

## 2016-2017 Annual Assessment Report Template

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or [contact us](#) for more help.

**Please begin by selecting your program name in the drop down.** If the program name is not listed, please enter it below:

**BS Computer Science**

OR

### Question 1: Program Learning Outcomes

#### Q1.1.

Which of the following Program Learning Outcomes (PLOs), Sac State Baccalaureate Learning Goals (BLGs), and emboldened Graduate Learning Goals (GLGs) **did you assess?** [Check all that apply]

- ☐ 1. **Critical Thinking**
- ☐ 2. **Information Literacy**
- ☐ 3. **Written Communication**
- ☒ 4. **Oral Communication**
- ☐ 5. Quantitative Literacy
- ☐ 6. **Inquiry and Analysis**
- ☐ 7. Creative Thinking
- ☐ 8. Reading
- ☒ 9. Team Work
- ☐ 10. Problem Solving
- ☐ 11. Civic Knowledge and Engagement
- ☐ 12. **Intercultural Knowledge, Competency, and Perspectives**
- ☐ 13. Ethical Reasoning
- ☐ 14. Foundations and Skills for Lifelong Learning
- ☐ 15. **Global Learning and Perspectives**
- ☐ 16. Integrative and Applied Learning
- ☐ 17. Overall Competencies for GE Knowledge
- ☐ 18. **Overall Disciplinary Knowledge**
- ☐ 19. **Professionalism**
- ☐ 20. Other, specify any assessed PLOs not included above:

a.

b.

c.

#### Q1.2.

Please provide more detailed background information about **EACH PLO** you checked above and other information including how your specific PLOs are **explicitly** linked to the Sac State **BLGs/GLGs**:

## Q12 BS COMPUTER SCI

Computer science student learning outcomes or PLOs are abilities a B.S. Computer Science graduate should possess at the time of graduation. The selection of our nine PLOs is guided by the Computing Accreditation Commission (CAC) of ABET, Inc., the accrediting body for computer science programs.

Our PLOs are listed below.

At graduation, a B.S. Computer Science student should be able to:

- (a) Apply fundamental knowledge of mathematics, algorithmic principles, computer theory, and principles of computing systems in the modeling and design of computer-based systems that demonstrate an understanding of tradeoffs involved in design choices.
- (b) Analyze a problem, specify the requirements, design, implement, and evaluate a computer-based system, process, component, or program that satisfies the requirements.
- (c) Apply design and development principles in the construction of software systems of varying complexity.
- (d) Use current skills, techniques, and tools necessary for computing practice.
- (e) Function effectively as a member of a team to accomplish a common goal.
- (f) Understand professional, ethical, legal, social, and security issues and responsibilities; analyze the impact of computing on individuals, organizations, and society both locally and globally.
- (g) Write effectively.
- (h) Give effective oral presentations.
- (i) Recognize the need for, and the ability to engage in, continuing professional development.

For each PLO, the faculty identified a set of measurable performance criteria or indicators in upper division core courses.

Assignments, exam questions, surveys, rubrics, etc. were developed to evaluate these performance criteria. Outcomes (a) through (d) address the theoretical concepts, technical knowledge, and skills necessary for our B.S. graduates to be successful upon graduation. Outcomes (e) through (i) address nontechnical characteristics or abilities the Department expects graduates to have, i.e., effective oral and written communication skills, teamwork, life-long learning, and ethical, legal responsibilities.

In 2015-2016, the Department assessed PLOs (a) through (d). This year, 2016-2017, we assessed PLO (e) Team work and PLO (h) Oral presentation. We also worked on closing the loop in areas where the established percentage of students meeting or exceeding criteria was below our minimum threshold of **70%**. For 2017-2018, we plan to assess PLOs (f), (g), and (i) and close the loop in areas of deficiency to complete our three-year assessment cycle.

The PLOs that have been assessed this year (e and h) and their performance criteria are as follows.

PLO (e) Function effectively as a member of a team to accomplish a common goal.

- e-1. Cooperate and collaborate as a team member.
- e-2. Communicate and listen. Keep teammates informed.
- e-3. Face conflicts and resolve differences
- e-4. Contribute equally as a participant in the project.

PLO (h) Give effective oral presentations

- h-1. Use an effective presentation style and delivery (e.g., speak clearly and with confidence, attract and hold the attention of the audience, maintain eye contact, and use clear, appropriate visual aids.)
- h-2. Use appropriate vocabulary and accurate technical terms and phrases. Consistently follow correct rules of standard English.
- h-3. Provide a well-organized and clear technical presentation of sponsor's problem, design of software solution, the highest priority feature and its functionality, and key testing issues.
- h-4. Articulate project-related issues, e.g., difficulties encountered and how they were dealt with, and lessons learned.

In this report we are required to select ONE PLO as an example (Q2.1). We have selected PLO h (Oral Presentation), and this report will focus on this PLO. However, our assessment data for the other PLO that we have assessed this year (PLO e Team Work) may be provided upon request.

The table below shows how our specific PLOs are explicitly linked to the Sac State BLGs.

## Alignment of Student Learning Outcomes with University Baccalaureate Learning Goals

| <b>University Baccalaureate Learning Goals</b>              | (a) Fundamental Knowledge | (b) Analysis | (c) Design | (d) Skills | (e) Teamwork | (f) Ethics | (g) Written Communications | (h) Oral Communications |
|-------------------------------------------------------------|---------------------------|--------------|------------|------------|--------------|------------|----------------------------|-------------------------|
| Competence in Discipline                                    | X                         | X            | X          | X          |              |            |                            |                         |
| Knowledge of Human Cultures and Physical and Natural Worlds | X                         |              |            |            | X            | X          |                            |                         |
| Intellectual and Practical Skills                           | X                         | X            | X          | X          | X            | X          | X                          | X                       |
| Personal and Social Responsibilities                        |                           |              |            | X          | X            | X          |                            |                         |
| Integrative Learning                                        | X                         | X            | X          | X          |              |            | X                          | X                       |

**Q1.2.1.**

Do you have rubrics for your PLOs?

- ☒ 1. Yes, for all PLOs
- ☐ 2. Yes, but for some PLOs
- ☐ 3. No rubrics for PLOs
- ☐ 4. N/A
- ☐ 5. Other, specify:

**Q1.3.**

Are your PLOs closely aligned with the mission of the university?

- ☒ 1. Yes
- ☐ 2. No
- ☐ 3. Don't know

**Q1.4.**

Is your program externally accredited (other than through WASC Senior College and University Commission (WSCUC))?

- ☒ 1. Yes
- ☐ 2. No (skip to **Q1.5**)
- ☐ 3. Don't know (skip to **Q1.5**)

**Q1.4.1.**

If the answer to Q1.4 is **yes**, are your PLOs closely aligned with the mission/goals/outcomes of the accreditation agency?

- ☒ 1. Yes
- ☐ 2. No

☐ 3. Don't know

**Q1.5.**

Did your program use the *Degree Qualification Profile* ("DQP", see <http://degreeprofile.org>) to develop your PLO(s)?

- ☐ 1. Yes
- ☒ 2. No, but I know what the DQP is
- ☐ 3. No, I don't know what the DQP is
- ☐ 4. Don't know

**Q1.6.**

Did you use action verbs to make each PLO measurable?

- ☒ 1. Yes
- ☐ 2. No
- ☐ 3. Don't know

(Remember: **Save your progress**)

## Question 2: Standard of Performance for the Selected PLO

**Q2.1.**

Select **OR** type in **ONE(1)** PLO here as an example to illustrate how you conducted assessment (be sure you *checked the correct box* for this PLO in Q1.1):

Oral Communication

If your PLO is **not listed**, please enter it here:

**Q2.1.1.**

Please provide more background information about the **specific PLO** you've chosen in Q2.1.

As detailed in Q 1.2, we use the following four performance indicators (criteria) to assess PLO (h) Oral Presentation:

h.1 Presentation style and delivery

h.2 Language and vocabulary

h.3 Organization

h.4 Communication of technical content

These indicators are evaluated in two different courses:

CSC 191 (Senior Project Part II). Student oral presentations of their senior projects are assessed by faculty members as detailed in Q2.3 and Q3.2.1. The Senior Project is a capstone course in our curriculum.

CSC 195 (Field Work). Student performance in internships is assessed by their employers as detailed in Q2.3 and Q3.2.1. Internships provide students with valuable work experience before they complete their B.S degrees.

**Q2.2.**

Has the program developed or adopted **explicit** standards of performance for this PLO?

- ☒ 1. Yes

- ☐ 2. No
- ☐ 3. Don't know
- ☐ 4. N/A

**Q2.3.**

Please **provide the rubric(s)** and **standards of performance** that you have developed for this PLO here or in the appendix.

## Q23 BS COMPUTER SCI

To evaluate student oral presentations for the senior project (CSC191 Part II), the following evaluation form was used. This form was completed by the faculty members who have participated in the evaluation as detailed in Q3.2.1.

|                         |                           |
|-------------------------|---------------------------|
| <b>Computer Science</b> | <b>Oral Communication</b> |
|                         | <b>Evaluation</b>         |

|                         |                               |                |                   |                |  |                               |                     |
|-------------------------|-------------------------------|----------------|-------------------|----------------|--|-------------------------------|---------------------|
| <b>Course: CSC 191</b>  | <b>Instructor: R. Buckley</b> |                |                   |                |  | <b>Date: December 9, 2016</b> |                     |
| <b>Team Name: _____</b> | <b>Evaluator:</b>             | <b>Faculty</b> | <b>Instructor</b> | <b>Student</b> |  |                               | <b>Industry Rep</b> |
|                         |                               |                |                   |                |  |                               |                     |

|                                                                   |                               |                                     |                          |                             |
|-------------------------------------------------------------------|-------------------------------|-------------------------------------|--------------------------|-----------------------------|
| <b>Group Ratings (Team as a Whole) - Check Appropriate Column</b> |                               |                                     |                          |                             |
| <b>ORGANIZATION</b>                                               | <b>1 – Below Expectations</b> | <b>2 – Minimally Meets Criteria</b> | <b>3 –Meets Criteria</b> | <b>4 – Exceeds Criteria</b> |

|                                                             |  |  |  |  |
|-------------------------------------------------------------|--|--|--|--|
| ORGANIZES content logically and sequentially.               |  |  |  |  |
| MAIN points are clearly IDENTIFIED and concisely PRESENTED. |  |  |  |  |
| TRANSITIONS are logical and smooth.                         |  |  |  |  |
| Provides CLEAR DESCRIPTION of project.                      |  |  |  |  |
| <b>STYLE and DELIVERY</b>                                   |  |  |  |  |
| Attracts and holds INTEREST of audience.                    |  |  |  |  |
| SPEAKS clearly, distinctly, and with sufficient volume.     |  |  |  |  |
| Presents material effectively with                          |  |  |  |  |

|                                                                             |  |  |  |  |
|-----------------------------------------------------------------------------|--|--|--|--|
| CONFIDENCE and enthusiasm.                                                  |  |  |  |  |
| Maintains EYE CONTACT throughout presentation.                              |  |  |  |  |
| <b>LANGUAGE and VOCABULARY</b>                                              |  |  |  |  |
| Appropriate use of VOCABULARY. Accurate use of TECHNICAL terms and phrases. |  |  |  |  |
| Consistently follows rules of Standard ENGLISH.                             |  |  |  |  |
| <b>COMMUNICATION OF TECHNICAL CONTENT</b>                                   |  |  |  |  |
| Explain HOW the software SOLVES the sponsor's                               |  |  |  |  |

|                                               |  |  |  |  |
|-----------------------------------------------|--|--|--|--|
| problem or SATISFIES the sponsor's needs.     |  |  |  |  |
| Present and describe the software as DEFINED. |  |  |  |  |
| Describe the key TESTING issues.              |  |  |  |  |

To evaluate student performance in their internships (CSC 195), an evaluation form is completed by the employer. Among other criteria, the form asks the employer to rate the student in terms of "Effective Oral Communication" and "Appropriate Use of Presentation Tools". The possible ratings are:

Outstanding

Above Average

Average

Below Average

Weak

Did Not Observe

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| Q2.4.<br>PLO                        | Q2.5.<br>Stdrd                      | Q2.6.<br>Rubric          | Please indicate where you have published the <b>PLO</b> , the <b>standard</b> of performance, and the <b>rubric</b> that was used to measure the PLO: |
|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | 1. In <b>SOME</b> course syllabi/assignments in the program that address the PLO                                                                      |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | 2. In <b>ALL</b> course syllabi/assignments in the program that address the PLO                                                                       |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | 3. In the student handbook/advising handbook                                                                                                          |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | 4. In the university catalogue                                                                                                                        |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | 5. On the academic unit website or in newsletters                                                                                                     |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | 6. In the assessment or program review reports, plans, resources, or activities                                                                       |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | 7. In new course proposal forms in the department/college/university                                                                                  |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | 8. In the department/college/university's strategic plans and other planning documents                                                                |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | 9. In the department/college/university's budget plans and other resource allocation documents                                                        |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | 10. Other, specify: <input type="text"/>                                                                                                              |

### Question 3: Data Collection Methods and Evaluation of Data Quality for the Selected PLO

#### Q3.1.

Was assessment data/evidence **collected** for the selected PLO?

- ☒ 1. Yes
- ☐ 2. No (skip to **Q6**)
- ☐ 3. Don't know (skip to **Q6**)
- ☐ 4. N/A (skip to **Q6**)

#### Q3.1.1.

How many assessment tools/methods/measures **in total** did you use to assess this PLO?

#### Q3.2.

Was the data **scored / evaluated** for this PLO?

- ☒ 1. Yes
- ☐ 2. No (skip to **Q6**)
- ☐ 3. Don't know (skip to **Q6**)

☐ 4. N/A (skip to Q6)

### Q3.2.1.

Please describe how you collected the assessment data for the selected PLO. For example, in what course(s) or by what means were data collected:

As mentioned in Q1.2, the PLO was assessed in two courses: CSC191 (Senior Project- Part II) and CSC195 (Field Work). The details of the evaluation for each course are as follows.

CSC191 (Senior Project- Part II).

Student presentations of their senior projects were assessed at the end of Fall 2016 semester. All twelve project teams were evaluated. Three students from each team participated in the presentations. So, the total number of student presenters was 36 students.

Eight faculty members participated in the evaluation. Each faculty member completed the form shown in Q2.3 for the each presentation that he/she could attend. A total of 61 forms were completed. So, on average, each faculty evaluated 7.6 presentations.

The results of this evaluation are shown in Q4.1.

CSC195 (Field Work)

A survey (evaluation form) was completed by employers of students who worked as interns in companies or state/federal agencies during their junior or senior year. Internships provide students with valuable work experience before they complete their B.S. degrees. At the completion of an internship, supervisors were asked to rate an intern's performance in a number of different areas, including "Effective oral communication" and "Appropriate use of presentation tools". The evaluation in this cycle included all the students who did internships in Summer 2014, Fall 2015, Spring 2016, Summer 2016 and Fall 2016. The total number of intern students included in the evaluation was 86.

The results are given in Q4.1.

(Remember: **Save your progress**)

## Question 3A: Direct Measures (key assignments, projects, portfolios, etc.)

### Q3.3.

Were direct measures (key assignments, projects, portfolios, course work, student tests, etc.) used to assess this PLO?

- ☒ 1. Yes
- ☐ 2. No (skip to Q3.7)
- ☐ 3. Don't know (skip to Q3.7)

### Q3.3.1.

Which of the following direct measures (key assignments, projects, portfolios, course work, student tests, etc.) were used?  
[Check all that apply]

- ☒ 1. Capstone project (e.g. theses, senior theses), courses, or experiences
- ☒ 2. Key assignments from required classes in the program
- ☐ 3. Key assignments from elective classes
- ☐ 4. Classroom based performance assessment such as simulations, comprehensive exams, or critiques
- ☒ 5. External performance assessments such as internships or other community-based projects
- ☐ 6. E-Portfolios
- ☐ 7. Other Portfolios

☐ 8. Other, specify:

**Q3.3.2.**

Please **provide** the direct measure (key assignments, projects, portfolios, course work, student tests, etc.) you used to collect data, THEN **explain** how it assesses the PLO:

The assessment methodology and direct measures are described in Q2.3 and Q3.2.1.



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**Q3.4.**

What tool was used to evaluate the data?

- ☐ 1. **No** rubric is used to interpret the evidence (skip to **Q3.4.4.**)
- ☐ 2. Used rubric developed/modified by the faculty who teaches the class (skip to **Q3.4.2.**)
- ☒ 3. Used rubric developed/modified by a group of faculty (skip to **Q3.4.2.**)
- ☐ 4. Used rubric pilot-tested and refined by a group of faculty (skip to **Q3.4.2.**)
- ☐ 5. The VALUE rubric(s) (skip to **Q3.4.2.**)
- ☐ 6. Modified VALUE rubric(s) (skip to **Q3.4.2.**)
- ☐ 7. Used other means (Answer **Q3.4.1.**)

**Q3.4.1.**

If you used other means, which of the following measures was used? [**Check all that apply**]

- ☐ 1. National disciplinary exams or state/professional licensure exams (skip to **Q3.4.4.**)
- ☐ 2. General knowledge and skills measures (e.g. CLA, ETS PP, etc.) (skip to **Q3.4.4.**)
- ☐ 3. Other standardized knowledge and skill exams (e.g. ETC, GRE, etc.) (skip to **Q3.4.4.**)
- ☐ 4. Other, specify:  (skip to **Q3.4.4.**)

**Q3.4.2.**

Was the **rubric** aligned directly and explicitly **with the PLO**?

- ☒ 1. Yes
- ☐ 2. No
- ☐ 3. Don't know
- ☐ 4. N/A

**Q3.4.3.**

Was the **direct measure** (e.g. assignment, thesis, etc.) aligned directly and explicitly **with the rubric**?

- ☒ 1. Yes
- ☐ 2. No
- ☐ 3. Don't know
- ☐ 4. N/A

**Q3.4.4.**

Was the **direct measure** (e.g. assignment, thesis, etc.) aligned directly and explicitly **with the PLO**?

- ☒ 1. Yes  
☐ 2. No  
☐ 3. Don't know  
☐ 4. N/A

**Q3.5.**

How many faculty members participated in planning the assessment data **collection** of the selected PLO?

3

**Q3.5.1.**

How many faculty members participated in the **evaluation** of the assessment data for the selected PLO?

8

**Q3.5.2.**

If the data was evaluated by multiple scorers, was there a norming process (a procedure to make sure everyone was scoring similarly)?

- ☐ 1. Yes  
☒ 2. No  
☐ 3. Don't know  
☐ 4. N/A

**Q3.6.**

How did you **select** the sample of student work (papers, projects, portfolios, etc.)?

For CSC191, all senior project teams in Fall 2016 were evaluated.

For CSC195, all students who did internships between Summer 2014 and Fall 2016 were evaluated by their supervisors.

**Q3.6.1.**

How did you **decide** how many samples of student work to review?

For CSC191, ALL senior project teams in Fall 2016 were evaluated.

For CSC195, ALL students who did internships between Summer 2014 and Fall 2016 were evaluated by their supervisors.

**Q3.6.2.**

How many students were in the class or program?

For CSC191, 36 students

For CSC195, 86 students

**Q3.6.3.**

How many samples of student work did you evaluated?

For CSC191, 12 senior projects

For CSC195, 86 students

**Q3.6.4.**

Was the sample size of student work for the direct measure adequate?

- ☒ 1. Yes
- ☐ 2. No
- ☐ 3. Don't know

(Remember: **Save your progress**)

### Question 3B: Indirect Measures (surveys, focus groups, interviews, etc.)

**Q3.7.**

Were indirect measures used to assess the PLO?

- ☐ 1. Yes
- ☒ 2. No (skip to **Q3.8**)
- ☐ 3. Don't Know (skip to **Q3.8**)

**Q3.7.1.**

Which of the following indirect measures were used? **[Check all that apply]**

- ☐ 1. National student surveys (e.g. NSSE)
- ☐ 2. University conducted student surveys (e.g. OIR)
- ☐ 3. College/department/program student surveys or focus groups
- ☐ 4. Alumni surveys, focus groups, or interviews
- ☐ 5. Employer surveys, focus groups, or interviews
- ☐ 6. Advisory board surveys, focus groups, or interviews
- ☐ 7. Other, specify:

**Q3.7.1.1.**

Please explain and attach the indirect measure you used to collect data:



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**Q3.7.2.**

If surveys were used, how was the sample size **decided**?

**Q3.7.3.**

If surveys were used, how did you **select** your sample:

**Q3.7.4.**

If surveys were used, what was the response rate?

### Question 3C: Other Measures (external benchmarking, licensing exams, standardized tests, etc.)

**Q3.8.**

Were external benchmarking data, such as licensing exams or standardized tests, used to assess the PLO?

- ☐ 1. Yes
- ☒ 2. No (skip to **Q3.8.2**)
- ☐ 3. Don't Know (skip to **Q3.8.2**)

**Q3.8.1.**

Which of the following measures was used? **[Check all that apply]**

- ☐ 1. National disciplinary exams or state/professional licensure exams
- ☐ 2. General knowledge and skills measures (e.g. CLA, ETS PP, etc.)
- ☐ 3. Other standardized knowledge and skill exams (e.g. ETC, GRE, etc.)
- ☐ 4. Other, specify:

**Q3.8.2.**

Were other measures used to assess the PLO?

- ☐ 1. Yes
- ☒ 2. No (skip to **Q4.1**)
- ☐ 3. Don't know (skip to **Q4.1**)

**Q3.8.3.**

If other measures were used, please specify:



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(Remember: **Save your progress**)

## Question 4: Data, Findings, and Conclusions

### Q4.1.

Please provide simple tables and/or graphs to summarize the assessment data, findings, and conclusions for the selected PLO in Q2.1:

## Q41 BS COMPUTER SCI

The table below shows the results of the senior project oral presentation evaluation. For each evaluated criterion, the table shows the total number of responses, the number and percentage of ratings meeting the expectation (3 out of 4 in the form) or exceeding the expectation (4 out of 4 in the form). The total number of responses varies slightly (from 57 to 61), because some evaluators did not rate all criteria (they left some boxes blank). The table shows that the percentage of ratings meeting or exceeding the expectation ranges from 82% to 98%, which is well above the 70% target. Therefore, student oral presentation skills meet the performance standards for all evaluated criteria.

Table 1: Results of Senior Project Oral Presentation Evaluation by Faculty

| <b>Performance Indicator</b>                                |                        |                                                 |                                                   |
|-------------------------------------------------------------|------------------------|-------------------------------------------------|---------------------------------------------------|
| <b>ORGANIZATION</b>                                         | <b>Total Responses</b> | <b>Ratings Meeting or Exceeding Expectation</b> | <b>% Ratings Meeting or Exceeding Expectation</b> |
| ORGANIZES content logically and sequentially.               | 61                     | 60                                              | 98 %                                              |
| MAIN points are clearly IDENTIFIED and concisely PRESENTED. | 61                     | 58                                              | 95 %                                              |
| TRANSITIONS are logical and smooth.                         | 59                     | 54                                              | 92 %                                              |

|                                                               |    |    |      |
|---------------------------------------------------------------|----|----|------|
| Provides CLEAR DESCRIPTION of project.                        | 60 | 54 | 90 % |
| <b>STYLE and DELIVERY</b>                                     |    |    |      |
| Attracts and holds INTEREST of audience.                      | 61 | 51 | 84 % |
| SPEAKS clearly, distinctly, and with sufficient volume.       | 61 | 54 | 89 % |
| Presents material effectively with CONFIDENCE and enthusiasm. | 60 | 51 | 85 % |
| Maintains EYE CONTACT throughout presentation.                | 61 | 50 | 82 % |
| <b>LANGUAGE and VOCABULARY</b>                                |    |    |      |

|                                                                                         |    |    |      |
|-----------------------------------------------------------------------------------------|----|----|------|
| Appropriate use of VOCABULARY. Accurate use of TECHNICAL terms and phrases.             | 57 | 56 | 98 % |
| Consistently follows rules of Standard ENGLISH.                                         | 60 | 57 | 95 % |
| <b>COMMUNICATION OF TECHNICAL CONTENT</b>                                               |    |    |      |
| Explain HOW the software SOLVES the sponsor's problem or SATISFIES the sponsor's needs. | 59 | 50 | 85 % |
| Present and describe the software as DEFINED.                                           | 59 | 50 | 85 % |
| Describe the key TESTING issues.                                                        | 60 | 53 | 88 % |

Table 2 shows the results for intern student evaluations by their supervisors. As mentioned in Q2.3, the survey completed by the supervisors included two criteria that are related to oral communication: effective oral presentation and appropriate use of presentation tools. The results in the table show that 100% of the students included in the study received ratings of Average or better in both criteria. An Average rating meets the performance target. However, the results are even better than that. The table shows that the percentage of students who received ratings of "Above Average" or "Outstanding" is 89.5% in "Effective oral presentation" and 87.8% in "Appropriate use of presentation tools". These results strongly indicate that our students' supervisors were generally very satisfied with our students' oral presentation skills during their internships.

Table 2: Results of Intern Student Evaluation by Supervisors

| Criterion                             | Outstanding | Above<br>Average | Average | Below<br>Average | Weak | Did not<br>Observe | % Meeting<br>Target |
|---------------------------------------|-------------|------------------|---------|------------------|------|--------------------|---------------------|
| Effective oral presentation           | 46          | 31               | 9       | 0                | 0    | 0                  | 100%                |
| Appropriate use of presentation tools | 33          | 25               | 8       | 0                | 0    | 20                 | 100%                |

 No file attached No file attached**Q4.2.**

Are students doing well and meeting the program standard? If not, how will the program work to improve student performance of the selected PLO?

As discussed in Q4.1, the assessment results for both methods show that the percentage of students meeting or exceeding the performance standards is well above the target percentage of 70%. For senior project presentations, the percentages ranged from 82% to 98%. For interns, the percentages were 100% for both criteria. See Q4.1 for more details.

 No file attached No file attached**Q4.3.**

For the selected PLO, the student performance:

- ☒ 1. **Exceeded** expectation/standard
- ☐ 2. **Met** expectation/standard
- ☐ 3. **Partially** met expectation/standard
- ☐ 4. Did not meet expectation/standard
- ☐ 5. No expectation/standard has been specified
- ☐ 6. Don't know

## Question 4A: Alignment and Quality

**Q4.4.**

Did the data, including the direct measures, from all the different assessment tools/measures/methods directly align with the PLO?

- ☒ 1. Yes
- ☐ 2. No
- ☐ 3. Don't know

**Q4.5.**

Were **all** the assessment tools/measures/methods that were used good measures of the PLO?

- ☒ 1. Yes
- ☐ 2. No
- ☐ 3. Don't know

## Question 5: Use of Assessment Data (Closing the Loop)

### Q5.1.

As a result of the assessment effort and based on prior feedback from OAPA, do you anticipate *making any changes* for your program (e.g. course structure, course content, or modification of PLOs)?

- ☐ 1. Yes
- ☒ 2. No (skip to Q5.2)
- ☐ 3. Don't know (skip to Q5.2)

#### Q5.1.1.

Please describe *what changes* you plan to make in your program as a result of your assessment of this PLO. Include a description of how you plan to assess the impact of these changes.

#### Q5.1.2.

Do you have a plan to assess the *impact of the changes* that you anticipate making?

- ☐ 1. Yes
- ☐ 2. No
- ☐ 3. Don't know

### Q5.2.

Since your last assessment report, **how have the assessment data from then been used** so far?

|                                                   | 1.<br>Very<br>Much               | 2.<br>Quite<br>a Bit             | 3.<br>Some                       | 4.<br>Not at<br>All              | 5.<br>N/A                        |
|---------------------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 1. Improving specific courses                     | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            |
| 2. Modifying curriculum                           | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/>            |
| 3. Improving advising and mentoring               | <input type="radio"/>            | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/>            |
| 4. Revising learning outcomes/goals               | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/>            |
| 5. Revising rubrics and/or expectations           | <input type="radio"/>            | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/>            |
| 6. Developing/updating assessment plan            | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/>            |
| 7. Annual assessment reports                      | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            |
| 8. Program review                                 | <input type="radio"/>            | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/>            |
| 9. Prospective student and family information     | <input type="radio"/>            | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/>            |
| 10. Alumni communication                          | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            | <input checked="" type="radio"/> |
| 11. WSCUC accreditation (regional accreditation)  | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            |
| 12. Program accreditation                         | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            |
| 13. External accountability reporting requirement | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            | <input checked="" type="radio"/> |
| 14. Trustee/Governing Board deliberations         | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/>            | <input checked="" type="radio"/> |
| 15. Strategic planning                            |                                  |                                  |                                  |                                  |                                  |

|                                                    |                       |                                  |                                  |                       |                                  |
|----------------------------------------------------|-----------------------|----------------------------------|----------------------------------|-----------------------|----------------------------------|
|                                                    | <input type="radio"/> | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/>            |
| 16. Institutional benchmarking                     | <input type="radio"/> | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/> | <input checked="" type="radio"/> |
| 17. Academic policy development or modifications   | <input type="radio"/> | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/> | <input checked="" type="radio"/> |
| 18. Institutional improvement                      | <input type="radio"/> | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/> | <input checked="" type="radio"/> |
| 19. Resource allocation and budgeting              | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/> | <input type="radio"/>            |
| 20. New faculty hiring                             | <input type="radio"/> | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/>            |
| 21. Professional development for faculty and staff | <input type="radio"/> | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/>            |
| 22. Recruitment of new students                    | <input type="radio"/> | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/> | <input checked="" type="radio"/> |

23. Other, specify:

**Q5.2.1.**

Please provide a detailed example of how you used the assessment data above:

## Q521 BS COMPUTER SCI

Indicator A-7 (Understand and apply the logic programming paradigm) was not meeting the target in Fall 2015. Only 64% of the students met the performance standards. This indicator is evaluated in CSC135.

In Fall 2016, the instructor of CSC 135 implemented the following change.

He added an additional two-question quiz on logic programming. In the next day, he went over the quiz results and the proper way of solving the problems.

The instructor then did the reassessment in two sections separately.

The percentages of students meeting the standards for this indicator were 80% in the first section and 73% in the other section. Both percentages are above the 70% target.

**Therefore, both sections met the minimum standards independently. The results indicate that learning was improved compared to the previous assessment period.**

Indicator A-10 (Understand network architecture, layered model, and protocol stacks) was not meeting the target in Fall 2015. Only 65% of the students met the performance standards. This indicator is evaluated in CSC138. In Fall 2016, the instructor of CSC138 implemented the following change.

The instructor noted that students may get overwhelmed with the details of one network layer if that layer is not compared with other layers. So, she related and compared each network layer under study with other layers, by explaining for example the corresponding protocols that may be used in other layers. At the end of the semester, she summarized the entire network architecture by providing a concrete scenario that shows the activities and protocols at each layer.

In Fall 2016, the percentage of students meeting the performance standards for this indicator was 79%, which is well above the target.

Indicator B-2 (Understand and apply requirements engineering process) was not meeting the target in Fall 2015. Only 65% of the students met the performance standards. This indicator is evaluated in CSC131.

In Fall 2016, the instructor of CSC131 implemented the following change:

The instructor provided in-depth lectures on the requirement engineering (RE) process. He had students practice the materials in various in-class exercises and homework assignments. He tested students' progress in the midterm exam and provided students with detailed feedback and corrections. He also reviewed the material before the final exam.

In Fall 2016, the percentage of students meeting the performance standards for this indicator was 91%, which is well above the target.

Indicator C-1 (Understand and use software metrics) was not meeting the target in Fall 2015. Only 54% of the students met the performance standards. This indicator is evaluated in CSC131.

In Fall 2016, the instructor implemented the following change:

The instructor provided in-depth lectures on software engineering metrics. He had students practice the materials in various in-class exercises and homework assignments. He provided examples and demonstrations on code coverage. He tested students' progress in quizzes and provided students with detailed feedback and corrections. He also reviewed the material before the final exam.

In Fall 2016, the percentage of students meeting the performance standards for this indicator was 90%, which is well above the target.

**Q5.3.**

To what extent did you apply **last year's feedback** from the Office of Academic Program Assessment in the following areas?

|                                                   | 1.<br>Very<br>Much    | 2.<br>Quite<br>a bit  | 3.<br>Some                       | 4.<br>Not at<br>All              | 5.<br>N/A             |
|---------------------------------------------------|-----------------------|-----------------------|----------------------------------|----------------------------------|-----------------------|
| 1. Program Learning Outcomes                      | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/> |
| 2. Standards of Performance                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/> |
| 3. Measures                                       | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/> |
| 4. Rubrics                                        | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/> |
| 5. Alignment                                      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/> |
| 6. Data Collection                                | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="radio"/> |
| 7. Data Analysis and Presentation                 | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/> |
| 8. Use of Assessment Data                         | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="radio"/> |
| 9. Other, please specify:<br><input type="text"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>            | <input type="radio"/>            | <input type="radio"/> |

**Q5.3.1.**

Please share with us an example of how you applied **last year's feedback** from the Office of Academic Program Assessment in any of the areas above:

In this year's report, we have made an effort to clearly describe the measures and rubrics that we have used in the assessment. We have also tried to clearly define the standard for "satisfactory performance".

We have also considered modifying the PLOs to use action verbs, but this requires departmental discussion and approval. We plan on pursuing this in the next year 2017/2018.

(Remember: **Save your progress**)

## Additional Assessment Activities

**Q6.**

Many academic units have collected assessment data on aspect of their program *that are not related to the PLOs* (i.e. impacts of an advising center, etc.). **If** your program/academic unit has collected data on program *elements*, please briefly report your results here:

N/A



No file attached



No file attached

**Q7.**

What PLO(s) do you plan to assess next year? **[Check all that apply]**

☐

1. **Critical Thinking**

☐

2. **Information Literacy**

☒

3. **Written Communication**

- ☐ 4. **Oral Communication**
- ☐ 5. Quantitative Literacy
- ☐ 6. **Inquiry and Analysis**
- ☐ 7. Creative Thinking
- ☐ 8. Reading
- ☐ 9. Team Work
- ☐ 10. Problem Solving
- ☐ 11. Civic Knowledge and Engagement
- ☐ 12. **Intercultural Knowledge, Competency, and Perspectives**
- ☒ 13. Ethical Reasoning
- ☐ 14. Foundations and Skills for Lifelong Learning
- ☐ 15. **Global Learning and Perspectives**
- ☐ 16. Integrative and Applied Learning
- ☐ 17. Overall Competencies for GE Knowledge
- ☐ 18. **Overall Disciplinary Knowledge**
- ☐ 19. **Professionalism**
- ☐ 20. Other, specify any PLOs not included above:

a.

b.

c.

**Q8.** Please attach any additional files here:



No file attached



No file attached



No file attached



No file attached

**Q8.1.**

Have you attached any files to this form? If yes, please list every attached file here:

Assessment Plan

Curriculum Map

## Program Information (**Required**)

**Program:**

(If you typed your program name at the beginning, please skip to Q10)

**Q9.**

Program/Concentration Name: [skip if program name appears above]

BS Computer Science

**Q10.**

Report Author(s):

Ghassan Shobaki

**Q10.1.**

Department Chair/Program Director:

Cui Zhang

**Q10.2.**

Assessment Coordinator:

Ghassan Shobaki

**Q11.**

Department/Division/Program of Academic Unit

Computer Science

**Q12.**

College:

College of Engineering and Computer Science

**Q13.**

Total enrollment for Academic Unit during assessment semester (see Departmental Fact Book):

583

**Q14.**

Program Type:

- ☒ 1. Undergraduate baccalaureate major
- ☐ 2. Credential
- ☐ 3. Master's Degree
- ☐ 4. Doctorate (Ph.D./Ed.D./Ed.S./D.P.T./etc.)
- ☐ 5. Other, specify:

**Q15. Number of undergraduate degree programs** the academic unit has?

2

**Q15.1.** List all the names:

BS in computer science (submitted here)

BS in computer engineering, joint program with electrical engineering (to be submitted separately)

Only CS is submitted here. CE to be submitted separately.

**Q15.2.** How many concentrations appear on the diploma for this undergraduate program?

0

**Q16. Number of master's degree programs** the academic unit has?

3

**Q16.1.** List all the names:

Computer Science

Computer Engineering

Software Engineering

**Q16.2.** How many concentrations appear on the diploma for this master's program?

0

**Q17.** Number of **credential programs** the academic unit has?

0

**Q17.1.** List all the names:

**Q18.** Number of **doctorate degree programs** the academic unit has?

0

**Q18.1.** List all the names:

When was your **assessment plan...**

|                             | 1.<br>Before<br>2011-12          | 2.<br>2012-13         | 3.<br>2013-14         | 4.<br>2014-15                    | 5.<br>2015-16         | 6.<br>2016-17         | 7.<br>No Plan         | 8.<br>Don't<br>know   |
|-----------------------------|----------------------------------|-----------------------|-----------------------|----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <b>Q19.</b> developed?      | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| <b>Q19.1.</b> last updated? | <input type="radio"/>            | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

**Q19.2. (REQUIRED)**

Please **obtain** and **attach** your latest **assessment plan**:



CS\_BS\_Assessment\_Plan.docx  
23.45 KB

**Q20.**

Has your program developed a **curriculum map**?

☐

1. Yes

- ☐ 2. No
- ☐ 3. Don't know

**Q20.1.**

Please **obtain** and **attach** your latest **curriculum map**:



CS\_BS\_Curriculum\_Map.docx  
14.61 KB

**Q21.**

Has your program indicated in the curriculum map where assessment **of student learning** occurs?

- ☐ 1. Yes
- ☒ 2. No
- ☐ 3. Don't know

**Q22.**

Does your program have a capstone class?

- ☒ 1. Yes, indicate:
- ☐ 2. No
- ☐ 3. Don't know

**Q22.1.**

Does your program have **any** capstone project?

- ☒ 1. Yes
- ☐ 2. No
- ☐ 3. Don't know

(Remember: **Save your progress**)

ver. 5.15/17

To evaluate student oral presentations for the senior project (CSC191 Part II), the following evaluation form was used. This form was completed by the faculty members who have participated in the evaluation as detailed in Q3.2.1. **(RUBRIC BELOW)**

|                         |  |                               |  |                           |                   |                               |                     |
|-------------------------|--|-------------------------------|--|---------------------------|-------------------|-------------------------------|---------------------|
| <b>Computer Science</b> |  |                               |  | <b>Oral Communication</b> |                   |                               |                     |
|                         |  |                               |  | <b>Evaluation</b>         |                   |                               |                     |
| <b>Course: CSC 191</b>  |  | <b>Instructor: R. Buckley</b> |  |                           |                   | <b>Date: December 9, 2016</b> |                     |
| <b>Team Name:</b> _____ |  | <b>Evaluator:</b>             |  | <b>Faculty</b>            | <b>Instructor</b> | <b>Student</b>                | <b>Industry Rep</b> |
|                         |  |                               |  |                           |                   |                               |                     |

To evaluate student performance in their internships (CSC 195), an evaluation form is completed by the employer. Among other criteria, the form asks the employer to rate the student in terms of "Effective Oral Communication" and "Appropriate Use of Presentation Tools". The possible ratings are:

Outstanding

Above Average

Average

Below Average

Weak

Did Not Observe

| <b>Group Ratings (Team as a Whole) - Check Appropriate Column</b> |                               |                                     |                          |                             |
|-------------------------------------------------------------------|-------------------------------|-------------------------------------|--------------------------|-----------------------------|
| <b>ORGANIZATION</b>                                               | <b>1 – Below Expectations</b> | <b>2 – Minimally Meets Criteria</b> | <b>3 –Meets Criteria</b> | <b>4 – Exceeds Criteria</b> |
| ORGANIZES content logically and sequentially.                     |                               |                                     |                          |                             |
| MAIN points are clearly IDENTIFIED and concisely PRESENTED.       |                               |                                     |                          |                             |
| TRANSITIONS are logical and smooth.                               |                               |                                     |                          |                             |
| Provides CLEAR DESCRIPTION of project.                            |                               |                                     |                          |                             |
| <b>STYLE and DELIVERY</b>                                         |                               |                                     |                          |                             |
| Attracts and holds INTEREST of audience.                          |                               |                                     |                          |                             |
| SPEAKS clearly, distinctly, and with sufficient volume.           |                               |                                     |                          |                             |
| Presents material effectively with CONFIDENCE and enthusiasm.     |                               |                                     |                          |                             |
| Maintains EYE CONTACT throughout presentation.                    |                               |                                     |                          |                             |

|                                                                                         |  |  |  |  |
|-----------------------------------------------------------------------------------------|--|--|--|--|
| <b>LANGUAGE and VOCABULARY</b>                                                          |  |  |  |  |
| Appropriate use of VOCABULARY. Accurate use of TECHNICAL terms and phrases.             |  |  |  |  |
| Consistently follows rules of Standard ENGLISH.                                         |  |  |  |  |
| <b>COMMUNICATION OF TECHNICAL CONTENT</b>                                               |  |  |  |  |
| Explain HOW the software SOLVES the sponsor's problem or SATISFIES the sponsor's needs. |  |  |  |  |
| Present and describe the software as DEFINED.                                           |  |  |  |  |
| Describe the key TESTING issues.                                                        |  |  |  |  |

### ***B.S. Computer Science Three-Year Assessment Plan for Student Outcomes***

| <b>Year</b>                   | <b>Outcomes Assessed<br/>(Abbreviated Form)</b>                         | <b>Courses</b>                            | <b>Data Collected</b>                                                                                                                 | <b>Continuous<br/>Improvement</b>                                                                                                                              |
|-------------------------------|-------------------------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Year 1<br/>(2015-2016)</b> | (a) Application of fundamental knowledge                                | CSC 130, 133, 134, 135, 137, 138, and 139 | Direct assessment in course-embedded exam questions, assignments, and projects<br><br>Supervisor evaluation of student interns        | Analyze results of assessment of SOs (a)-(d) and make recommendations for the performance indicators that are below the standard (target success rate of 70%). |
|                               | (b) Computer system development cycle                                   | CSC 131, 137, 138, 139, and 190/191       |                                                                                                                                       | Implement previous year's faculty recommendations for performance indicators for SOs (g) and (h) that are below minimum and re-assess these indicators.        |
|                               | (c) Application of software development principles                      | CSC 131, 133, 138, and 190/191            |                                                                                                                                       |                                                                                                                                                                |
|                               | (d) Application of skills, techniques, and tools for computing practice | CSC 133, 134, 135, 137, 139, and 195/195A |                                                                                                                                       |                                                                                                                                                                |
| <b>Year 2<br/>(2016-2017)</b> | (e) Team work                                                           | CSC 131, 190/ 191, and 195/195A           | Instructor evaluation<br>Student self-assessment and reflection<br>Supervisor evaluation of student interns                           | Analyze results of assessment of SO (e) and SO (f) and make recommendations for performance indicators below standard.                                         |
|                               | (f) Oral Communication                                                  | CSC 131, 190/191, and 195/195A            | Faculty evaluation of student oral presentations using a rubric<br>Supervisor evaluation of student interns                           | Implement previous year's faculty recommendations for performance indicators for SOs (a) - (d) that are below minimum and, re-assess these indicators.         |
| <b>Year 3<br/>(2017-2018)</b> | (g) Professional, ethical, and security issues and responsibilities     | CSC 138, 190/191, and 195/195A; PHIL 103  | Course-embedded exam questions<br>Student surveys<br>Faculty evaluation of written essays<br>Supervisor evaluation of student interns | Analyze results of assessment of SO (g) and SO (h) and make recommendations for performance indicators below standard.                                         |
|                               | (h) Written communication                                               | CSC 190/191 and 195/195A                  | Faculty evaluation of written reports using a rubric<br>Supervisor evaluation of student interns                                      | Implement previous year's faculty recommendations for performance indicators for SO (e) and SO (f) that are below minimum and, re-assess these indicators.     |

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|--|--|--|--|--|

***The expected level of attainment for each of the student outcomes.***

For each performance indicator, the percentage of student responses meeting or exceeding the performance standard is computed. Then, for each outcome, the average of the percentages for all relevant performance indicators is computed. If the average percentage for an outcome is greater than or equal to 70%, the outcome is considered to be satisfied. Although, in the past, the minimum standard was set at 75%, the faculty decided in 2013-2014 to use a 70% standard since it is common practice to consider a score of 70% to be a passing grade.

***Correspondence between Upper Division Required Courses and Student Outcomes***

| <b>Outcomes<br/>Courses</b>       | <b>(a)</b> | <b>(b)</b> | <b>(c)</b> | <b>(d)</b> | <b>(e)</b> | <b>(f)</b> | <b>(g)</b> | <b>(h)</b> |
|-----------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>CSC 130</b>                    | X          |            |            | X          |            |            |            |            |
| <b>CSC 131</b>                    | X          | X          | X          | X          | X          | X          | X          | X          |
| <b>CSC 133</b>                    | X          | X          | X          | X          |            |            |            |            |
| <b>CSC 134</b>                    | X          |            |            | X          |            |            |            |            |
| <b>CSC 135</b>                    | X          | X          | X          | X          |            |            |            |            |
| <b>CSC 137</b>                    | X          | X          |            | X          |            |            |            |            |
| <b>CSC 138</b>                    | X          | X          | X          | X          |            | X          |            |            |
| <b>CSC 139</b>                    | X          | X          |            | X          |            | X          |            |            |
| <b>CSC 190/191</b>                | X          | X          | X          | X          | X          | X          | X          | X          |
| <b>CSC 192 &amp; CSC<br/>194</b>  |            |            |            |            |            | X          | X          |            |
| <b>CSC 195 &amp; CSC<br/>195A</b> | X          | X          | X          | X          | X          | X          | X          | X          |
| <b>CSC 198 &amp; CSC<br/>199</b>  | X          | X          |            | X          |            | X          |            |            |

## ***Student Outcomes and Performance Indicators***

|                                                                                                                                                                                                                                                              | <b>Performance Indicator</b>                                                                                                        | <b>Core Course</b> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| (a) Apply fundamental knowledge of mathematics, algorithmic principles, computer theory, and principles of computing systems in the modeling and design of computer-based systems that demonstrate an understanding of tradeoffs involved in design choices. | a-1. Understand fundamental algorithms and essential data structures.                                                               | CSC 130            |
|                                                                                                                                                                                                                                                              | a-2. Understand trade-offs in the selection of algorithms and data structures.                                                      | CSC 130            |
|                                                                                                                                                                                                                                                              | a-3. Understand and apply mathematical transformations and algorithms for 2D graphics.                                              | CSC 133            |
|                                                                                                                                                                                                                                                              | a-4. Understand and use relational databases.                                                                                       | CSC 134            |
|                                                                                                                                                                                                                                                              | a-5. Understand distinctive features of the design of programming languages.                                                        | CSC 135            |
|                                                                                                                                                                                                                                                              | a-6. Demonstrate knowledge of abstract machines, languages, and grammars.                                                           | CSC 135            |
|                                                                                                                                                                                                                                                              | a-7. Understand and apply the logic programming paradigm.                                                                           | CSC 135            |
|                                                                                                                                                                                                                                                              | a-8. Understand and apply the functional programming paradigm.                                                                      | CSC 135            |
|                                                                                                                                                                                                                                                              | a-9. Demonstrate the ability to calculate performance parameters, such as, circuit propagation delay, memory latency, speedup, etc. | CSC 137            |
|                                                                                                                                                                                                                                                              | a-10. Understand network architecture, layered model, and protocol stacks.                                                          | CSC 138            |
|                                                                                                                                                                                                                                                              | a-11. Demonstrate the working knowledge of network management including monitoring, measurement, analysis, and control.             | CSC 138            |
|                                                                                                                                                                                                                                                              | a-12. Understand principles of concurrency and tradeoffs in synchronization approaches, analysis, and control.                      | CSC 139            |
|                                                                                                                                                                                                                                                              | a-13. Understand deadlocks and their solutions.                                                                                     | CSC 139            |
|                                                                                                                                                                                                                                                              | a-14. Understand principles of resource management.                                                                                 | CSC 139            |
|                                                                                                                                                                                                                                                              |                                                                                                                                     |                    |

|                                                                                                                                                                           |                                                                                                                       |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------|
| (b) Analyze a problem, specify the requirements, design, implement, and evaluate a computer-based system, process, component, or program that satisfies the requirements. | b-1. Understand and apply modeling and analysis techniques.                                                           | CSC 131, 190/191  |
|                                                                                                                                                                           | b-2. Understand and apply requirements engineering process.                                                           | CSC 131, 190/191  |
|                                                                                                                                                                           | b-3. Understand and apply design principles.                                                                          | CSC 131*, 190/191 |
|                                                                                                                                                                           | b-4. Understand and apply proper testing techniques                                                                   | CSC 131*, 190/191 |
|                                                                                                                                                                           | b-5. Understand and apply project management processes and tools.                                                     | CSC 131, 190/191  |
|                                                                                                                                                                           | b-6. Demonstrate the ability to design and analyze basic and complex hardware components.                             | CSC 137           |
|                                                                                                                                                                           | b-7. Understand and apply error detection and correction, flow control, and congestion control principles.            | CSC 138           |
|                                                                                                                                                                           | b-8. Understand and apply synchronization mechanisms to the critical section problem and to the process coordination. | CSC 139           |
|                                                                                                                                                                           |                                                                                                                       |                   |
| (c) Apply design and development principles in the construction of software systems of varying complexity.                                                                | c-1. Understand and use software metrics.                                                                             | CSC 131           |
|                                                                                                                                                                           | c-2. Understand and use object-oriented design.                                                                       | CSC 131*, 133     |
|                                                                                                                                                                           | c-3. Understand and use design patterns.                                                                              | CSC 133           |
|                                                                                                                                                                           | c-4. Understand and use verification and validation techniques.                                                       | CSC 131, 190/191  |
|                                                                                                                                                                           | c-5. Understand and apply documentation standards.                                                                    | CSC 131, 190/191  |
|                                                                                                                                                                           | c-6. Understand and apply semi-formal modeling languages, such as, UML, in requirement specification and design.      | CSC 190/191       |
|                                                                                                                                                                           | c-7. Demonstrate the ability to develop communication protocols and networking applications.                          | CSC 138           |
|                                                                                                                                                                           |                                                                                                                       |                   |

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|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| (d) Use current skills, techniques, and tools necessary for computing practice. | d-1. Implement event-driven GUI applications.                                                                                                                                                                        | CSC 133               |
|                                                                                 | d-2. Demonstrate competence in using SQL.                                                                                                                                                                            | CSC 134               |
|                                                                                 | d-3. Demonstrate competence in programming in a variety of programming paradigms.                                                                                                                                    | CSC 135               |
|                                                                                 | d-4. Demonstrate competence in language scanning and parsing.                                                                                                                                                        | CSC 135               |
|                                                                                 | d-5. Demonstrate the ability to use hardware design simulation tools.                                                                                                                                                | CSC 137               |
|                                                                                 | d-6. Demonstrate competence in system programming in Unix/Linux environments.                                                                                                                                        | CSC 139               |
|                                                                                 |                                                                                                                                                                                                                      |                       |
| (e) Function effectively as a team to accomplish a common goal.                 | e-1 Cooperate and collaborate as a team member.                                                                                                                                                                      | CSC 191               |
|                                                                                 | e-2. Communicate and listen; keep teammates informed.                                                                                                                                                                | CSC 191               |
|                                                                                 | e-3. Face conflicts and resolve most differences.                                                                                                                                                                    | CSC 191               |
|                                                                                 | e-4 Contribute equally as a participant in the project.                                                                                                                                                              | CSC 191               |
|                                                                                 |                                                                                                                                                                                                                      |                       |
| (f) Understand professional, ethical, and security issues and responsibilities. | f-1. Know, understand, and practice professional codes of conduct (*i.e., ACM Code of Ethics and Professional Conduct, IEEE Code of Ethics, ACM/IEEE Software Engineering Code of Ethics and Professional Practice.) | PHIL 103, CSC 190/191 |
|                                                                                 | f-2 Understand need for and use of proper security features.                                                                                                                                                         | CSC 138               |
|                                                                                 | f-3. Be able to evaluate the ethical dimensions of a computer solution to a problem.                                                                                                                                 | PHIL 103              |
|                                                                                 | f-4. Understand moral and ethical dimensions of a computer solution to a problem.                                                                                                                                    | PHIL 103              |
|                                                                                 |                                                                                                                                                                                                                      |                       |

|                                        |                                                                                                                                                                                 |              |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| (g) Write effectively.                 | g-1. Focus – responds to the questions asked.                                                                                                                                   | CSC 191      |
|                                        | g-2. Structure – well-organized, consistent style, and smooth transitions                                                                                                       | CSC 191      |
|                                        | g-3. Sentence Structure – use of language: clearly communicates ideas, uses correct syntax, grammar, and spelling.<br>Word Choice – use and placement of words are appropriate. | CSC 191      |
|                                        | g-4. Paragraph Structure – well-written paragraphs on topic and understandable.                                                                                                 | CSC 191      |
|                                        | g-5. Problem Statement – objective, nature of challenges, and value of project are clear; purpose is clear.                                                                     | CSC 191      |
|                                        | g-6. Design Requirements – specifications complete and design constraints identified                                                                                            | CSC 191      |
|                                        |                                                                                                                                                                                 |              |
| (h) Give effective oral presentations. | h-1. Effective style and delivery.                                                                                                                                              | CSC 131, 191 |
|                                        | h-2. Correct language and vocabulary                                                                                                                                            | CSC 131, 191 |
|                                        | h-3. Good organization                                                                                                                                                          | CSC 131, 191 |
|                                        | h-4. Clear communication of technical content                                                                                                                                   | CSC 131, 191 |
|                                        | h-5. Project related issues                                                                                                                                                     | CSC 191      |
|                                        |                                                                                                                                                                                 |              |