

Instructional Program Review Report

Sierra College, 2014-15

Department/Program Name: Computer Science
Date Submitted: February 20, 2015
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Ideally, the writing of a Program Review Report should be a collaborative process of full-time and part time faculty as well as the appropriate educational administrator, instructional assistants, classified staff members and students who have an interest in the present and future vision of the program at all sites throughout the district. The Program Review Committee needs as much information as possible concerning the present and future of the program to assess and recommend the resources needed to keep the program viable and robust.

Please attach your Department Statistics Report (DSR) and your ePAR Report when sending in your Program Review.

1) Relevancy: This section assesses the program’s significance to its students, the college, and the community.

1a) To provide context for the information that follows, describe the basic functions of your program.

The Computer Science department educates the next generation of computer programmers—the ones who will be creating the mobile, web, and desktop apps that you will use in the future. We pursue this goal through a variety of programs and courses that cater to a diverse set of students:

- students seeking to transfer to a four-year institution as a computer science major;
- returning students looking for a few courses to refresh their skillset; and
- students fulfilling general education requirements.

1b) How does your program fit within the district mission, as quoted below. Please include an analysis of how your program supports ISLOs (Institutional Student Learning Outcomes).

“Sierra College provides a challenging and supportive learning environment for students having diverse goals, abilities, and needs interested in transfer, career and technical training, and lifelong learning. The College’s programs and services encourage students to identify and to expand their potential. Sierra College students will develop the knowledge, skills and abilities to become engaged and contributing members of the community.”

The Computer Science Department supports ISLOs by providing its students with educational avenues for transfer to other institutions via AST degree tracks and curricula aligned with nearby four-year universities; career and technical training and lifelong learning through certificates and specialized courses to meet industry demand.

1c) Program offerings align with which of the following mission categories (check all that apply):

- Transfer Career Technical Education
 Basic Skills Personal Development/Enrichment Lifelong Learning

1d) Please analyze the role of your department's programs and offerings in supporting the categories marked in 1c above; please provide evidence in support of this analysis. If any of the following apply to your program, please address them in your analysis.

- The number of degrees, certificates, and/or licenses your department has generated
 - The alignment of these awards with the district's mission and/or strategic goals. (See the district "Awards Data File, available from Research and Planning, for your numbers).
- Job placement or labor market information for your program's awards and licenses.
- The contribution your program makes to student transfer.
- Participation in basic skills programs.

Relative to the number of students taking our classes—roughly 870 per semester (three-year average)—the number of degrees we grant is low (approximately 25-30 each year). However, most of our students are not seeking associate degrees in computer science. Most employers are looking for candidates with a bachelor's degree or higher, so roughly half of our majors transfer to a four-year institution without receiving an AS/AA degree.

Our AST degree was approved last year. We have no data yet that measures how many students are using it to transfer. However, we have noticed a remarkable increase in enrollment in the core AST courses, so we suspect that many students are using this route.

Approximately 1/4–1/3 of our students are taking a course to fulfill a general education requirement. These students, likewise, are not seeking a degree or certificate in CS.

The bulk of our remaining students are returning students who are taking one or two classes as part of lifelong learning and to improve their employability. These students are not pursuing a degree or certificate. However, we surveyed our students and found that the majority reach their educational goal.

1e) Optional Additional Data: Comment on any other relevance to district goals, mission, values, strategies, etc., that your program provides that are not incorporated in the answers above. Consider, for example, contributions to diversity, campus climate, cultural enrichment, community ties, partnerships and service, etc. Include specific data and examples.

The CSCI department takes an active role in contributing to the Sierra College climate. In the past few years, our faculty have acted as advisors to the Computer Engineering Club (current) and the Computer Science Club (2012-2013). Our faculty also sponsor honors projects and internships.

More recently, some of our part-time faculty will be volunteering at the new Hacker Lab facility in Rocklin and our students have expressed an interest in becoming members to help them prototype and build project ideas they have. Consequently, we have been altering some of our day-to-day classroom curricula to better align with student interests in creating high-tech artwork and designing one-of-a-kind creations.

2) Currency: This category assesses the currency of program curricula as dictated by Title 5 and the currency of efforts in meeting accreditation standards as well as improving pedagogy and engaging in professional development.

2a) Curriculum: Considering the information provided on your Department Statistics Report (DSR), comment on the currency of your program's curricula. Please describe your process for evaluating and revising curriculum, including the use of SLOs.

The Computer Science Department is scheduled to perform a Curriculum Review in the 2015-2016 year. Our core courses were previously reviewed last year to bring them up-to-date with the statewide AST curriculum for computer science.

In the rapidly-changing field of Computer Science, we are constantly updating our curriculum. We have formal department meetings every semester (and many more informal ones), in which curriculum updates are always a topic. Our curriculum changes are informed by our faculty's experience and research, industry contacts, and changes to curriculum standards such as the State's Transfer Model Curriculum (<https://c-id.net/degreereview.html>), and the ACM's curriculum guidelines (http://www.capspace.org/pgm_inventory/programdetail.aspx?pID=38).

In addition, we use SLOs and their associated SLAS reports to provide feedback on the effectiveness of our curriculum. We make changes to the curriculum as needed to incorporate the action items on the SLAS forms.

2b) Student Learning Outcomes Assessment: Analyze your program's assessment of course outcomes, analysis of results, and improvements/changes made to the program as a result of this assessment. Please provide specific data and analysis in the space provided.

The Computer Science Department is actively engaged in the assessment of course outcomes. Here are three examples of recent assessments:

- 1) CSCI 13 – Programming Concepts/Methods II
 - A) CSLO 1: Implement linear lists with arrays and linked objects.
 - B) Four programming (lab) assignments are chosen that require implementations of linear lists using:
 - a. 1. Arrays (two assignments)
 - b. 2. Linked lists (two assignments)
 - c. The programming assignments are each graded out of 100 points. The four assignment grades are averaged to produce a single score 0-100 for each student.
 - C) Results were deemed satisfactory. Some students may require extra individual help.
 - D) Actions: No changes necessary.

- 2) CSCI 052 – Introduction to Structured Query Language
 - A) Outcomes:
 - a. PSLO A: An ability to engage in continuous learning as well as research and assess new ideas and information to provide the capabilities for lifelong learning.
 - b. PSLO C: An ability to analyze a problem and craft an appropriate algorithmic solution.
 - c. PSLO E: An ability to interpret data, think critically and apply the scientific method.
 - B) Assessments:
 - a. Anonymous class exit survey to assess students' expectation and satisfaction level for identifying areas of continue improvement.
 - b. Small groups of 2 or 3 students worked on a final class project summarizing all materials covered through the semester.
 - C) Based on survey result, students noted that course materials met their expectation with a high level of satisfaction in the newly developed teaching method of small group activities. Students also noted that the final class project was a practical assignment that helped to put together everything covered throughout the semester.
 - D) Actions: No changes necessary.

- 3) CSCI 79 – Mobile Device Programming
 - A) CSLO 1: Graphics. Write code to draw a custom view for a mobile device application using lines, rectangles, ellipses, and/or bitmap image files.
 - B) Three programming (lab) assignments were chosen that require the student to draw a custom view using vector graphics. The assignments are each graded out of 100 points. The three assignment grades are averaged to produce a single score 0-100 for each student.
 - C) Results were deemed satisfactory. Some students may require extra individual help.
 - D) Actions: No changes necessary.

In the space below, please describe or attach the cycle you have developed for outcomes assessment.

Course	Sp 14	Fall 14	Sp 15	Fall 15	Sp 16	Fall 16
CSCI 10	x			x		
CSCI 12 core	x			x		
CSCI 13 core		x		x		
CSCI 21				x		
CSCI 26 core	x			x		
CSCI 27						x
CSCI 39 core	x			x		
CSCI 46 core			x			x
CSCI 50 core			x			x
CSCI 52		x				
CSCI 54					x	
CSCI 55					x	
CSCI 59P						x
CSCI 59R					x	
CSCI 62						x
CSCI 63						x
CSCI 66				x		
CSCI 76A			x			
CSCI 79		x				

2c) Professional development: Describe how your department's planned activities and professional development efforts serve to improve teaching, learning and scholarship. Please be sure to include flex activities, departmental meetings and activities, conferences, and the like.

The Computer Science Department maintains academic and professional currency through:

Attending the Association of Computing Machinery Special Interest Group on Computer Science Education (ACM SIGCGE) annual symposium. This conference is attended by over 1,200 faculty members from around the world and focuses on curriculum and teaching issues in computer science. We have sent at least one representative in seven of the past ten years.

Attending articulation meetings with CSU Sacramento and CSU Chico. Informally, we maintain contacts at UC Berkeley, Stanford, and UC San Diego.

Taking courses in computer science and related disciplines. MOOC (Massive Online Open Courses) have been a boon to professional development. Most recently, one of our faculty has been accepted to the online Master's in Computer Science at Georgia Tech.

Meeting with part-time faculty formally at least twice a year and individually periodically throughout the semester to answer questions and keep them informed of department matters.

Facilitating Flex Week workshops on educational technology and pedagogy.

2d) Optional Additional Data: Enter additional data here that you believe to be an indicator of your program's effectiveness and explain why.

In an ever-changing field, the Department must continually revise its program to meet student and industry demand. In the past four years we developed a Mobile Device Programming course, initially targeted at the then-nescient Apple iPhone platform. However, the rise of Android devices necessitated revamping the course. The course, which had seen its enrollment decline before the curriculum was revised, is now more popular than ever. We believe this is but one example of how we are able to adapt our courses quickly to address changing technologies and remain not only current, but effective at meeting our students' educational goals.

3) Effectiveness: This section assesses the effectiveness of the program in light of traditional measurements.

3a) Retention and Success: Identify and explain the trends in your program's data. Address separately the data for on ground and on-line course. Comment on the significance of the trends as well as the challenges experienced within the program, including any relevant data/analysis from your course and program outcomes assessments. If you see a need to improve the statistical trends, outline a plan that will achieve the changes you are seeking, including the results or your outcomes assessment, as appropriate. Please refer specifically to the data in your Department Statistics Report, as supplied by the Research and Planning Office, in supplying your answer.

The chart below summarizes the retention and success averages over the past three years for classroom and online instruction. In all cases we are within standard deviation or higher. Our online success rate is much higher than the District average.

	District	CSCI
Classroom retention	86 ± 1%	86 ± 2%
Classroom success	72 ± 2%	75 ± 2%
Online retention*	79 ± 2%	82 ± 5%
Online success*	64 ± 3%	74 ± 5%

We attribute our success in online instruction to excellent teaching faculty who have developed course material that take advantage of the online format: interactive content, online office hours, screencasts, and clearly-defined deliverables. The CSCI department is one of the few that uses Canvas for *all* of its courses, both on-ground and online. This helps keep students engaged throughout the semester.

* Last known District online success and retention data are from 2011.

- 3b) Enrollment Trends: Identify and explain the enrollment trends in your program’s data. Address separately the data for on ground, on-line, and enrollment at the various centers. Comment on the significance of the trends as well as the challenges experienced within the program. If you see a need to improve the statistical trends, outline a plan that will achieve the changes you are seeking. If applicable, comment on both the past performance and the future direction of the program as a whole as well as by location and mode of delivery. Please refer specifically to the data in your Department Statistics Report, as provided by the Research and Planning Office, in supplying your answer.

The latest DSR report from Spring 2014 shows a flat FTES enrollment as compared to three years ago, with a fill-rate nearing 100%. We were able to obtain data from Fall 2014 showing that our enrollments have experienced a very sharp uptick. We have had to add additional sections of our core transfer courses (CSCI 10, 12, 13, 39, 46, and 50) and the fill rates in these sections are well above 100%—sometimes approaching 125%. Consequently, we have scrambled to hire part-time faculty to fill these classes and shuffled rooms around to accommodate seating for everyone.

	F'08-S'11	F'11-'S14	F'14
FTES	119	118	130
Fill Rate	98.3%	99.5%	100%
FTEF	7.2	7.3	8.1

We expect that when the Spring 2015 numbers are in, FTES will go up again.

Increased interest in computer science is a national trend. Last year, Stanford University announced that Computer Science was the most popular major on campus—surpassing business, the nationwide favorite. At Harvard, over 700 students each semester take the Introduction to Computer Science course, making it the most popular course on campus.

The startling boost in enrollment is our biggest challenge at this time. Whereas the department saw a significant contraction in the Dot-Com bust era (2001–2008), overflowing classrooms and the need to hire faculty has been a problem over the past year. We believed that our FTES could be even higher if our resources were not so constrained.

More details can be found in the Resources section below.

- 3c) Productivity: Comment on how the program contributes to overall district productivity. Comment on the significance of the trends as well as the challenges experienced within the program. If you believe the statistical trends need improvement, outline a plan that will achieve the changes you are seeking.

Overall, Department efficiency is higher than the District figures. The three-year average efficiency for the Department is 502 compared to 491 for the District over the same period.

Because we cannot add enough new sections to meet the crushing demand of students in recent semesters, many sections are over-enrolled during the first weeks of instruction and continue to see a high fill rate over the semester.

- 3d) Analysis and Planning: Referring to your ePAR Report of Goals, Strategies, Actions, and outcomes assessment cycle and relevant assessments/evaluations, comment on how your program plans to maintain or increase its effectiveness and whether it has taken actions to do so.

Our 2013 ePAR includes five goals (numbered 4-8). Of these, two have been met and three are ongoing.

Goal 4: Develop a new program of Computer Game Programming. We believe this goal has been met. We currently offer three game-related courses, all of which are well-attended each semester. Long-term, we see computer gaming as a separate sub-discipline declining in popularity as mobile devices become much more mainstream. Consequently, we are not planning any new development in this area.

Goal 5: Hire a replacement full-time faculty member. Not yet met. See Staffing below.

Goal 6: Offer CSCI 10 at Tahoe Truckee. As of Spring 2015, we have begun offering this course at TT.

Goal 7: Address scheduling conflicts in our one computer lab. Ongoing. See Facilities below.

Goal 8: Develop instructional material to supplement both on-ground and online courses. This is ongoing, but several of our faculty have made advances in this area.

- 3e) Optional Additional Data: Enter additional data here that you believe to be an indicator of your program's effectiveness and explain why.

You may add additional data here if desired:

4) Resources: This category assesses the adequacy of current resources available to the program and describes and justifies the resources required to achieve planning goals by relating program needs to the assessments above. (Refer to the bottom row of your DSR in your response to this category. You may include budget information if you have it.)

4a) Please describe the future direction and goals of your program for the next three years in terms of sustaining or improving program effectiveness, relevance, and currency. Please include any analysis of relevant outcomes assessment data noted above.

If nationwide enrollment trends are an indication of the future of the Computer Science Department, we expect to see an increase in demand for our courses. Students realize that computing is pervasive throughout their lives and that having a foundational knowledge of the technology helps them be better digital citizens and more employable.

Our future goals include:

- Increase course offerings to meet student demand;
- Develop new courses to address computing needs in other disciplines such as Engineering, Science, and the liberal arts; and
- Evaluate our current selection of courses and make strategic decisions about cutting courses that are no longer relevant.

4b) **Equipment and Technology:** Comment on the adequacy of the program’s equipment and technology funding level for the District as well as specific sites. Include a projection of equipment and technology needs for the next three years as well as a justification for needs. Please include any analysis of relevant outcomes assessment data noted above.

We believe our current funding levels for equipment and technology are, for the most part, adequate. The nature of our discipline necessitates keeping our computer labs up-to-date. The District-wide upgrade cycle of every 5-6 years is not sufficient. However, we were able to secure funding to replace our labs computers this year, which will meet our needs for the time being.

However, if we are able to obtain an additional computer lab (see Facilities below), we would need to outfit the room with computers, the funding source for which is unknown.

4c) **Staffing:** Comment on the adequacy of your program’s faculty, classified, and student help staffing levels for the overall District as well as specific sites. Include a projection of staffing needs for the next three years and justification for any increases. Please include any analysis of relevant outcomes assessment data noted above.

Staffing levels are currently inadequate to meet our needs. Our three full-time faculty and thirteen part-time faculty cannot teach all the sections we would like to offer. It has been very difficult to find qualified part-time faculty. Consequently, we have had to cancel classes, putting an unfortunate and artificial lid on our FTES growth.

To address our staffing needs, we have requested an additional full-time faculty, particularly to teach at NCC and Tahoe-Truckee, which have not had a full-time instructor in over three years.

- 4d) Facilities: Comment on the program’s fill rate and the adequacy of the facilities for the District as well as specific sites. Include a projection of facility needs for the next three years as well as a justification for any increases. Please include any analysis of relevant outcomes assessment data noted above.

Our department has two lecture classrooms and one computer lab. Between the hours of 7:00am and 10:00pm, all rooms are full of computer science classes. In other words, we are not only near 100% fill rate in individual classes, we are near 100% fill rate of the rooms themselves across the business day. This, too, puts a cap on the number of courses we can offer.

We are seeking additional instruction space, particularly computer labs. Our computer labs run specialized software, which makes other labs around campus either unusable as they are or places an undue burden on IIT to adapt them to our needs. Obtaining an additional dedicated computer lab and an additional lecture room would go a long way to alleviate overcrowding in our existing classrooms and would enable us to offer more sections.

- 4e) Please check the appropriate boxes in the chart below indicating the general reasons for your requests (check all that apply):

Program	Function/Role	Maintenance	Development	Growth	Safety	Outcomes	Other success measures	No Requests
		XX		XX				

5) Summary/Closing

- 5a) Evaluate the program’s strengths, weaknesses, opportunities, and challenges.

Strengths

- High quality classroom and online instruction.
- Curriculum that adapts to changing needs.
- Ties to transfer institutions.

Weaknesses

- Many students come to Sierra inadequately prepared for university-level academic rigor, which hinders our ability to transfer students within two years.

Opportunities:

- Booming enrollment and interest in computer science offers opportunities to expand into other disciplines.

Challenges:

- Support for educational technologies and new media instruction.

5b) Please provide any other information the Program Review Committee should consider that was not expressed in questions above.

Enter additional information here...

5c) How has the author of this report integrated the views and perspectives of those who have interests in the future of this program, e.g. full time and part time faculty, educational administrators, instructional assistants, classified staff, and students at Rocklin, Roseville Gateway, NCC and/or Tahoe Truckee?

The author has solicited responses from faculty and students. Since our department is small, contacting faculty is relatively easy.

We have surveyed students informally with discussion roundtables and questionnaires.

Former students who have transferred to nearby institutions periodically give us reports with anecdotal information about preparedness and alignment of curriculum. Although it is not formal data, it helps us determine if we have met their transfer needs.

The Deans of NCC and Tahoe-Truckee have been working closely with us to ensure at least one of our core courses can be offered at both campuses, primarily by helping to locate qualified faculty.