the lives of individual engineers and in the profession as a whole. Longitudinally, it should be noted that there wasn't much variation on this outcome from one semester to the next.

GEN ED SS Outcome 2

Outcome:

Students will apply basic social science concepts, theories, and/or methods to a particular issue and identify factors that influence change.

Method of Measurement:

The following essay question was administered to the students at the end of the Fall 2017 semester and at the end of the Spring 2018 semester:

In a paragraph or two provide some concrete examples where the course deepened your understanding of historical change and what drives this change. If you can, try to answer this by direct reference to a formal theory of change.

Threshold:

The threshold for acceptable performance was a 60%.

Findings:

The average score on this assignment was 70% in fall 2017 and 90% in spring 2018.

Approximately 87 percent met the threshold for acceptable performance in this outcome in Fall 2017. 100 percent met the threshold for acceptable performance in this outcome in Spring 2018.

Action Plan:

Overall, students did well in this category, with the clear majority of students exceeding the threshold for acceptable performance. Longitudinally, students improved on their performance from one semester to the next. Part of the reason students do so well on this category is that the course dwells at length on two competing theories of historical change; technological determinism and instrumentalist. As a result, the students are very well-equipped to perform well on this learning outcome. I will continue to teach this the way I am currently doing it because of the good results.

GEN ED SS Outcome 3

Outcome:

Students will identify an argument about a social phenomenon and understand alternative explanations.

Method of Measurement:

The following essay question was administered to the students at the end of the fall 2017 semester and at the end of the spring 2018

semester:

In a paragraph or two, provide some concrete examples where you were forced to consider engineering culture, historical change or the Singularity from more than one perspective.

Threshold:

The threshold for acceptable performance is a 60%.

Findings:

The average score on this assignment was 90.62% in Fall 2017 and 91% in Spring 2018.

Approximately 88 percent met the threshold for acceptable performance in this outcome in Fall 2017. Approximately 83 percent met the threshold for acceptable performance in this outcome in Spring 2018.

Action Plan:

Longitudinally, there was a slight decline in performance on this measure. This is curious because students were actually very well-equipped to show competency on this outcome in either semester. The course dwells at length on two competing theories of historical change, and the students are intimately familiar with their respective weaknesses/strengths. The reason students didn't do as well on this question as they might have may have more to do with the method of measurement than in a substantive inability to examine a social phenomenon and describe it from alternative perspectives. Next semester, I may rephrase the question.

It is proposed that these assessment results will be reviewed by the General Education Improvement & Assessment Committee, who will provide feedback on evidence of continuous improvement.

Additional narrative (optional – use as much space as needed):

Appendix A

Most departments or programs receive a number of recommendations from their Five/Seven-Year Program Review processes. This page provides a means of updating progress towards the recommendations the department/program is enacting.

Date of Program Review: 2019	Recommendation	Progress Description
Recommendation 1	Text of recommendation	#### +1 progress
During our last ABET review, a recommendation to require a gen ed course that includes the topics of local and global impacts of computing solutions on individuals, organizations, and society as made.		The CS Program Curriculum Committee has reviewed this concern and recommended that ETC 2001 Engineering Culture be added as a required general education course. This course is a social science general education course that covers local and global impacts of computing solutions on individuals, organizations, and society

Additional narrative:

Appendix B

Please provide the following information about the full-time *and adjunct faculty* contracted by your department during the last academic year (summer through spring). Gathering this information each year will help with the headcount reporting that must be done for the final Five Year Program Review document that is shared with the State Board of Regents.

Faculty Headcount	2018-19	2019-20	2020-21	Notes
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)				
Full-time Tenured	6	8	9	
Full-time Non-Tenured (includes tenure-track)	5	6	7	
Part-time and adjunct	0	0	0	
With Master's Degrees				
Full-time Tenured	2	1	1	
Full-time Non-Tenured	7	8	6	
Part-time and adjunct	6	6	5	
With Bachelor's Degrees				
Full-time Tenured	0	0	0	
Full-time Non-tenured	2	2	2	
Part-time and adjunct	10	10	10	
Other				
Full-time Tenured				
Full-time Non-tenured				
Part-time				
Total Headcount Faculty	38	38	40	
Full-time Tenured	8	9	10*	Two positions are part-time, shared between the CS program and the Dean's office
Full-time Non-tenured	14	16	15*	Three positions are share among these program: CS, WEB and UX, and NMT

Part-time	16	16	15	All adjuncts
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Please respond to the following questions.

- Review and comment on the trend of minority students enrolling in your classes (particularly lower-division, GEN Ed) and in your programs.

The number of women in the program will continue to increase

Official Fall Third Week Gender Counts

		Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021
Female	N	79	105	105	103	122	115	133	131	157	147
	%	10%	13%	13%	13%	14%	12%	14%	15%	17%	16%

The number of Latinx students will continue to increase.

Ethnicity Classification		12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21
Latinx	N	82	82	101	130	119	154	163	145	150
	%	7%	8%	9%	11%	10%	12%	12%	12%	11%

This is an ongoing effort. Our program recognizes that although the number of students from underrepresented groups has grown, the percentage, in the case of the Latinx community, has not. We are working with our local K-12 schools to promote our program and recruit students from these underrepresented groups.

- What support (from enrollment services, advising, first-year transition office, access & diversity, etc.) do you need to help you recruit and retain students?

As mentioned in the previous questions, we need to do more outreach in the K-12 system to recruit students from underrepresented groups.

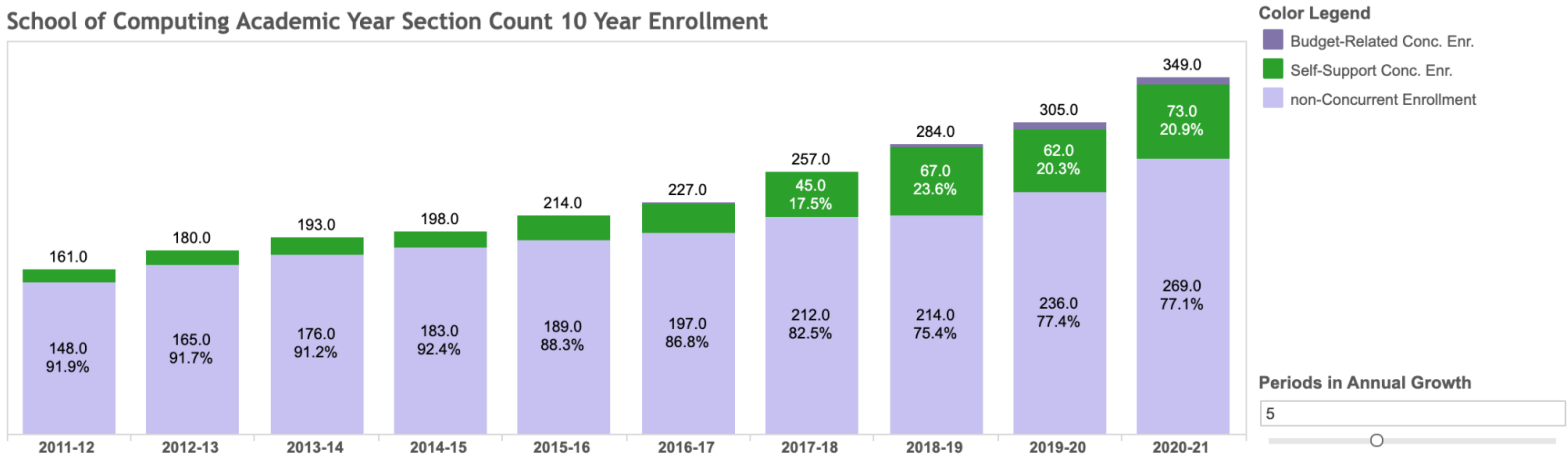
- 3) We have invited you to re-think your program assessment. What strategies are you considering? What support or help would you like?

Currently, every course we have in the catalog has a course committee. These course committees are monitored by our program curriculum committee. On a rotational basis, all courses are evaluated by their respective committee members over a period of three years. The first year, the committee evaluate the current course curriculum and suggest recommendations and updates to the current curriculum. The second year, those faculty members teaching the courses, implement the recommendations. Finally, the third year, an evaluation on the changes is done. It is at this point that the committee evaluates the impact of the changes and propose new ones.

- 4) Finally, we are supporting our Concurrent Enrollment accreditation process. Does your program offer concurrent enrollment classes? If so, have you been able to submit the information requested from the Concurrent Enrollment office? Staff from OIE will reach out to you in the next few months to assist in finalizing that data submission, as well as gather information for concurrent Gen Ed assessment.

Our program supports and offer Concurrent Enrollment courses in all surrounded school districts. In the last year, there were 80 sections of concurrent enrollment courses.

School of Computing Academic Year Section Count 10 Year Enrollment



Glossary

Student Learning Outcomes/Measurable Learning Outcomes

The terms 'learning outcome', 'learning objective', 'learning competency', and 'learning goal' are often used interchangeably. Broadly, these terms reference what we want students to be able to do AFTER they pass a course or graduate from a program. For this document, we will use the word 'outcomes'. Good learning outcomes are specific (but not too specific), are observable, and are clear. Good learning outcomes focus on skills: knowledge and understanding; transferrable skills; habits of mind; career skills; attitudes and values.

- Should be developed using action words (if you can see it, you can assess it).
- Use compound statements judiciously.
- Use complex statements judiciously.

Curriculum Grid

A chart identifying the key learning outcomes addressed in each of the curriculum's key elements or learning experiences (Suskie, 2019). A good curriculum:

- Gives students ample, diverse opportunities to achieve core learning outcomes.
- Has appropriate, progressive rigor.
- Concludes with an integrative, synthesizing capstone experience.
- Is focused and simple.
- Uses research-informed strategies to help students learn and succeed.
- Is consistent across venues and modalities.
- Is greater than the sum of its parts.

Target Performance (previously referred to as 'Threshold')

The level of performance at which students are doing well enough to succeed in later studies (e.g., next course in sequence or next level of course) or career.

Actual Performance

How students performed on the specific assessment. An average score is less meaningful than a distribution of scores (for example, 72% of students met or exceeded the target performance, 5% of students failed the assessment).

Closing the Loop

The process of following up on changes made to curriculum, pedagogy, materials, etc., to determine if the changes had the desired impact.

Continuous Improvement

An idea with roots in manufacturing, that promotes the ongoing effort to improve. Continuous improvement uses data and evidence to improve student learning and drive student success.

Direct evidence

Evidence based upon actual student work; performance on a test, a presentation, or a research paper, for example. Direct evidence is tangible, visible, and measurable.

Indirect evidence

Evidence that serves as a proxy for student learning. May include student opinion/perception of learning, course grades, measures of satisfaction, participation. Works well as a complement to direct evidence.

HIEE – High Impact Educational Experiences

Promote student learning through curricular and co-curricular activities that are intentionally designed to foster active and integrative student engagement by utilizing multiple impact strategies. Please see <https://weber.edu/weberthrives/HIEE.html>