2015-2016
Annual Assessment Report Template

For instructions and guidelines visit our **website**
or **contact us** for more help.

Report: BS Computer Science

Question 1: Program Learning Outcomes

Q1.1.
Which of the following Program Learning Outcomes (PLOs) and Sac State Baccalaureate Learning Goals (BLGs) **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 and Competency

☐ 13. Ethical Reasoning

☐ 14. Foundations and Skills for Lifelong Learning

☐ 15. Global Learning

☐ 16. Integrative and Applied Learning

☐ 17. Overall Competencies for GE Knowledge

☑ 18. Overall Competencies in the Major/Discipline

☐ 19. 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 such as how your specific PLOs are **explicitly** linked to the Sac State BLGs:

In the computer science (CS) department, we use the following outcomes to evaluate student competencies in the major/dscipline:

Outcome (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.

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) 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 **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):

Overall Competencies in the Major/Disicpline

Q2.1.1.
Please provide more background information about the **specific PLO** you've chosen in Q2.1.

We have developed performance indicators to evaluate our outcomes as explained in Q1.2.

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.

Each of the performance indicators listed in Q1.2 is evalauted using one or more exam questions or homework assignments. For each indicator, the target is that at least 70% of the students have satisfactory performance on the questions or assignments that are used for evaluating that indicator. If that 70% target is not met, actions are taken in the next year to improve student performance. More details appear in the assessment plan attached in P 11.3.

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

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?

Don't know

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 explained in Q1.2, one or more courses were selected for evaluating each performance indicator. The instructor for each core course was responsible for evaluating the set of performance indicators mapped to his/her course. The evaluation was done using one or more exam questions or homework assignments. Student performance data for each indicator were reported by the instructors to the assessment coordinator, who analyzed the results.

(**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 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 **explain** and **attach** the direct measure you used to collect data:

All the questions and assignments that were used in the evaluation have been reported to the assessment coordinator. These questions and assignments can be provided upon request.

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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?

> Entire faculty

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.)?

> That was selected by each instructor based on the indicators.

Q3.6.1.
How did you **decide** how many samples of student work to review?

> The work of all the students in each assessed class was included in the assessment.

Q3.6.2.

How many students were in the class or program?

```
The average class size in our
department is 35.
```

Q3.6.3.
How many samples of student work did you evaluated?

```
All of them.
```

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**?

[blank box]

Q3.7.3.
If surveys were used, how did you **select** your sample:

[blank box]

Q3.7.4.
If surveys were used, what was the response rate?

[blank box]

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: [blank box]

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:

[empty box]

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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 for **Q2.1**:

Table 1. Assessment Results for Outcome (a)

		CSC Core	Success
Performance Indicator			

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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 noted in Q4.1, students performance me our program's standards (the target success rate) for most but not all performance indicators. Students did not meet the standards for four indicators: a.7, a.10, b.2 and c.1. As mentioned in Q4.1, the assessment coordinator will be working with the instructors of these courses on improving student performance on the corresponding indicators and then doing a reassessment.

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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.

As mentioned in Q5, our students did not meet the target success rate for four performance indicators. Each performance indicator corresponds to a certain skill that the assessment coordinator and the course instructor will be working on improving. Methods of improvement include spending more lecture time and giving more excercises to improve these skills. After implementing these improvements, we will be reassessing student performance on these indicators.

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.

How have the assessment data from the last annual assessment been used so far? [**Check all that apply**]	1. Very Much	2. Quite a Bit	3. Some	4. Not at All	5. N/A
1. Improving specific courses	○	○	○	○	☉
2. Modifying curriculum	○	○	○	○	☉
3. Improving advising and mentoring	○	○	○	○	☉
4. Revising learning outcomes/goals	○	○	○	○	☉

	1	2	3	4	5
5. Revising rubrics and/or expectations	○	○	○	○	◉
6. Developing/updating assessment plan	○	○	○	○	◉
7. Annual assessment reports	○	○	○	○	◉
8. Program review	○	○	◉	○	○
9. Prospective student and family information	○	○	○	○	◉
10. Alumni communication	○	○	○	○	◉
11. WSCUC accreditation (regional accreditation)	○	○	○	○	◉
12. Program accreditation	◉	○	○	○	○
13. External accountability reporting requirement	○	○	○	○	◉
14. Trustee/Governing Board deliberations	○	○	○	○	◉
15. Strategic planning	○	○	◉	○	○
16. Institutional benchmarking	○	○	○	○	◉
17. Academic policy development or modifications	○	○	○	○	◉
18. Institutional improvement	○	○	○	○	◉
19. Resource allocation and budgeting	○	○	○	○	◉
20. New faculty hiring	○	○	○	○	◉
21. Professional development for faculty and staff	○	○	○	○	◉
22. Recruitment of new students	○	○	○	○	◉

23. Other, specify:

Q5.2.1.
Please provide a detailed example of how you used the assessment data above:

The above assessment data for 2015/2016 has not been used yet. As explained above, it will be used in Fall 2016 to improve student performance on the indicators that did not meet the target. This approach was used in previous years according to the ABET accreditation standards and procedures.

(**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

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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 and Competency

☐ 13. Ethical Reasoning

☐ 14. Foundations and Skills for Lifelong Learning

☐ 15. Global Learning

☐ 16. Integrative and Applied Learning

☐ 17. Overall Competencies for GE Knowledge

☐ 18. Overall Competencies in the Major/Discipline

☐ 19. 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:

No attachements. All the data was cut and pasted into the corresponding fields.

Program Information (**Required**)

P1.
Program/Concentration Name(s): [by degree]

BS Computer Science

P1.1.
Program/Concentration Name(s): [by department]

Computer Science BS

P2.
Report Author(s):

Ghassan Shobaki

P2.1.
Department Chair/Program Director:

Cui Zhang

P2.2.
Assessment Coordinator:

Ghassan Shobaki

P3.
Department/Division/Program of Academic Unit

Computer Science

P4.
College:

College of Engineering and Computer Science

P5.
Total enrollment for Academic Unit during assessment semester (see Departmental Fact Book):

1037 in Fall 2015

P6.
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:

P7. Number of **undergraduate degree programs** the academic unit has?

2

P7.1. 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.

P7.2. How many concentrations appear on the diploma for this undergraduate program?

0

P8. Number of **master's degree programs** the academic unit has?

3

P8.1. List all the names:

Computer Science

Software Engineering

Computer Engineering, joint program with electrical engineering

P8.2. How many concentrations appear on the diploma for this master's program?

0

P9. Number of **credential programs** the academic unit has?

0

P9.1. List all the names:

P10. Number of **doctorate degree programs** the academic unit has?

0

P10.1. List all the names:

When was your **assessment plan**...	1. Before 2010-11	2. 2011-12	3. 2012-13	4. 2013-14	5. 2014-15	6. No Plan	7. Don't know
P11. developed?	●	○	○	○	○	○	○
P11.1. last updated?	○	○	○	○	●	○	○

P11.3.
Please attach your latest **assessment plan**:

> 📎 **CS_BS_Assessment_Plan.docx**
> **23.45 KB**

P12.
Has your program developed a **curriculum map?**

● 1. Yes

○ 2. No

○ 3. Don't know

P12.1.
Please attach your latest **curriculum map**:

> 📎 CS_BS_Curriculum_Map.docx
> 14.61 KB

P13.
Has your program indicated in the curriculum map where assessment **of student learning** occurs?

○ 1. Yes

● 2. No

○ 3. Don't know

P14.
Does your program have a capstone class?

● 1. Yes, indicate: CSC 190/191

○ 2. No

○ 3. Don't know

P14.1.
Does your program have **any** capstone project?

● 1. Yes

○ 2. No

○ 3. Don't know

(**Remember**: Save your progress)

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

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

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

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

Student Outcomes and Performance Indicators

	Performance Indicator	**Core Course**
(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-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) Analyze a problem, specify the requirements, design, implement, and evaluate a computer-based system, process, component, or program that satisfies the requirements.	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-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) Apply design and development principles in the construction of software systems of varying complexity.	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

	d-1. Implement event-driven GUI applications.	CSC 133
	d-2. Demonstrate competence in using SQL.	CSC 134
(d) Use current skills, techniques, and tools necessary for computing practice.	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-1 Cooperate and collaborate as a team member.	CSC 191
(e) Function effectively as a team to accomplish a common goal.	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. 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

B.S. in Computer Science

Alignment of Student Learning Outcomes with University Baccalaureate Learning Goals

University Baccalaureate Learning Goals	(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