California State University East Bay

5-Year Program Review for

Department of Computer Science

2017-2018

Self Study and 5-Year Plan approved by faculty on: March 18, 2018 by a vote of 9-0-1

External Reviewer Report received by the program on: June 16, 2018

Program's Response to External Reviewer's Report completed on: June 18, 2018

Complete 5-Year Program Review Report submitted to CAPR on: July 19, 2018

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1. Summary

The Department of Computer Science offers one Bachelor's degree, two Master's degrees, and one minor. For the official review, there are three programs included in this document

- Computer Science, B.S.
- Computer Science, M.S.
- Computer Networks, M.S.

1.1 Self-Study

The Department addressed all the goals set in the last Five Year Plan. Some goals were met with great success, e.g., growing the program, while other attempts were less successful, e.g., hiring new faculty. Those goals and actions are summarized by category here.

Curriculum:

The most significant change in this category was the development and deployment of a formal assessment plan for the Bachelor's and Master's programs. PLOs were specified and mapped to appropriate classes, assessment instruments and rubrics were developed, and assessment was completed on a regular basis. As required by the last CAPR approval, at least one PLO per year was assessed and analyzed in the corresponding annual reports.

Several new courses to address new fields or changes in existing fields were added to both undergraduate and graduate programs. A number of goals, including modifying the curriculum towards future accreditation, updates to the introductory programming sequence, integrating the M.S. Networks degree into the M.S. Computer Science degree, and simplifying the Master's degree program requirements have been addressed as part of program transformation for the semester-based system.

Students:

A primary goal in this category was to grow the program to address the need for tech workers in computing disciplines. The program grew from 420 students in Fall 2012 to 828 in Fall 2017 and is still growing. In fact, due to program growth and difficulties in hiring faculty, the Department no longer has the capacity to serve the number of students that wish to enroll. The Department has taken steps in the last year to decrease the size of the graduate program to adjust the total number of students in the major programs to one which may be successfully served.

The Department also worked to address the need for more formal advising for the students. An Undergraduate Coordinator position was created providing a single point of contact for advising for students. The undergraduate adviser is a first contact for students who want to plan their computer science schedules, receive transfer credit evaluation, request job/internship/ graduate school recommendations, and review graduation requirements. The undergraduate advisor contacts and counsels students who have low GPA's in their Computer Science courses and meets with students who have been cited for academic dishonesty. The Department believes this added advising will lead to a shorter time to graduation for students, and improve the student experience.

Faculty:

The primary goal regarding Faculty was to hire more faculty members to replace a large number of retiring faculty, and to support the large growth in the department. Despite being granted one to two searches a year throughout most of the five year review period, the Department was successful in hiring only three faculty members. Enrollment demands require at least three more members. Two searches are currently underway this year, but despite extensive outreach, few applications were submitted for the positions, and only perhaps one will be filled. Based on discussions with past candidates who have declined the CSUEB offers of employment, the searches have failed due to inadequate salary offers.

A second large change is the separation of the combined Department of Mathematics and Computer Science into two individual departments. The great size of the combined department (nearly 30 faculty), and the large differences in the programs made it difficult to manage, and difficult for standard departmental policies to be developed. As a result, a request was made to separate the programs into two departments. That request was approved in July, 2015.

Resources:

The most significant change in this category is the rehoming of the Department of Computer Science to the new Student and Faculty Support (SF) building. Faculty had been spread over all four floors of both Science buildings previously. Proximity to colleagues and the department office has already led to increased communication between department faculty, more frequent department committee meetings, and increased productivity. Unfortunately, space was not made available for all department faculty. In particular, faculty participating in the FERP program, and all lecturers are still housed in the Science buildings. In addition, there is not enough space in the new building even to house the faculty that would result from successful searches that have been approved for next year.

A second important goal was to improve the Department's relationship with ITS (Instructional Technology Services) in order to support teaching and research needs. The centralization of Information Technology Services (ITS) on campus left the Department of Computer Science with no dedicated support for its teaching and research support needs. The College of Science recently approved a support position for the Department, which was filled in Winter 2018. Due to the lack of physical lab space and physical machines on which to work, the Department has been working with ITS on virtual resources. While not a substitute for physical resources, these virtual resources fill a gap, specifically for students without the financial resources to buy their own devices. BayCloud images have been deployed and made available to Computer Science students. These environments do not yet provide all the necessary functionality, but the Department is consulting with ITS in hopes that additional functionality may be made available. Long-time College of Science Linux servers have also been retired in the last quarter, with only limited replacements made available.

1.2 Plan

Many of the department goals for the next five years relate to the coming semester conversion as well as the university goals of reducing time to graduation and increasing retention of students. Those goals and actions are summarized by category here.

Curriculum:

The main department goal regarding curriculum is to implement the semester-based curriculum developed by the Department over the last two years. The Department chose to transform, rather than simply convert, its program, leading to a large number of changes. To provide better preparation for industry requirements, more consistent scheduling, and a more tightly knit student community, the number of required courses in the Bachelor's degree was increased by three courses. In addition, laboratory sections have been added to introductory programming courses, and non-major courses have been added to make the B.S. curriculum consistent with Accreditation Board for Engineering and Technology (ABET) standards. The Master's degree program requirements were also modified to require three additional required courses, and to greatly simplify the system used to choose the remaining electives. In addition, the set of capstone experiences was expanded to include a project option. Finally, the separate Master's in Computer Networks program has been pulled into the Master's in Computer Science program as a concentration. This change will simplify admissions, advising, and scheduling.

A second important goal is the implementation of the new assessment plan developed for the semester-based programs. The Department created new PLOs for the semester-based system. Many PLOs are driven by learning outcomes required by ABET, which provides accreditation for Computer Science programs. In addition, the PLOs for the Bachelor's and Master's programs were aligned, so that matching PLOs in each program would be assessed at the same time. Assessment of PLOs will be done in all required courses, in Fall semester of each year at a minimum. This data will be analyzed and provided back to the instructors for possible changes to the courses to close the loop.

Secondary goals, including possible accreditation of the program, regular re-evaluation of the introductory programming sequence, development of new courses, and increasing the number of courses which are taught in online or hybrid modes are discussed in the full plan in Section 3.

Students:

A primary goal in this category is to support students who are continuing through the semester conversion. In addition, the Department would like to improve the student experience, increase retention and the graduation rate, and decrease the time to graduation. The Department hopes to address all of these goals in similar ways. The first is through more formal advising. For the last two years, the Department has supported an Undergraduate Coordinator who has provided proactive advising and a single point of contact for advising to students in the Bachelor's program. The Undergraduate Coordinator would help students plan their schedule, and contact at-risk students when they were performing poorly in classes and provide pointers to tutoring and other campus resources. While the Department would like to continue to provide this advising, the College of Science Dean has indicated that, starting next year, funding will no longer be made

available to support the Undergraduate Coordinator position. As a result, the Department must either identify another funding source or develop new mechanisms to achieve the same goals.

A second method to address these goals is embodied in the transformed curriculum, which includes more required courses. Such a program will lead to more predictable scheduling of courses, and more sections of required courses being scheduled, and at more times of the day. This will make it easier for students for students to enroll in the courses they need, and the added simplicity of the program should lead to fewer problems with students taking the wrong courses. The department also hopes to offer more courses in a hybrid or online mode to serve students who need more flexible schedules.

A third method is to provide opportunities for student to form a community within the department. This will be accomplished by developing platforms for students to share their research, internship, job search, and other information, and to provide advice and references for other students. The Department will also support the existing Computer Science club, and continue to conduct regular hackathons and industry visits to campus.

Secondary goals include working with AACE on internship and job recruiting on campus, and managing enrollment in the undergraduate and graduate programs.

Faculty:

The main goal regarding faculty will continue to be addressing the need for new faculty and lecturers. The Department plans to continue to request new positions in the Department, and carry out the searches to secure new faculty members for the department. The Department will continue to do extensive outreach to local universities and universities which serve under-represented groups, as well as recruiting at conferences and other events where possible. The Department is currently conducting searches for two faculty positions. New avenues for recruiting lecturers will also be explored including working through our Industry Advisory Board.

Another important goal is to improve the functioning of the department by developing department by-laws and encouraging department leadership opportunities. Due to the retirements of many senior faculty, and the separation into an individual department, the Department lacks administrative experience, and more faculty must take on leadership roles. The Department will need to develop requirements or incentives to encourage more faculty to take leadership roles. Regarding by-laws, the Department has typically tried to address department policy issues by attaining consensus on issues. Often, consensus was not possible to achieve and the Department was left to inaction on important issues. As a result, department by-laws must be developed to ensure that divisive issues may be resolved.

Mitigation of workload issues was also a major goal. Since most courses in our programs are worth three semester units, the faculty load will be four sections per semester, a daunting proposition. The Chair has suggested several possible partial solutions. As part of the semester-conversion, both the undergraduate and graduate programs were modified to include more required courses. This will result in the scheduling of more sections of the same course in the same semester. Under semesters, it is envisioned that three sections of many courses will be

offered per semester, allowing at least two to be assigned to the same faculty member. In addition, more courses have been approved to be taught in a hybrid or online mode rather than in-person. Finally, all introductory programming courses now include a laboratory component, making them worth four semester units rather than three. Given these tools, the Department Chair will attempt to create schedules which reduce the number of preparations for any given faculty member and address their teaching load concerns.

Secondary goals regarding faculty include encouraging professional development, and addressing support for faculty supervision of student research.

Resources:

The primary goal regarding resources is to address the need to co-locate faculty, lecturer, and research space to provide opportunities for faculty and students to work together more easily. The Department was pleased that space was made available in the new Student and Faculty Support (SF) building for the department office and faculty offices. Unfortunately, space was not made available for all department faculty, excluding faculty participating in the FERP program, all lecturers, and any new faculty resulting from ongoing searches. Ideally, it would be beneficial to house the entire department in one place with enough made available for desired growth. In addition, the faculty offices are far from both the teaching rooms and labs, making it less convenient for students to attend office hours or seek advising. The Department also suffers from a lack of sufficient teaching and research lab space, regardless of location. The Department is currently in discussions with the Dean of the College of Science to address the lack of teaching lab space.

Another important goal is to continue to work with ITS (Instructional Technology Services) to support teaching and research needs. Centralization of equipment by ITS has proven to be a serious concern, impacting both teaching and research goals of the department. Servers supporting student work and necessary for teaching classes in Database Administration, Network Administration, Network Design, and the like have been taken from departmental control. These servers have either not been replaced at all or have been replaced with virtual counterparts which provide much less functionality the originals. For instance, BayCloud virtual images have been suggested as temporary solutions, but do not provide the functionality needed in the long-term. The Department is in discussions with ITS to attempt to find solutions to this problem.

Secondary goals include upgrading labs and computing environments, addressing library support, and continuing work with our Industry Advisory Board.

2. Self-Study

2.1 Summary of Previous Review and Plan

The last five-year review of the department was completed in academic year 2011-2012. At that time the Computer Science programs were offered through the combined Department of Mathematics and Computer Science. This summary will address the review components and

plans specific to the Computer Science programs, or which affected both Computer Science and Mathematics programs.

The goals specified in the 2011-2012 Five Year Plan included:

Curriculum:
i) Evaluate B.S. curriculum in light of possible decision to seek accreditation from Accreditation Board for Engineering and Technology (ABET) which provides accreditation for Computer Science programs.
ii) Implement a more formal assessment plan for all programs.
iii) Update introductory sequence in programming for B.S. degree.
iv) Add new courses to address new fields or changes in existing fields in B.S. and M.S. degrees.
v) Revamp the currently confusing breadth category M.S. requirements in which students must take 2 courses each from courses identified as either Development/Theory or Systems/Architecture.
vi) Address issues arising from allowing graduate students to take 3000 or 4000 level undergraduate courses towards their Master's degree electives.
vii) Improve preparedness of M.S. students, ensuring that prerequisite courses adequately prepare students for later coursework.
viii) Complete integration of M.S. Computer Networks into the M.S. Computer Science program

Students:
i) Grow all programs in order to help address need for qualified tech workers in California.
ii) Improve student experience and B.S. graduation rate. Increased course offerings and more formal advising should result in better retention.
iii) Work on student preparation for courses in a sequence in B.S. degree.

Faculty:
i) Discuss future of Department (combined or split)
ii) Recruit new faculty to reduce reliance on lecturers and to provide opportunities to offer classes and research support in areas of current Computer Science areas of development.
iii) Develop department leadership.
iv) Address workload of Graduate Coordinator, who is responsible for evaluating 1500-2000 applications per year, in addition to advising enrolled graduate students.

Resources:
i) Facilities for Department faculty offices, teaching labs, research labs, including co-locating office space to provide opportunities for faculty to work together more easily.
ii) Improve relationship with ITS (Instructional Technology Services) to support teaching and research needs.
iii) Restore funding for readers, TAs, and travel to academic conferences.
iv) Need for library resources, specifically to support graduate courses.

In 2012, Dr. Sigurd Meldal, Chair of Computer Engineering at San Jose State University, serving as external reviewer, complimented the Computer Science program on:

- C.S. faculty that are well qualified and dedicated

- High quality student course deliverables and achievements
- Curriculum which is current with the Association for Computing Machinery (ACM) recommended model curriculum
- Curriculum which is being assessed and updated in a systematic manner

Dr. Meldal also identified several serious concerns regarding the program. These included:

- Lack of dedicated computer labs
- Insufficient faculty influence on curricular infrastructure decisions
- Insufficient technical support
- Insufficient budget support

He also identified lesser concerns including the small number of faculty available to teach major courses, and the heavy workload required of them. He pointed out concerns with the advising available to the students, and the need to enhance the assessment mechanisms used in the department. Finally, he suggested that laboratory sections be added to courses to provide significant design and implementation experience for the students.

The Department response to the outside reviewer's comments noted that no additional concerns had been raised beyond those already described in the Department's self-study. The outside reviewer's comments reinforced many of the goals specified in the Department's plan.

In 2012, CAPR proposed that the Department's Five Year Review be approved with the recommendation that the programs continue with specific modification. Specifically, each program was required to submit evidence of direct and indirect assessment of at least one Program Learning Outcome (PLO) each year in the Department's annual report. In addition, each program was asked to note actions taken to use the assessment results for program improvement.

The Department has complied with the CAPR recommendations, and has made significant progress towards many of the goals in the plan. That progress will be described in the corresponding sections below.

2.2 Curriculum and Program Learning, including Assessment

2.2.1 Summaries regarding each degree program

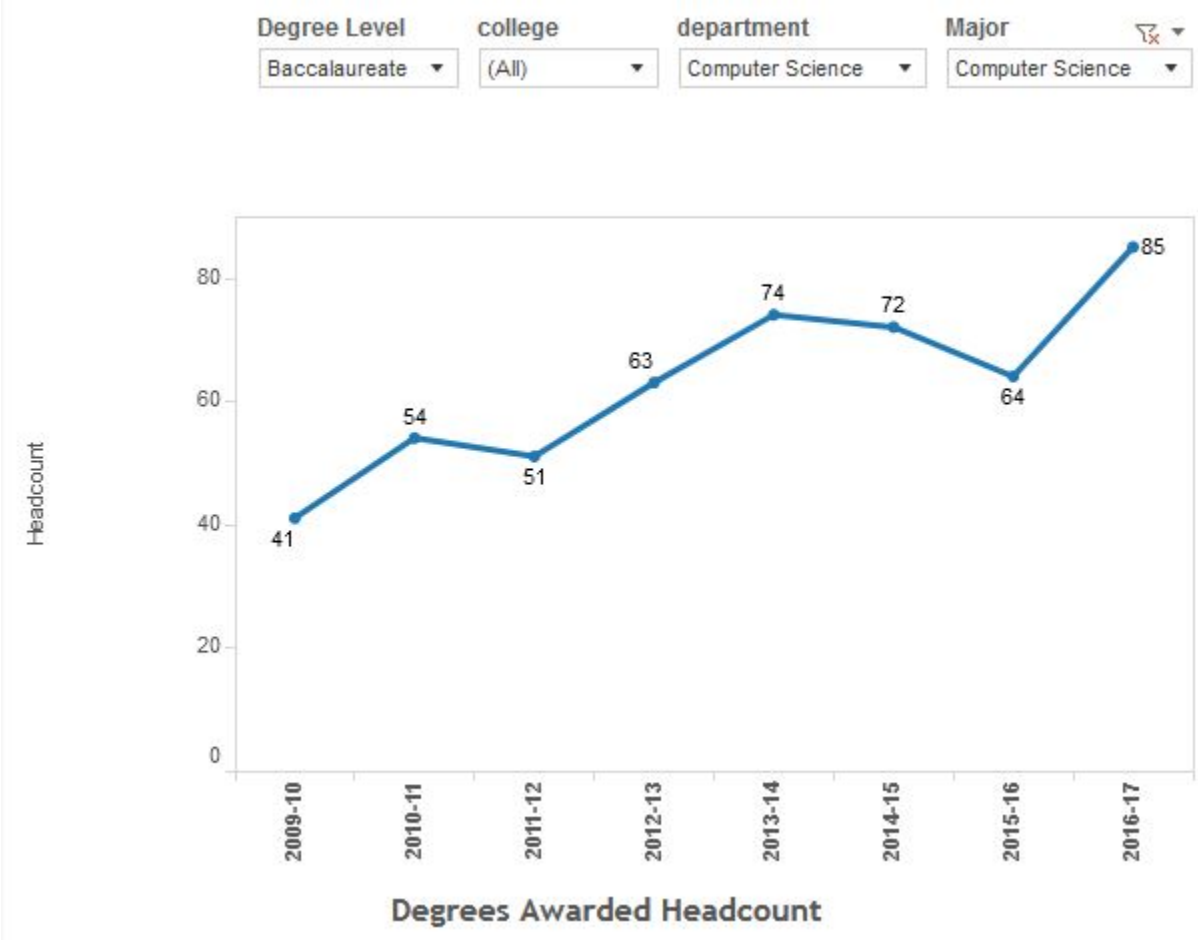
a) B.S. degree in Computer Science

We have seen a healthy increase in students enrolled in the Bachelor of Science, Computer Science program over the last five years. In fall 2013 there were 326 students. In fall 2017 we had 598 students, representing a growth of 54%. Students are attracted to the major due to various reasons such as a fondness for technology and computer games, a desire to be employed at popular Silicon Valley companies such as Apple, Google, and Facebook, and the prospect of a lucrative career. Approximately 40% of the students in the program are of Asian descent and 14% are women.

At the time of our last five year review, we were identifying program learning outcomes (PLOs) and student learning outcomes (SLOs). In the past two years, we have finalized our assessment process and have conducted post-assessment examinations for targeted courses. Three new hybrid courses were added to the curriculum: Security in Mobile, Wireless, Grid and Pervasive Computing (CS 4526), Security Management (CS 4527) and Cloud Computing (CS 4593). These courses are currently tiered with graduate sections.

Students in the B.S. Computer Science program are a mix of full time freshman, transfer students, and working students with families. Time to graduation varies depending on the student. Issues we have discovered that hinder graduation rates include taking courses out of order, taking courses without the proper prerequisites, and repetition of courses. To better serve the B.S. Computer Science students, we have created and undergraduate adviser position. The undergraduate adviser is a first contact for students who want to plan their schedules, receive transfer credit evaluation, request job search tips and recommendations, and review graduation requirements. In preparation for semesters, we have created new program requirements to align with ABET accreditation recommendations.

Below is a graph of B.S. Computer Science degrees awarded from 2009-10 to 2016-17

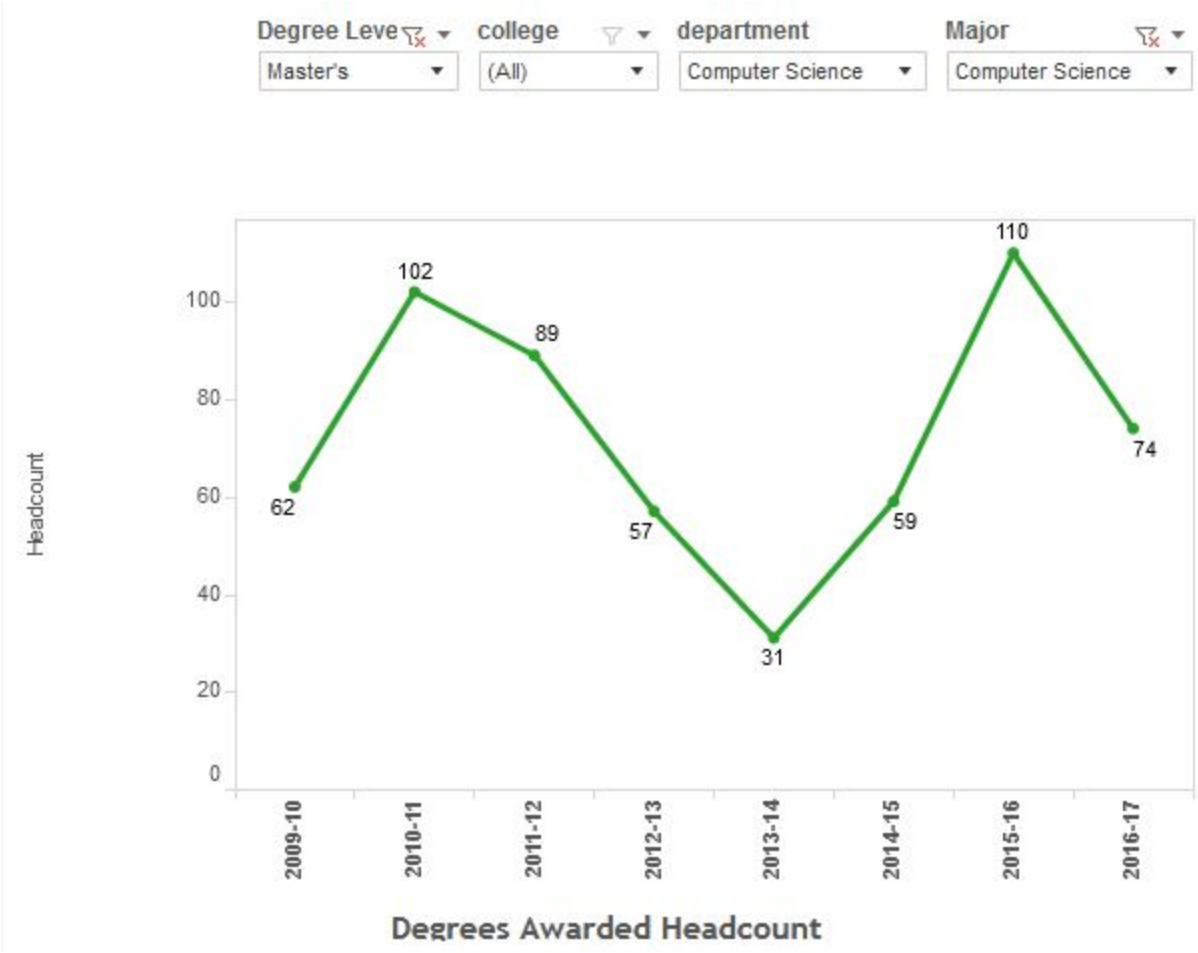


b) M.S. degree in Computer Science

The Master's degree program in Computer Science attracted a healthy number of students, with headcounts from 105 to 222 in the period of 2012 – 2017. Variations are due both to the fluctuations in demand for Computer Science degrees as well as departmental admissions policies. Most of the demand for the M.S. degree comes from three sources, students with Bachelor's degrees in Computer Science who hope to continue their education, students with Bachelor's degrees in other disciplines who hope to prepare themselves for a position in a Computer Science field, and international students with Computer Science or Computer Science-related fields who need a Computer Science degree from a U.S. institution to be considered for jobs in the U.S. The last category is by far the largest, typically comprising 80-90% of all the students in the program. While this percentage is typical for Computer Science Master's programs at other CSU campuses, it does serve as a point of concern because international applications depend upon national immigration policy. The extremely large number of applications received each year, approximately 1500-2000, points to a large unmet demand though, providing the program with the opportunity to set reasonably high requirements for admission. The acceptance rate over the last 5 years has ranged from 10% to 38%, depending on the number of applications submitted, the quality of the students applying, and the size of the program desired by the Department. The large proportion of international students also presents some challenges. International transcripts are very time-consuming to evaluate, and international students require much more advising than domestic students. The department has been working with the College of Science Dean's office to develop solutions to these concerns.

One very positive point regarding the Master's program is the representation of women. Women are currently and historically very poorly represented in Computer Science programs. For the period from 2011-2015 at CSUEB, however, women represented over 50% of the Master's program headcount.

Much like the headcount, the number of degrees awarded has varied over the last five years, ranging from 31 to 110. Most students take two courses per quarter, and many are required to take a number of prerequisite courses that do not count towards their degree. It is common for students to take two or more years to complete the degree requirements, so the rise in degrees awarded appears to match the rise in the number of students admitted to the program in Fall 2014.



Accepted Applications for MS Computer Science (Data is from Graduate Coordinator records):

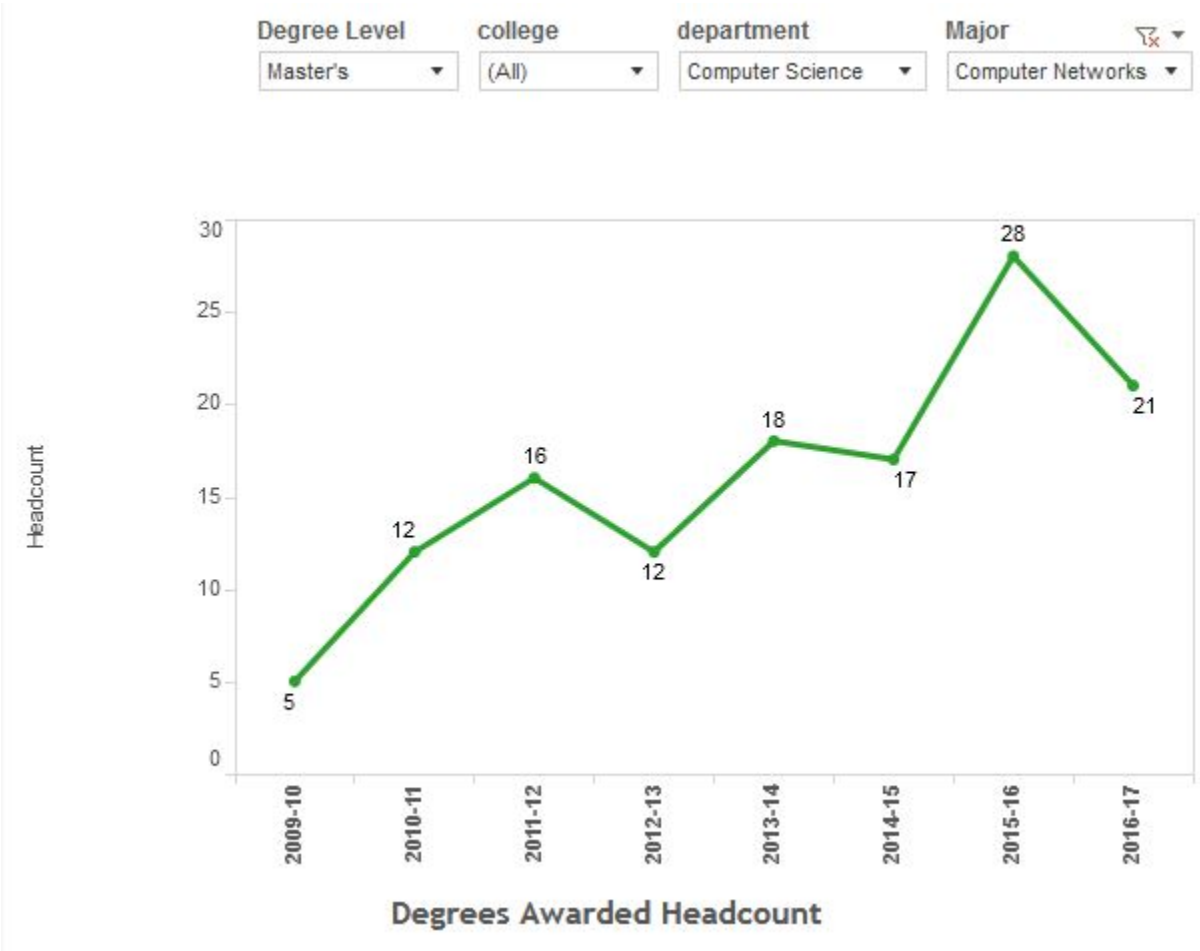
c) M.S. degree in Computer Networks

The Computer Networks program has always seen lower enrollment than the MS in Computer Science. Computer Networks began as an interdisciplinary program with the College of Business and the Department of Accounting and Telecommunications, but became housed in Computer Science in 2008. The program attracts students from India and China who have Telecommunication and Engineering degrees. Enrollment in Computer Networks was reached a high of 57 in 2015 but has decreased since due to increased standards for admittance. Students were required to meet a particular GRE score and have taken at least three of the prerequisite courses. We received approximately 130 applications during 2016 and accepted 52 students. Of these 29 students chose to join the program. Students generally graduate in 2 years and are successful finding jobs in industry. Approximately 3 to 5 student papers from the Capstone Course (CS 6899) are accepted to networking conferences each year.

At the time of our last five year review, we were beginning to identify program learning outcomes and student learning outcomes. In the past three years we have finalized program learning outcomes, aligned those to our courses, and have been implementing post-assessment

examinations for each course. Evaluating assessment results for the Computer Networks and Computer Science programs has been difficult as PLOs are distinct yet faculty and courses serve students from both programs.

The primary task of the 2015-16 academic year was semester conversion. The decision was made to fold the Master's degree of Computer Networks into the Master's degree of Computer Science as an option. In Fall 2018, the department will offer a Master's degree of Computer Science with options in Networking and Software Engineering. This will greatly aid assessment processes and evaluation. The following table shows degrees conferred for the MS degree in Computer Networks from the years 2009 to 2017.



2.2.2 Progress towards Goals

i) Evaluate B.S. curriculum in light of possible decision to seek accreditation from Accreditation Board for Engineering and Technology (ABET) which provides accreditation for Computer Science programs.

During the Five Year Review period, the Department made changes to the B.S. degree curriculum to better align it with ABET standards. Math 2304 - Calculus III was eliminated as a requirement, and a third course in introductory programming, CS 2370 - Introduction to Computer Science III was added. The major course portion of the B.S. degree was then in alignment with ABET standards, but other requirements including minimum science and mathematics coursework were not.

Given the opportunity for major program revisions provided by the semester conversion, the Department has now proposed a curriculum which will meet the requirements of the ABET standards. A course in Physics, PHYS 135 - Physics for Scientists and Engineers I, will now be required. Two existing Computer Science courses, CS 411 - Automata and Computation, and CS 413 - Analysis of Algorithms, will also be required, and will fulfill mathematics requirements of the ABET standards. Finally, CS 230 - Computing and Social Responsibility, will also be required, satisfying the ABET requirement for a course in computer ethics

ii) Implement a more formal assessment plan for all programs.

The Department developed Program Learning Outcomes for all three degree programs, and assessed them as requested by CAPR in its 2012 Five year Review action. The department created SLOs and PLOs for the Computer Science program in the academic year 2012-2013. The decision was made to use Blackboard as a means to provide students with an assessment exam that addresses the SLOs of each course which are aligned to the PLOs for each program and the ILOs of the university. The full current assessment plan is included in Appendix A.

Assessment exams are in place for approximately eight courses in the B.S. Computer Science program, and five each for the M.S. in Computer Science and M.S. in Computer Networks. The results of these exams are being stored in a separate Blackboard shell repository for the department. Evaluating the results of these exams is challenging, as each assessment contains questions for multiple PLOs. Additionally, each instructor creates the assessments in different ways – some combining PLOs in one question and some keeping them separate. We are currently looking at averages over the entire exam. Another large challenge is addressing PLOs for courses that serve both the graduate and undergraduate degree programs as the PLOs for the programs do not map well to one another.

The PLOs for the programs were as follows:

Students graduating with a **B.S. in Computer Science** will be able to:

1. apply knowledge of mathematics and computational theory to appropriate problems in computer science (ILO 2 & 6)
2. analyze a problem, and identify and define the resources and requirements needed for its solution (ILO 1)
3. design and implement a program to meet stated needs (ILO 6)
4. develop and maintain computer-based systems, processes, and platforms (ILO 1 & 6)
5. recognize and distinguish the mechanisms, components and architecture of computing systems (ILO1 & 6)
6. employ current techniques, skills, and tools necessary for computing practice (ILO 1 & 2)

7. identify professional, ethical, legal, and security issues and responsibilities and the impact of computing on individuals, organizations, and society (ILO5)
8. perform successfully on teams to accomplish a common goal, and communicate effectively in written and oral form (ILO 4)

Students graduating with an **M.S. in Computer Science** from CSU East Bay will be able to:

1. Apply knowledge of mathematics and computational theory to analyze problems in computer science, and assess and determine the resources and requirements needed for their solution. (ILO 1,2)
2. Design, develop, and evaluate a computer-based system, process, component, or program to meet desired needs. (ILO 1,4)
3. Classify and explain the mechanisms, components and architecture of computing systems. (ILO 1)
4. Employ current techniques, skills, and tools necessary for computing practice, and justify the need for continuing professional development. (ILO 1)
5. Discuss professional, ethical, legal, and security issues and responsibilities and the impact of computing on individuals, organizations and society. (ILO 1,2)
6. Function successfully on teams to accomplish a common goal, and explain computer science concepts effectively in written and oral form. (ILO 1,5)

Students graduating with an **M.S. in Computer Networks** from CSU East Bay will be able to:

1. Exhibit mastery of advanced computer science theory as applied to the field of computer networks (ILO 2 & 6)
2. Employ current techniques, skills, tools, and coding practices necessary for application and system development (ILO 1 & 6)
3. Apply critical thinking and problem solving skills by analyzing problems, designing solutions, and evaluating results (ILO 1)
4. Demonstrate communication skills in both written and oral form, and work in a team environment (ILO 4)
5. Independently acquire new computer related skills through analysis of current computer science literature and industrial practices (ILO 6)

As required by CAPR, the Department has assessed one PLO a year for each program on the following schedule:

PLO 1	2013-2014
PLO 2	2014-2015
PLO 3	2015-2016
PLO 4	2016-2017
PLO 5	2017-2018

Following are the assessment results, separated by program. While one PLO assessment per year was required, additional assessment data was collected when possible. While the B.S. Computer Science program has an 8th PLO, it is not included here as it has yet to be assessed.

B.S. Computer Science **Assessment Results 2013-2014 (PLO 1)**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
MATH 2101 Linear Algebra Introduces PLO 1	2.8						
CS 3120 Programming Language Concepts Introduces PLO 1	7.3						
CS 3590 Data Communications and Networking Develops PLO 1, 4, and 5	6.8						
CS 4590 Computer Networks Masters PLO 1, 4, and 5	7.1						
CS 4596 Wireless and Mobile Networks Masters PLO 1, 4, and 6	6.3						
B.S. Computer Science **Assessment Results 2014-2015 (PLO 2)**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
CS 3340 Object Oriented Programming Develops PLOs 2, 3, and 6		**7.3**	**4.4**	**3.3**			
CS 4245 Algorithm Analysis Masters PLOs 1, 2, and 6	**6.8**	**7.2**			**6.2**		
CS 4320 Software Testing and Quality Assurance Develops PLO 7, Masters PLO 6						**6.4**	**4.4**
CS 4660 Database Architecture Masters PLO 4 and 6				**5.0**		**8.0**	
Assessment Results 2015-2016 (PLO 3)							
CS 2370 Intro to Programming III Introduces PLOs 2, 3, and 6	**10.0**		**9.4**				
CS 3240 Data Structures Develops PLOs 2, 3, and 6			**6.6**				
CS 3340 Object Oriented Programming Develops PLOs 2, 3, and 6			**7.6**				
CS 4525 Network Security Masters PLOs 5, 7, and 8						**7.8**	**7.8**
CS 4560 Operating Systems Masters PLOs 3, 4, and 5	**8.7**		**9.1**		**10**		
CS 4596 Wireless and Mobile Networking Masters PLOs 1, 4, and 6	**6.8**			**5.7**		**7.1**	
Assessment Results 2016-2017 (PLO 4)							
CS 2430 Computer Organization and Assembly Language Introduces PLOs 4 and 5				**6.0**			
CS 4560 Operating Systems Masters PLOs 4 and 5				**8.3**			
CS 4590 Computer Networks Masters PLOs 1, 3, and 4				**7.8**			

CS 4660 Database Architecture Masters PLOs 4 and 6				**5.5**			
CS 4596 Wireless and Mobile Networking Masters PLOs 1, 4, and 6				**5.7**			

Data Analysis:

In evaluating the assessment scores for PLO's 1, apply knowledge in mathematics and computational theory, we see that improvements are needed. The scores are particularly poor in Math 2101 Linear Algebra. Many students at CSUEB and in our program require remediation in math; therefore, results in this PLO may reflect a gap in students' math background. This course has been revamped for semester conversion to include more high impact teaching methods. Of the other courses for which we have assessment data, only CS 3120 Programming Languages is required for all majors. This course as well as the other two elective courses has also been redesigned for semesters.

PLO 2 assesses student's abilities to analyze a problem, and identify and define the resources and requirements. Here we have data for two courses. The content for these courses includes programming skills and tools and algorithm analysis. Assessment results here are average to high. CS 3340 Object Oriented programming has been removed from the curriculum in semesters. CS 4245 Analysis and Design remains, but has been redesigned.

PLO 3 assesses student's abilities to design and write a program. Here we see good results with the exception of CS 3240 Data Structures. This course has historically been tough for students. Data Structures is the first programming course that B.S. Computer Science transfer students take at CSUEB. Transfer students enter this course from various community colleges with different backgrounds and may not have had earlier programming experience in C++, the language used in this course. For semesters we have changed Data Structures to include a lab unit to give the students more programming practice.

PLO 4 assesses student's written and oral communication skills and their ability to work in teams. CS 2430 Assembly Language requires a group project. It is the students' first introduction to computer architecture making it different than their previous major courses. As such students find it challenging. We retain this course in semesters, and with the support of our Engineering faculty will strive to improve the course to improve assessment results. CS 4560 Operating systems has been successful in meeting PLO 4. CS 4590 Computer Networks also appears to be successful in meeting this PLO. Computer Networks will be merged with CS 3590 Data Communication under semesters. CS 4660 Database Architecture is an elective that has been redesigned. We will monitor assessment results and make adjustments as necessary. CS 4596 Mobile Networks will exist as a graduate level course under semesters.

In the past adjustments to courses based on assessment outcomes have been made in an ad hoc manner as instructors rotate for each class and may not be aware of the previous instructor's assessment results. For semesters we have developed a standard assessment for each course that covers only one PLO. In addition only required courses will be assessed. Results from previous semesters will be housed in a standard repository available to all faculty members. This will add uniformity to our assessment process as each instructor will use the same assessment test.

Next Step(s) for Closing the Loop:
Instructors redesigning their courses for semesters have been encouraged to include more algorithm design, program development, testing, and tool use in their courses. High impact teaching practices such as think, pair share, jigsaws, explorative learning, collaborative projects, and flipped classroom techniques have also been encouraged.

M.S. Computer Science **2013-2014 Assessment Results (PLO 1)**	**1**	**2**	**3**	**4**	**5**
CS 6320 Software Engineering of Web-Based Systems Develops PLOs 2 and 4		**8.0**		**8.5**	
CS 6560 Operating Systems Design Develops PLOs 2 and 3		**7.9**	**5.8**		
CS 6870 Computer Simulation Develop PLO 2, Master PLO 4		**5.6**		**8.3**	
CS 6901 Comprehensive Exams Masters PLOs 1, 2, and 3	**7.4**	**7.7**	**9.0**		
M.S. Computer Science **2014-2015 Assessment Results (PLO 2)**					
CS 6320 Software Engineering of Web-Based Systems Develops PLOs 2 and 4		**8.0**		**8.4**	
CS 6560 Operating Systems Design Develops PLOs 2 and 3		**7.9**	**5.8**		
CS 6660 Database Systems Develops PLOs 2 and 3		**5.6**	**5.6**		
CS 6901 Comprehensive Exams Masters PLOs 1, 2, and 3	**6.5**	**7.8**	**6.8**		
M.S. Computer Science **2015-2016 Assessment Results (PLO 3)**					
CS 6260 Computational Complexity Develops PLOs 1 and 3	**7.8**		**8.7**		
CS 6560 Operating Systems Design Develops PLOs 2 and 3		**8.9**	**8.9**		
CS 6901 Comprehensive Exams (Fall) Masters PLOs 1, 2, and 3	**6.7**	**6.8**	**8.2**		
CS 6901 Comprehensive Exams (Spring) Masters PLOs 1, 2, and 3	**4.6**	**8.1**	**6.4**		
M.S. Computer Science					

2016-2017 Assessment Results (PLO 4)					
CS 6310 Advanced Software Engineering (Fall 2016) Develops PLOs 2 and 4		**7.0**		**7.0**	
CS 6320 Software Engineering of Web-Based Systems (Fall 2016) Develops PLOs 2 and 4				**5.38**	
CS 6525 Network Security (Fall 2016) Develops PLO 2 and Masters PLO 4				**9.78**	
CS 6901 Capstone Exams (Fall 2016, Winter 2017, Spring 2017) Masters PLOs 1, 2, and 3	**5.5**	**8.6**	**6.0**		

Data Analysis:

In evaluating the assessment scores for PLO's 1 and 2, the performance on the capstone course has only been fair. For PLO 1, it is probably the case that students just find the material difficult. The material is covered by one of the 3 exams that make up the capstone grading. Part of the material comes from the CS 6260 Computational Complexity course, which for most students is the most difficult requirement to satisfy.

While PLO 2 is more concrete than PLO 1, it is still more conceptual than PLO 3. In line with the observations for the CS 6660 course, students may struggle here because the correctness or incorrectness of answers is not as obvious. Discussing the concepts in the context of topics that are more attractive to the students has some benefits. As we consider the semester conversion process, one idea we are considering is modifying the capstone course to try to motivate the understanding of the concepts better.

For changes made to close the loop for specific PLO's, adjustments are still made in an ad hoc manner. For CS 6660, the course material has been completely revamped to cover more current topics. While the scores were not very good, one positive effect was that participation in the assessment quiz was quite high (85%). The instructor also noted that while the average score for both PLO's was the same, there was a much higher correlation between a student's total score for the PLO 3 questions and the student's final grade in the course (.61) than between the total score for PLO 2 and the final grade (.25). The PLO 2 questions did require more understanding of the principles behind the technology. The PLO 3 questions mostly involved the more straightforward use of the technology.

In evaluating the assessment scores for PLO #3, we find very positive results in three of the four courses assessed. CS 6260, CS 6560, and CS 6901 are required courses for all students, except a small number of students who elect to complete a thesis rather than taking the comprehensive exams (CS 6901.) As a result, these assessment scores reflect the performance of the program as a whole in achieving PLO #3.

In regards to closing the loop and using the results of the assessment process to improve student learning for PLO #3, it would appear that the CS 6260 and CS 6560 need only fine tuning, while

CS 6901 instructors could attempt to address consistency. In Fall 2015, CS 6901 students successfully demonstrated their proficiency regarding PLO #3, while Spring 2016 students were much less successful.

In evaluating the assessment scores for PLO #4, we find mediocre results in two of the courses assessed, CS 6310 and CS 6320, and much better results in the last course assessed, CS 6525. PLO #4 is one of the more challenging outcomes for students to achieve in that it requires students to develop and master their coding skills. Developing good coding skills often takes years of practice and should be begun early in an undergraduate career. Again, most of the graduate students in the Master's in Computer Science program are international students, and many international Computer Science programs do not stress coding skills to the degree that is necessary to become proficient. As a result, many of our Master's students start at a disadvantage in regards to PLO #4. The Department addresses this disadvantage by requiring remediation of basic programming courses for many admitted students, and by emphasizing the need for programming projects in as many Master's degree courses as possible. Under the semester-based system, a new required graduate-level data structures and algorithm analysis has been added to help students get up to speed quickly.

Please also note that all of the courses used to assess PLO #4 are electives, which can lead to selection bias. It may be that students with poorer coding skills chose to take CS 6310 and CS 6320, where the assessment results are mediocre, and students with better skills chose to take CS 6525, where the results are good. It is not clear that the scores assess the program as a whole. That said, PLO #4 is to be developed in CS 6310 and CS 6320 while it is to be mastered in CS 6525, and the scores do actually reflect a better mastery of coding in CS 6525 than the earlier courses. The Department has again addressed the issue of consistency of assessment under semesters by assessing all PLOs in required classes rather than electives.

In regards to closing the loop and using the results of the assessment process to improve student learning for PLO #4, it would appear that the students in CS 6525 have successfully mastered the PLO and no further modifications are needed. In CS 6310 and 6320, we would like to see improvements in coding proficiency at the development level. As mentioned, the new required course in coding that will be instituted under semesters will be the Department's first attempt to address this issue.

Next Step(s) for Closing the Loop:
In the last year before the semester-based system begins, course instructors have been encouraged to include more program development, testing, and tool use in their courses. In addition, it would be beneficial to provide additional learning opportunities for students who were unsuccessfully served by the current class format. These opportunities might include high impact educational practices such as collaborative projects or swapped classrooms.

M.S. Computer Networks **2013-2014 Assessment Results (PLO 1)**	**1**	**2**	**3**	**4**	**5**
CS 6526 Security in Wireless, Mobile, Grid and Pervasive Masters PLOs 1, 4, and 5	**8.0**				
CS 6596 Wireless and Mobile Network Architecture Master's PLOs 1, 2, and 3	**9.7**				
M.S. Computer Networks **2014-2015 Assessment Results (PLO 2)**	**1**	**2**	**3**	**4**	**5**
CS 6525 Network Security Masters PLOs 1, 4, and 5		**7.8**			
CS 6526 Security in Wireless, Mobile, Grid and Pervasive Masters PLOs 1, 4, and 5		**8.0**			
CS 6560 Operating Systems Masters PLOs 2, 3, and 5		**6.9**			
CS 6591 Communication Network Analysis and Design Masters PLOs 1, 2, and 3		**8.2**			
CS 6596 Wireless and Mobile Network Architecture Master's PLOs 1, 2, and 3		**7.7**			
CS 6715 Data Compression Masters PLO 2 and 3		**8.0**			
CS 6899 Masters PLO 3, 4, and 5		**8.2**			
M.S. Computer Networks **2015-2016 Assessment Results (PLO 3)**					
CS 6560 Operating Systems Masters PLOs, 3, and 5			**8.8**		
CS 6596 Mobile and Wireless Networks Masters PLOs 1, 2, and 3			**8.3**		
CS 6591 Communication Network Analysis Masters PLOs 1, 2, and 3					
CS 6715 Data Compression Masters PLOs 2 and 3			**6.2**		
CS 6899 Project Masters PLO 3, 4, and 5			**7.0**		
M.S. Computer Networks **2016-2017 Assessment Results (PLO 4)**					
CS 6525 Network Security Masters PLOs 1, 4, and 5				**8.2**	
CCS 6526 Security in Wireless, Mobile, Grid and Pervasive Masters PLOs 1, 4, and 5				**8.6**	
CS 6594 Broadband and Multimedia Networks Masters PLOs 1, 4, and 5				**9.8**	
CS 6899 Project Masters PLO 3, 4, and 5				**9.4**	

Data Analysis:

PLO 1 assesses student's mastery of network theory. From results in two network courses, CS 6526 Security in Wireless and Mobile Grid and CS 6596 Wireless and Mobile Networks, it appears that students are doing quite well learning the content for these PLOs. These courses will remain as topics courses for students in the semester system.

PLO 2 assesses student's abilities with current tools, techniques needed for application development. Once again, here we see good results in the courses assessed. Most of these courses will become topics courses under semesters with the exception of CS 6560 Operating Systems which currently is required for both M.S. Computer Science and M.S Computer Networks students. It will remain as a required course and has been redesigned for semesters.

In PLO 3 we are assessing problem solving skills and critical thinking. Here we see good results with the exception of CS 6715 Data Compression. This course presents complex programming problems and typically has low enrollment. This course was completely changed for semesters into a Coding Theory course covering encryption, error correction, and media coding.

PLO 4 evaluates written and oral communication skills and teamwork. Once again here we are happy with the results as assessed.

Next Step(s) for Closing the Loop:

As mentioned the MS Computer Networks program will cease to exist in Fall 2018. Some courses that are part of the current degree will remain as special topics courses and some will be changed entirely. Instructors have been encouraged during course redesign to include more tools, program development, and testing. High impact teaching practices such as think, pair share, collaborative projects, and flipped classroom techniques have also been encouraged.

In summary for all programs:

As described above, the existing assessment mechanisms are unwieldy. The Department proposed a new assessment model for use under semesters which will address the problems in the current system. PLOs in the B.S. and M.S. programs will be aligned, and all required courses will be assessed. Each assessment instrument will assess one PLO only to more clearly show student achievement. This new assessment plan will be described in the Plan portion of this document.

iii) Update introductory sequence in programming for B.S. degree.

As described above, an additional introductory programming course, CS 2370 - Introduction to Computer Science III was added to the B.S. major requirements.

The Department's semester-conversion plan calls for modifications to the structure of the one-year introductory sequence. Students will begin programming in Python, a simple and intuitive language which is more accessible than the currently taught language, C++. Later in the introductory sequence, the students will be introduced to C++.

iv) Add new courses to address new fields or changes in existing fields in B.S. and M.S. degrees.

Since our last five year review, three new hybrid courses have been added to the curriculum for the quarter system: Security in Mobile, Wireless, Grid and Pervasive Computing (CS 4526), Security Management (CS 4527) and Cloud Computing (CS 4593). These courses are currently tiered with graduate sections (CS 6526, 6527, and 6593.) Additionally, the new course, Statistical Learning and Data Analysis (CS 6831), was added to the Computer Science curriculum. These courses provide students the opportunity to learn about current technologies.

v) Revamp the currently confusing breadth category M.S. requirements in which students must take 2 courses each from courses identified as either Development/Theory or Systems/Architecture.

The department faculty felt that the division of courses into two categories was less than clear in some cases. As part of semester conversion, the breadth categories are eliminated. Instead, the number of core courses was increased from 2½ (3 courses worth a total of 10 quarter units) to 5 (5 courses worth a total of 15 semester units), providing a more comprehensive shared learning experience for the students, and more flexibility in the remaining electives. The new requirements are much a simpler to understand, which should reduce confusion and need for advising. A larger number of required courses will also simplify scheduling and lead to a more predictable annual schedule allowing students to plan their schedules far in advance. The need for consistent schedules is particularly important for the International students that make up most of the graduate program.

vi) Address issues arising from allowing graduate students to take 3000 or 4000 level undergraduate courses towards their Master's degree electives.

While the CSU and WASC allow a portion of Master's degree requirements to be fulfilled using undergraduate courses, there was substantial difficulty in ensuring that students did not use the same course to address both a requirement in their undergrad and grad programs. This policy required substantial, careful evaluation of undergraduate transcripts, and extensive advising, and caused a great deal of confusion for the students. As a result, the department chose not to allow undergraduate courses to be used towards Master's degree requirements under the semester system. This new policy will reduce the time needed to evaluate transcripts during admission, and greatly simplify one area of advising for students.

vii) Improve preparedness of M.S. students, insuring that prerequisite courses adequately prepare students for later coursework.

As part of the semester conversion, the department has clarified the requirements for admission to the Master's program, and added several admission prerequisites to ensure that students are adequately prepared to succeed in the program. Scores earned on the GRE test have also been made a mandatory component of the admission packet, and minimum scores on the test have been established.

In a development that the Department applauds, the University will begin enforcing course prerequisites as part of course enrollment. The Department has been checking course prerequisites by hand in the past, which is not practicable for large numbers of sections. As a result, some students successfully enrolled in courses for which they had not completed the course prerequisite often leading to less than successful results.

viii) Complete integration of M.S. Computer Networks into the M.S. Computer Science program

The M.S. in Computer Networks degree program was originally instituted as an inter-disciplinary program in conjunction with the Business degree program in Telecommunications Management. Students would take some courses Business and some in Computer Science. After the College of Business discontinued the Telecommunications Management degree program, Computer Science developed additional coursework to replace the Business courses and maintained the M.S. in Computer Networks. After several years' experience with the Master's in Computer Networks program, the Department does not feel that the program is sufficiently different from the Master's in Computer Science degree. As a result, the Department has requested that the M.S. in Computer Networks program be discontinued as of Fall 2018. Instead, a concentration in Computer Networks within the Master's in Computer Science will be offered. This is reasonable as there is still great demand in industry for professionals experienced in computer network theory and practice. In addition, the Department already provides significant course offerings in the field of Computer Networks, and has several faculty members who do research in the area.

2.3. Students, Advising, and Retention

2.3.1 Summary Comments regarding Student Success

The total number of students enrolled in Computer Science programs rose from 420 in Fall 2012 to 815 in Fall 2017, and is still growing. Enrollment by all categories of students has risen, with first time freshman rising from 34 to 101, first time transfers from 54 to 133, and graduate students from 26 to 99 from 2012 to 2016. Degrees granted per year have risen from 55 to 85 for undergrads. Graduate degrees awarded have been more variable, ranging from 31 to 110 as the graduate enrollment has also varied. Graduation rates for the Bachelor's program are summarized in the tables below. The Cohort from 2010 is the most recent for which 6 year graduation rate statistics are available.

Graduation Rates for First Time Freshman

	Cohort 2007	Cohort 2008	Cohort 2009	Cohort 2010
4 year graduation rate	16.7%	16.2%	5.2%	2.4%

6 Year Graduation Rate	46.7%	40.5%	34.5%	38.1%
% Retained at 4 Years	66.6%	56.8%	58.6%	52.4%

Graduation Rates for First Time Transfer Students

	Cohort 2007	Cohort 2008	Cohort 2009	Cohort 2010
4 year graduation rate	76.9%	63.2%	58.3%	81%
6 Year Graduation Rate	84.6%	68.4%	58.3%	81%
% Retained at 2 Years	84.6%	89.5%	54.2%	90.5%

As can be seen, the 4-year graduation rate for First Time Freshman has been going down, although the 6-year rate is holding fairly steady. The graduation rate for First Time Transfers students has varied. Based on analysis of student records by the Undergraduate Coordinator, the Department has found that many First Time Freshman struggle with the introductory programming sequence. They often must repeat the same course 3-4 times, and likely due to frustration, take the courses out of order, without completing the necessary course prerequisites. This leads to poor performance in later classes as well. Transfer students tend to be more successful because they transfer in having completed the introductory programming sequence. In fact, due to poor advising at the community colleges, the transfer students often have completed a number of additional programming courses which may not be used towards CSU major requirements. While this is a waste of time and money for the student, it means that the transfer students often have good programming skills, allowing them to move forward effectively in the program once at CSUEB.

The Department has been addressing the problem with the freshman graduation rate through more extensive and active advising through a single point of contact. For the last two years, the Department has identified an Undergraduate Coordinator within the Department who has proactively contacted students who are having trouble completing the major requirements and provided contacts for tutoring and other support services as well as advice regarding enrollment in the proper classes. The Department also believes the automated course prerequisite checking that will be provided under the semester system will help to ensure that students take courses in the right order allowing them to succeed.

For the last year, the department has also provided help to the students through the lab assistants in its new open lab, SC N337. The Department is grateful to the College of Science Dean for providing the lab space, equipment, and funding for this lab. The additional assistance provided to the students as well as the sense of community provided by the open lab should help with both graduation and retention efforts.

Retention levels have varied somewhat but are fairly steady at roughly 55% for First Time Freshman and 85% for First Time Transfer students. Both of these rates should also be improved via more directed advising and improving student services and sense of community. Unfortunately, the College of Science Dean has indicated that no funds will be provided for an Undergraduate Coordinator going forward. The Department will have to develop a new solution.

2.3.2 Progress towards Goals

i) Grow all programs in order to help address need for qualified tech workers in California.

Studies have shown for many years that there is a lack of qualified applicants for tech jobs in California and across the nation. The Department of Computer Science had hoped to help address this shortage by growing our program and generating more qualified graduates. The Bachelor's program has been growing quickly and steadily, from 315 to 598 students in the interval from 2012 to 2017. It is expected to continue growing as demand in the tech sector continues to grow. At the Master's degree level, there is limited demand from domestic students as most positions require a Bachelor's degree and some industry experience. As a result, the large majority of our student population is made up of students from other countries, predominantly India. They are attracted to the university due to our proximity to Silicon Valley. Our programs already possess the highest rate of degree-related job placement at CSUEB (from AACE data). Even so, the economic upturn has increased job opportunities for our graduates even more. The Bureau of Labor statistics projects another 22% increase in jobs over the next 6 years. Consequently, we are seeing a marked increase in the number of applications. Students are getting hired even more quickly and finding internships easily. Employers are contacting our department on a weekly basis.

Despite the demand for qualified Computer Science graduates, the Department does not have the faculty resources to cover the sections of courses needed to support both the undergraduate and graduate programs. The undergraduate program is growing quickly, by 20% or more each year, and undergraduate enrollment cannot be regulated by the Department. As a result, graduate enrollment must be reduced to keep the combined undergraduate and graduate enrollment to a manageable size. With the support of the CSCI Dean's office, the Department voted to significantly decrease the size of the Master's in Computer Science program, from roughly 300 students to roughly 100 students. This decrease in enrollment is being implemented by increasing the standards required of the applicants and by accepting applications for Fall quarter admission only, rather than accepting applications in Fall, Winter, and Spring quarter as has been traditional. Approximately 200 students have been accepted for Fall 2018 admission. If historical yields of 25% admits to enrollees holds for Fall, then approximately 50 enrollees will have been obtained. Since students typically complete the Master's degree requirements in two years, 50 new enrollees per year will give the desired 100 student population.

ii) Improve student experience and B.S. graduation rate. Increased course offerings and more formal advising should result in better retention.

Overall enrollment in our B.S. Computer Science program has increased roughly 40% since the date of our last 5-year review. To better serve our undergraduate students, we have created an undergraduate adviser position. The undergraduate adviser is a first contact for students who want to plan their computer science schedules, receive transfer credit evaluation, request job/internship/ graduate school recommendations, and review graduation requirements. The undergraduate advisor contacts and counsels students who have low GPA's in their Computer Science courses and meets with students who have been cited for academic dishonesty. She also meets with perspective students and parents. The Department believes this added advising will lead to a shorter time to graduation for students.

The Computer Science Club and new ACM-W club have become an active presence on campus. The groups participated in a Google Spark outreach project teaching children from the Hayward Boys and Girls Club Python programming, competed in several programming competitions (placing third out of eleven at Google), and have hosted numerous speakers. Dr. Ertaul continues to lead his Hackathon each year. These experiences should serve to create a stronger bond between the Department and the students, leading to better retention.

ITS, working with the Department of Computer Science, completed an implementation of the Degree Audit Record (DAR) online advising system for the Bachelor's and Master's in Computer Science program. The system went live for Fall quarter 2016. This additional advising channel will allow advising to be done more efficiently and to provide all necessary information to the students so that they are kept informed of any decisions regarding substitutions, change of status, etc.

iii) Work on student preparation for courses in a sequence in B.S. degree.

Students often struggle with the introductory programming sequence, CS 1160/2360/2370/3240, which must be taken in order, and which build upon one another. Students may take the first three courses at community college, but all take CS 3240 – Data Structures at a CSU. As a result, the students entering CS 3240 have very diverse programming backgrounds, having studied perhaps Java, C++, Python, or other languages. Articulation agreements with the community colleges specify only the content to be covered rather than the language to be taught. The Department has addressed this issue to some extent through advising and notification of the students that all sections of CS 3240 will be taught in C++, and consistently enforcing this policy over several years.

A second issue regarding preparation is that many students who do not successfully complete an early course in the sequence often move forward regardless. For instance, students are required to earn a C or better in their required major courses. Some will earn a "D" in CS 1160 and then continue on to CS 2360, perhaps attempting to repeat CS 1160 again for a better grade later. This strategy leads to failure in the later class as well. The Undergraduate Coordinator has identified a large number of students who both need to repeat the introductory courses 3-4 times before earning an acceptable grade and who also take courses out of order. The Department has been addressing this issue through proactive advising. The Undergraduate Coordinator has been contacting students, and providing guidance regarding course schedules and tutoring resources.

2.4. Faculty

2.4.1 Summary Comments regarding Faculty

Numbers from Institutional Research regarding faculty are not extremely helpful as the Computer Science program was housed in the combined Department of Mathematics and Computer Science until 2015. In addition, perhaps 5 faculty members taught both Mathematics and Computer Science courses. We can identify approximately 15 tenured or tenure-track Computer Science faculty members at the time of the last five year review. Many have retired, not including one

faculty member completing the last year of FERP this year. Due to these retirements and the large growth of both the graduate and undergraduate programs, the Department has been awarded hiring positions by the university almost every year covered by this review. Many of these searches have not been successful though, and the Department is now comprised of only ten tenured or tenure-track faculty members. The Department has been fortunate to hire the following faculty during the review period:

Dr. Jiaofei Zhong	Joined Fall 2014
Dr. Varick Erickson	Joined Fall 2016
Dr. Xiaojun Ruan	Joined Fall 2017

The Department is also conducting a search for two positions to begin Fall 2018.

The Department is more gender diverse than the Computer Science field in general (20% women according to 2016 CRA Taulbee Report) and more than our student population. 30% (3/10) of the department faculty are women and 70% (7/10) are men.

The Department has attempted to address the failed searches by doing considerable outreach, with faculty members personally contacting graduate programs, and doing recruitment at conferences, including the Grace Hopper Conference for Women in Computing. The Department has received a reasonable number of applications during each search, resulting in quality candidates being interviewed on campus. It has often been the case though that the top two or three candidates have not accepted the offers made to them. Based on discussions with those candidates, the searches have failed due to inadequate salary offers. CSUEB offers have often been exceeded by other offers by $10,000 or more, even when those offers have been made by other CSU Computer Science programs. The Department has discussed this problem with both the outgoing College of Science Dean, Dr. Michael Leung, and the current College of Science Dean, Dr. Jason Singley. Some small progress towards more competitive salary offers has been made in the last year. According to the data from the Computing Research News Taulbee Survey shown below though, even better funded programs are often unsuccessful in filling their positions due to the great demand for Computer Science PhDs.

Table F2. Vacant Positions 2014-2015 by Position and Department Type

	Tried to fill	Filled
US CS Public		
TenureTrack	302	221
Teaching	121	104
Research	46	45
Postdoc	96	115
Total	565	485

2.4.2 Progress towards Goals

i) Discuss future of Department (combined or split)

The faculty of the department of Mathematics and Computer Science had discussed the possibility of separation into two departments for many years. Combined departments were the result of Computer Science growing out of Mathematics departments, with some faculty teaching in both disciplines. Computer Science has been a distinct field of endeavor for several decades now, and only 2-3 faculty members of the combined department taught in both areas, limiting the need to house the two programs in one department. The great size of the department (nearly 30 faculty), and the large differences in the programs made it difficult to manage, and difficult for standard departmental policies to be developed. As a result, a request was made to separate the programs into two departments. That request was approved in July, 2015.

ii) Recruit new faculty to reduce reliance on lecturers and to provide opportunities to offer classes and research support in areas of current Computer Science areas of development.

Faculty recruitment is one of the Department's main concerns. Even to maintain the program at its current size, new faculty will need to be hired as there three faculty completed their FERP periods at the end of 2016-2017, with one more member to complete his FERP period at the end of 2017-2018. In order to handle the enormous growth in the undergraduate program and address new areas, even more faculty will be required. Three years ago, a faculty search ended in failure with only a handful of applicants. This was despite extensive outreach efforts. Two years ago, the Department conducted a search for 2 positions. The Department was fortunate to fill one of the tenure track positions, and welcomed Dr. Varick Erickson, who joined us in Fall 2016. The Department again held searches for two positions in the last year. Again, one position was filled, and we will welcome Dr. Xianjun Ruan in Fall 2017. In both years, the Department was unable to fill the second position, and as has been typical, the first few applicants who have been offered a position have taken jobs elsewhere. The applicants have regularly pointed to insufficient compensation as the reason for turning down our offer, and it is typical that even other CSU

campuses are able to provide more competitive offers. The Department is again conducting a search for two positions in 2017-2018, a roll-over of last year's position, and a new one. The Department continues to seek diverse applicants with interests in emerging fields of current interest, and again is making significant efforts to provide outreach to under-represented groups.

iii) Develop department leadership.

Due to the retirements of many senior faculty, four in the last few years and one more at the end of 2017-2018, the Department lacks administrative experience. The faculty serving as Department Chair and Graduate Coordinator have retired, as well as the faculty who had run many of the faculty searches. In addition, due to the separation of the Mathematics and Computer Science programs into two separate departments, expertise that was available in the Mathematics side of the combined department is no longer available. Dr. Matt Johnson has since served as Graduate Coordinator and now Department Chair, while Dr. David Yang and now Dr. Kevin Brown have served as Graduate Coordinator. Dr. Leann Christianson has been serving as Undergraduate Coordinator although the College of Science Dean has indicated that no further funding for this position will be made available.

Now that the department is so much smaller than it was when the Mathematics and Computer Science programs were housed in a combined department, it will be necessary for more faculty to take leadership roles. For instance, faculty will be needed to run the faculty searches, chair the curriculum committees, handle department assessment, and so on. The Department has attempted to address this situation by requiring all faculty to serve on either the Graduate Committee or the Undergraduate Committee, and dividing many of the department responsibilities between the two committees. This model has not resulted in much additional involvement of faculty in department matters.

iv) Address workload of Graduate Coordinator, who is responsible for evaluating 1500-2000 applications per year, in addition to advising enrolled graduate students.

The Graduate Coordinator evaluates applications for admission, and advises current students. The Coordinator receives 2 courses assigned time, which is insufficient in order to complete these tasks. The main concern is the number of applications, which have been in the range to 1500-2000 per year. Almost all applications are from abroad, and require significant evaluation in order to determine if the applicant has completed the 19 prerequisite courses that the Department has determined are necessary for successful preparation for entrance to the Master's program. A large percentage of the applicants are not prepared for the program and must be denied. The yield of enrolled students to applicants ranged from 3% to 20% over the last two years. An enormous amount of work was necessary on the part of International Admissions, the staff of the Department of Computer Science, and Graduate Coordinator for very little payoff in terms of enrolled students.

This payoff is especially an issue now that the Department has voted to decrease the size of the graduate program. Evaluating 2000 applications to enroll 50 students is not a workable system. In order to decrease the number of applications, the program will accept applications in Fall quarter only, rather than Fall, Winter, and Spring quarters as has been traditional. Also, a

minimum requirement on GRE scores has been implemented, eliminating the need to evaluate some of the least competitive applications. Finally, the Department has met with the Office of International Admissions (IAO) to better streamline the admissions process in hopes of increasing the yield, so that admitted students are more likely to attend.

2.5. Resources

i) Facilities for Department faculty offices, teaching labs, research labs, including co-locating office space to provide opportunities for faculty to work together more easily.

The Department was pleased that space was made available in the new Student and Faculty Support (SF) building for the department office and faculty offices. Faculty had been spread over all four floors of both Science buildings previously. Proximity to colleagues and the department office has already led to increased communication between department faculty, more frequent department committee meetings, and increased productivity. Unfortunately, space was not made available for all department faculty. In particular, faculty participating in the FERP program, and all lecturers are still housed in the Science buildings. In addition, there is not enough space in the new building even to house the faculty that would result from successful searches that have been approved for next year. Ideally, it would be beneficial to house the entire department in one place with enough made available for desired growth.

Through the generosity of the College of Science, the department was able to create an open Computer Science Lab for students in N Sci 337. This lab is staffed with student TAs. We have fewer classroom labs, however, which are needed for many of our courses. Currently our classroom labs are VBT 218, N Sci 336, and a small room N Sci 104. We have added lab components to five of our courses for semesters and fear that this shortage will be a dire problem in the future.

As our outside reviewer mentioned, if we choose to seek accreditation, our relative lack of teaching and experimental lab space would be a major concern to the accrediting board. The Department is in discussions with the Dean of the College of Science to address these issues.

ii) Improve relationship with ITS (Instructional Technology Services) to support teaching and research needs.

The centralization of Information Technology Services (ITS) on campus left the Department of Computer Science with no dedicated support for its teaching and research support needs. The centralized model was unwieldy, slow, and has not served the Department well, impacting the students as software and hardware testbeds and learning environments have become outdated or unusable. Our outside reviewer stated that even the support that was provided before centralization was insufficient. The College of Science approved a support position for the Department, similar to that provided for other lab-based disciplines, which was filled in January 2017. Unfortunately, due to lack of support from Human Resources, that hire was invalidated. Another second search resulted in a hire who began work in Winter 2018.

Due to the lack of physical lab space and physical machines on which to work, the Department has been working with ITS on virtual resources. While not a substitute for physical resources, these virtual resources fill a gap, specifically for students without the financial resources to buy their own devices. BayCloud images of Windows and Linux operating systems environments have been deployed and made available to Computer Science students. These environments do not yet provide all the necessary functionality, but the Department is consulting with ITS in hopes that additional functionality may be made available. Long-time College of Science Linux servers have also been retired in the last quarter, with only limited replacements made available. The Department is also in discussions with ITS regarding these replacements.

iii) Restore funding for readers, TAs, and travel to academic conferences.

The need for additional resources to fund readers, Teaching Assistants, and travel to academic conferences is little changed. Our outside reviewer specified lack of funding for continuing development and other department needs was a significant issue. The lack of funding is especially an important factor as we attempt to hire new faculty who are especially in need of grading support, and are expected to publish and present at conferences.

iv) Need for library resources, specifically to support graduate courses.

Library offerings have been uneven, with important database subscriptions cancelled and re-established. Access to a wide range of journals and conference proceedings is especially important as we plan to increase the rigor of our graduate courses under the semester system.

2.6. Units Requirement and Transfer Model Curriculum

The Bachelor's degree in Computer Science requires 180 quarter units. At the beginning of the review period, the Department had offered three options, in Software Engineering, Networking, and Computer Engineering, which each required 188 units. These options have been discontinued. The Community College Transfer Model Curriculum is included as an appendix.

3. Five-Year Plan

As part of the campus-wide semester conversion, the Department of Computer Science chose to transform both the Bachelor's and Master's programs, rather than simply convert the existing programs to equivalent semester-based programs. Many of the goals the Department has identified for the next five year period are to be achieved through the transformation. As a result, The Department will emphasize the successful implementation, evaluation, assessment, and fine-tuning of the new programs throughout the Five Year Plan sections.

The Department has identified goals as given below. Goals are prioritized and explained in detail in the sections that follow.

Curriculum:
i) Implement semester-based courses as defined by transformed syllabi.
ii) Assess semester-based courses and use data to continually improve courses.

iii) Evaluate assessment mechanisms themselves to provide opportunity to improve mechanisms.
iv) Regularly re-visit choice of programming languages and platforms used in introductory programming classes based on effectiveness shown by assessment data.
v) Regularly evaluate possibility of seeking accreditation from Accreditation Board for Engineering and Technology (ABET), which provides accreditation for Computer Science programs.
vi) Add new courses to address new fields or changes in existing fields in B.S. and M.S. degrees.
vii) Increase the number of sections of introductory courses taught by tenured or tenure-track faculty.
viii) Continue to increase lab elements and other participatory elements of classes.
ix) Offer more on-line or hybrid courses to allow students more flexible schedules.
x) Continue to offer new service courses in computing to other university departments.
xi) Offer GE course in computing.

Students:
i) Provide ongoing support for students who are continuing through the semester conversion.
ii) Find funding or substitute for undergraduate advising role.
iii) Improve student experience and B.S. graduation rate.
iv) Reduce time to graduation for B.S. Students, both native CSUEB students and transfer students.
v) Implement mechanisms to make student research projects available to student population. Use same mechanisms for internship experiences, peer advice, and references.
vi) Work with AACE to increase recruiting on campus, both for graduates and students seeking internships.
vii) Develop mechanisms for handling growth in undergraduate program and right-size graduate program to fit department resources.

Faculty:
i) Recruit new faculty to reduce reliance on lecturers and to provide opportunities to offer classes and research support in areas of current Computer Science areas of development.
ii) Encourage professional development.
iii) Develop department by-laws.
iv) Develop department leadership.
iv) Address workload of faculty, specifically four course per semester teaching load.
v) Address support for faculty supervision of student research.

Resources:
i) Facilities for department faculty offices, teaching labs, research labs, including co-locating office space to provide opportunities for faculty to work together more easily.
ii) Improve relationship with ITS (Instructional Technology Services) to support teaching and research needs.
iii) Upgrade labs and environments used for class assignments, student research.
iv) Address funding for readers, TAs, and travel to academic conferences.
v) Address need for library resources, specifically to support graduate courses.
vi) Continue to develop Industry Advisory Board

3.1. Curriculum including Assessment

The main department goal regarding curriculum is to implement the semester-based curriculum developed by the Department over the last two years. Again, the Department chose to transform, rather than simply convert, its program, leading to a large number of changes. To provide better preparation for industry requirements, more consistent scheduling, and a more tightly knit student community, the number of required courses in the Bachelor's degree was increased by three courses. In addition, laboratory sections have been added to introductory programming courses, and non-major courses have been added to make the B.S. curriculum consistent with Accreditation Board for Engineering and Technology (ABET) standards. The Master's degree program requirements were also modified to require three additional required courses, and to greatly simplify the system used to choose the remaining electives. In addition, the set of capstone experiences was expanded to include a project option. Finally, the separate Master's in Computer Networks program has been pulled into the Master's in Computer Science program as a concentration. This change will simplify admissions, advising, and scheduling.

A second important goal is the implementation of the new assessment plan developed for the semester-based programs. The Department created new PLOs for the semester-based system. Many PLOs are driven by learning outcomes required by ABET, which provides accreditation for Computer Science programs. In addition, the PLOs for the Bachelor's and Master's programs were aligned, so that matching PLOs in each program would be assessed at the same time. Assessment of PLOs will be done in all required courses, in Fall semester of each year at a minimum. This data will be analyzed and provided back to the instructors for possible changes to the courses to close the loop.

Secondary goals, include possible accreditation of the program, regular re-evaluation of the introductory programming sequence, development of new courses, and increasing the number of courses which are taught in online or hybrid modes.

Goals for the next five years concerning curriculum include:

i) Implement semester-based courses as defined by transformed syllabi.

Transformed syllabi for each course were submitted as part of the semester-conversion process. The Department has since developed detailed course outlines for each course as well, including texts, sample assignments, computing resources needed, etc. These course outlines are to be used by the various instructors who teach the same course to provide consistency, especially for courses in a sequence such as CS101, CS 201, and CS 301, the introductory programming sequence.

The Department will collect course syllabi for each offered course in each semester. Each year, the syllabi will be compared to the approved course outlines to determine if course material is being covered as required. The undergraduate and graduate Computer Science committees will be responsible for courses as appropriate.

ii) Assess semester-based courses and use data to continually improve courses.

The Department has devised a semester-based assessment plan. Assessment of PLOs will be done in all required courses, in Fall semester of each year at a minimum. Instructors of courses will be responsible for deploying the assessment mechanisms in their courses, and providing it to the Chair or Graduate Coordinator depending on the level of the course. This data will be analyzed and provided back to the instructors for possible changes to the courses to close the loop.

The Department created new PLOs for the semester-based system. Many PLOs are driven by learning outcomes required by ABET, which provides accreditation for Computer Science programs. In addition, the PLOs for the Bachelor's and Master's programs were aligned, so that matching PLOs in each program would be assessed at the same time. The intent was to make the process simpler and easier to improve instructor participation and increase the amount of assessment data collected. The PLOs for the programs are as follows:

Semester-Based Bachelor's Program PLOs

Students graduating with a B.S. in Computer Science will be able to:

1. Apply knowledge of mathematics and computational theory to analyze problems in computer science, and identify and define the resources and requirements needed for their solution.
2. Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
3. Recognize and distinguish the mechanisms, components and architecture of computing systems.
4. Employ current techniques, skills, and tools necessary for computing practice, and recognize the need for continuing professional development.
5. Identify professional, ethical, legal, and security issues and responsibilities and the impact of computing on individuals, organizations and society.
6. Perform successfully on teams to accomplish a common goal, and communicate computer science concepts effectively in written and oral form.

Semester-Based Master's Program PLOs

Students graduating with an M.S. in Computer Science will be able to:

1. Apply knowledge of mathematics and computational theory to analyze problems in computer science, and assess and determine the resources and requirements needed for their solution.
2. Design, develop, and evaluate a computer-based system, process, component, or program to meet desired needs.
3. Classify and explain the mechanisms, components and architecture of computing systems.
4. Employ current techniques, skills, and tools necessary for computing practice, and **justify** the need for continuing professional development.
5. Discuss professional, ethical, legal, and security issues and responsibilities and the impact of computing on individuals, organizations and society.
6. Function successfully on teams to accomplish a common goal, and explain computer science concepts effectively in written and oral form.

PLOs will be assessed in courses as shown in the following tables for the Bachelor's and Master's programs.

B.S. Program - Curriculum Map #1: PLOs Aligned to Required and Elective Courses

- Provide a course title and new number for all required and elective courses. Indicate if required (R) or elective (E) course
- For all <u>required</u> courses, use an I = Introduce, D = Develop, M = Master, and A= Assess.

COURSE	TITLE	R/E	PLO #1	PLO #2	PLO #3	PLO #4	PLO #5	PLO #6
CS 101	**Computer Science I**	**R**		**I**		**I**		**I**
CS 201	**Computer Science II**	**R**		**I**		**I**		**I**
CS 211	**Mathematical Foundations of Computer Science**	**R**	**I**			**I**		
CS 221	**Computer Organization and Assembly Programming**	**R**	**I**	**I**	**I**			
CS 231	**Computers and Social Responsibility**	**R**					**I**	**D**
CS 301	**Data Structures and Algorithms**	**R**	**D**	**D**		**I**		
CS 311	**Programming Language Concepts**	**R**	**D**			**D**	**D**	
CS 321	**Computer Architecture**	**R**	**D**		**D**			
CS 351	**Website Development**			**D**		**D**	**D**	
CS 401	**Software Engineering**	**R**		**D**		**D**	**D**	**M**
CS 411	**Automata and Computation**	**R**	**M**			**M**		
CS 413	**Analysis of Algorithms**	**R**	**M**	**M**		**M**		
CS 421	**Operating Systems**	**R**	**M**	**M**	**M**			
CS 431	**Database Architecture**	**E**		**M**	**M**	**M**		
CS 441	**Computer Networks**	**R**	**M**		**M**	**M**	**M**	**M**
CS 453	**Mobile Programming**	**E**		**D**	**D**	**M**		
CS 455	**Computer Graphics**	**E**	**M**	**M**		**M**		
CS 461	**Artificial Intelligence**	**E**	**M**	**M**				
CS 471	**Security and Information Assurance**	**E**	**M**		**M**		**M**	

CS 490	**Independent Study**	**E**				**M**		**M**
CS 498	**Cooperative Education**	**E**				**M**		**M**

M.S. Program - Curriculum Map #1: PLOs Aligned to Required and Elective Courses

- Provide a course title and new number for all required and elective courses. Indicate if required (R) or elective (E) course
- For all <u>required</u> courses, use an I = Introduce, D = Develop, M = Master, and A= Assess.

PLOs	**R/E**	**PLO 1**	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**
Course title and new number							
CS 601 – Advanced Algorithms	**R**		**D**		**M(A)**		
CS 603 – Advanced Software Development	**E**		**D**	**D**			
CS 605 – Information Coding and Cryptography	**E**	**D**		**D**	**D**	**D**	
CS 607 – Parallel Programming	**E**			**D**	**D**		
CS 611 – Theory of Computation	**R**	**M(A)**			**D**		
CS 615 – Compiler Design	**E**	**D**		**D**	**D**		
CS 621 – Operating Systems Design	**R**			**M(A)**	**D**	**D**	**D**
CS 623 – Cloud Computing	**E**			**D**	**D**	**D**	
CS 625 – Advanced Computer Architecture	**E**			**D**			
CS 631 – Database Systems	**E**			**D**	**D**		
CS 641 – Advanced Computer Networks	**R***		**D**	**D**		**D**	
CS 643 – Distributed Systems	**E**			**D**	**D**		
CS 645 – Network Analysis and Design	**E**		**D**	**D**			
CS 651 – Web Systems	**R**		**M(A)**	**D**			
CS 661 – Advanced Artificial Intelligence	**E**	**D**			**D**		
CS 663 - Computer Vision	**E**	**D**			**D**		
CS 671 - Cybersecurity	**R**		**D**	**D**		**M(A)**	**M(A)**
CS 681 – Digital Signal Processing	**E**	**D**			**D**		
CS 683 – Computer Simulation	**E**		**D**	**D**			
CS 689 – Capstone Project	**R^+**	**M**	**M**	**M**	**M**	**M**	**M**
CS 690 – Independent Study	**E**		**D**		**D**		**D**
CS 692 – Capstone Examinations	**R^+**	**M(A)**	**M**	**M(A)**	**M(A)**	**M**	**M**
CS 697A - Topics in Computer Science	**E**		**D**		**D**	**D**	**D**
CS 697B - Topics in Computer Networks	**E**		**D**		**D**	**D**	**D**
CS 699 – Capstone Thesis	**R^+**	**M**	**M**	**M**	**M**	**M**	**M**

B.S. Program Five Year Assessment Plan

PLO's	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023

PLO 1 **Apply knowledge of mathematics and computational theory to analyze problems in computer science, and identify and define the resources and requirements needed for its solution.** **ILO #6**	**CS 211 Mathematical Foundations of Computer Science (Introduce)** **CS 311 Programming Language Concepts (Developing)** **CS 411 Automata and Computation (Master)** **Quiz with questions addressing this PLO deployed through Blackboard and assessed with Blackboard rubric**				
PLO 2 **Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs** **ILO#1**		**CS 101 Computer Science I (Introduce)** **CS 301 Data Structures (Develop)** **CS 413 Analysis of Algorithms (Master)** **Quiz with questions addressing this PLO deployed**			

		and through Blackboard and assessed with Blackboard rubric			
PLO 3 **Recognize and distinguish the mechanisms, components and architecture of computing systems ILO#6**			**CS 221 Computer Organization and Assembly Programming (Introduce)** **CS 321 Computer Architecture (Developing)** **CS 421 Operating Systems (Master)** **Quiz with questions addressing this PLO deployed and through Blackboard and assessed with Blackboard rubric**		
PLO 4 **Employ current techniques, skills, and tools necessary for computing practice, and recognize the need for continuing professional**				**CS 201 Computer Science II (Introduce)** **CS 311 Programming Language Concepts (Develop)** **CS 441**	

development ILO#6				**Computer Networks (Master)** **Quiz with questions addressing this PLO deployed and through Blackboard and assessed with Blackboard rubric**	
PLO 5 **Identify professional, ethical, legal, and security issues and responsibilities and the impact of computing on individuals, organizations and society ILO#5**					**CS 231 Computers and Social Responsibility (Introduce)** **CS 401 Software Engineering (Develop)** **CS 441 Computer Networks (Master)** **Quiz with questions addressing this PLO deployed and through Blackboard and assessed with Blackboard rubric**
PLO 6 **Perform successfully on teams to accomplish a common goal, and communicate effectively in written and oral formILO#4**					**CS 101 Computer Science I (Introduce)** **CS 231 Computers and Social Responsibility (Develop)** **CS 401 Software Engineering (Master)**

					Quiz with questions addressing this PLO deployed and through Blackboard and assessed with Blackboard rubric **Project/ Paper/Presentation and rubric for evaluation in Blackboard**

Assessment Procedure: Blackboard will be used as a means to provide students with an assessment that addresses the SLO's of each course which will be mapped to the particular PLO being assessed for that course. A Blackboard rubric will be used to calculate result which can be exported and evaluated. Faculty will review these results and modify course content to improve outcomes when needed.

M.S. Program Five Year Assessment Plan

PLO's	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
PLO 1	Course: CS 611 Theory of Computation Tool: Department specified summative assessment Artifact: Exam	Course: CS 692 Capstone Examinations Tool: Department specified summative assessment Artifact: Exam	Course: CS 611 Theory of Computation Tool: Department specified summative assessment Artifact: Exam	Course: CS 692 Capstone Examinations Tool: Department specified summative assessment Artifact: Exam	Course: CS 611 Theory of Computation Tool: Department specified summative assessment Artifact: Exam
PLO 2	Course: CS 651 Web Systems Tool: Department specified summative assessment Artifact: Exam		Course: CS 651 Web Systems Tool: Department specified summative assessment Artifact: Exam	University 5-year Program Review (CAPR)	Course: CS 651 Web Systems Tool: Department specified summative assessment Artifact: Exam
PLO 3	Course: CS 621 Operating Systems Design Tool:	Course: CS 692 Capstone Examinations Tool:	Course: CS 621 Operating Systems Design Tool:	Course: CS 692 Capstone Examinations Tool:	Course: CS 621 Operating Systems Design Tool:

	Department specified summative assessment Artifact: Exam	**Department specified summative assessment Artifact: Exam**	**Department specified summative assessment Artifact: Exam**	**Department specified summative assessment Artifact: Exam**	**Department specified summative assessment Artifact: Exam**
PLO 4	**Course: CS 601 Advanced Algorithms Tool: Department specified summative assessment Artifact: Exam**	**Course: CS 692 Capstone Examinations Tool: Department specified summative assessment Artifact: Exam**	**Course: CS 601 Advanced Algorithms Tool: Department specified summative assessment Artifact: Exam**	**Course: CS 692 Capstone Examinations Tool: Department specified summative assessment Artifact: Exam**	**Course: CS 601 Advanced Algorithms Tool: Department specified summative assessment Artifact: Exam**
PLO 5	**Course: CS 671 Cybersecurity Tool: Department specified summative assessment Artifact: Exam**		**Course: CS 671 Cybersecurity Tool: Department specified summative assessment Artifact: Exam**		**Course: CS 671 Cybersecurity Tool: Department specified summative assessment Artifact: Exam**
PLO 6	**Course: CS 671 Cybersecurity Tool: Department specified summative assessment Artifact: Exam**		**Course: CS 671 Cybersecurity Tool: Department specified summative assessment Artifact: Exam**		**Course: CS 671 Cybersecurity Tool: Department specified summative assessment Artifact: Exam**

Assessment Procedure: Department faculty will develop a standard summative assessment to be given in each section of each assessed course, in addition to regular course materials specified by instructor. Initial summative assessment will be an exam with a proficiency requirement. Department faculty will also develop a grading rubric for the exam. A score of 60% proficiency will indicate that a student has met expectations for this PLO.

iii) Evaluate assessment mechanisms themselves to provide opportunity to improve mechanisms.

As assessment data is collected over the 5 year period, the undergraduate and graduate Computer Science committees, in conjunction with the course instructors, will determine if the data is useful towards driving improvements. Modifications to the assessment mechanisms will be made if necessary.

iv) Regularly re-visit choice of programming languages and platforms used in introductory programming classes based on effectiveness shown by assessment data.

There is constant dispute in the Computer Science field as to the most effective programming language to use in introductory programming courses. C++, Java, Python, Pascal, and many other languages have been proposed as the best solution. Introductory programming courses in the Department have historically been taught in C++. Under the semester-based system, the Department plans to begin teaching Python, with a switch to C++ in later courses. An additional required upper division course in Software Engineering will introduce Java, so that students are proficient in at least two of the industry standard languages. The undergraduate Computer Science committee will annually re-evaluate the choice of the language used in the introductory programming courses based on assessment data, pass rate, and other factors, to ensure that students are being provided the best learning experience possible.

v) Regularly evaluate possibility of seeking accreditation from Accreditation Board for Engineering and Technology (ABET), which provides accreditation for Computer Science programs.

With the transformation of the semester-based Bachelor's program curriculum, the program now meets ABET requirements for accreditation. The Department will annually consider whether to seek that accreditation or not. This decision will be based on the suggested benefits of accreditation, as well as the costs in terms of added workload for Department faculty. Non-curriculum based ABET requirements such as faculty workload requirements may also require additional expenditure from the university which may not be available.

vi) Add new courses to address new fields or changes in existing fields in B.S. and M.S. degrees.

The field is Computer Science is constantly, evolving with new technologies and theory continuously being developed and deployed in both academia and industry. The Department will work towards developing new courses or adding content to existing courses to address these new areas. The Graduate and Undergraduate Computer Science committees will annually evaluate course offerings.

vii) Increase the number of sections of introductory courses taught by tenured or tenure-track faculty.

Due to the fact that many students struggle with introductory programming courses, often leading them to abandon the major, our best instructors should be teaching our introductory courses. Tenured and tenure-track faculty can provide the consistency needed and the vision as to the place that programming fits into the rest of the curriculum. As such, when possible, tenured and tenure-track faculty should be assigned to teach the introductory courses. This is often problematic, as the tenured and tenure-track faculty are needed to teach upper–division and graduate courses where lecturer support is often unavailable. Still, an effort should be made in this regard. When making scheduling decisions, the Chair will attempt to create a schedule as described. Sections of

introductory classes taught by tenured and tenure track faculty are specified in the annual reports provided to CAPR.

viii) Continue to increase lab elements and other participatory elements of classes.

In the semester-based Bachelor's program, laboratory sections were added to all introductory programming classes to provide more opportunity for students to practice their programming skills and develop experience using programming tools such as integrated programming environments and debuggers. Faculty will be encouraged to add lab elements to all appropriate courses. Graduate course descriptions were all modified to indicate that programming projects were expected of the students. High impact teaching strategies will be recommended as well, including flipped classrooms, collaborative assignments, think-pair-share, multiple exposures, added feedback and others. Some department faculty have significant experience using high impact teaching strategies and will be encouraged to share those experiences with the rest of the department. The undergraduate and graduate Computer Science committees will annual review course syllabi to determine if progress has been made and to provide guidance to department faculty.

ix) Offer more on-line or hybrid courses to allow students more flexible schedules.

CSUEB students often work full-time jobs and have significant family obligations. Students have often remarked that it is a struggle for them to come to campus both to attend class and to meet with instructors during office hours. In addition, the Department serves both significant numbers of full-time students who typically prefer courses offered during the day, and part-time students, who typically prefer courses offered at night. The Department already offers a significant number of hybrid courses, allowing students to attend class through BlackBoard for most class sessions. The Department plans to offer more classes in a hybrid or fully on-line mode under semesters. Department faculty have significant experience in this area both in practice, using East Bay Replay to capture video of courses, and in theory, as some faculty have completed the QOLT Certified Quality Online Course program. The Department Chair will control the number of hybrid or online courses offered through course scheduling given input from the department faculty.

x) Continue to offer new service courses in computing to other university departments.

The Department has been working with other departments to offer service courses under the semester-based system. In particular, the Department currently plans to offer:

CS 180 – Computer Literacy
CS 200 – Advanced Programming for Everyone
CS 250 – Web Technology
CS 300 – Discovering Computer Science
CS 350 – Databases for Social and Health Sciences
CS 400 – Computer Programming for Science

The Department is discussions with the Department of Art regarding possible additional classes. The Department plans to work with other departments in the future to provide any service courses in computing that are desirable.

xi) Offer GE courses in computing.

In light of CSU Executive Order 1100, which specifically lists Computer Science as an acceptable topic for fulfilling General Education Area B4, the Department has proposed offering two GE courses. These courses are still undergoing review by the University GE committee.

CS 100 – Computer Programming for Everyone
CS 231 – Computers and Social Responsibility

3.2. Students

A primary goal in this category is to support students who are continuing through the semester conversion. In addition, the Department would like to improve the student experience, increase retention and the graduation rate, and decrease the time to graduation. The Department hopes to address all of these goals in similar ways. The first is through more formal advising. For the last two years, the Department has supported an Undergraduate Coordinator who has provided proactive advising and a single point of contact for advising to students in the Bachelor's program. The Undergraduate Coordinator would help students plan their schedule, and contact at-risk students when they were performing poorly in classes and provide pointers to tutoring and other campus resources. While the Department would like to continue to provide this advising, the College of Science Dean has indicated that, starting next year, funding will no longer be made available to support the Undergraduate Coordinator position. As a result, the Department must either identify another funding source or develop new mechanisms to achieve the same goals.

A second method to address these goals is embodied in the transformed curriculum, which includes more required courses. Such a program will lead to more predictable scheduling of courses, and more sections of required courses being scheduled, and at more times of the day. This will make it easier for students for students to enroll in the courses they need, and the added simplicity of the program should lead to fewer problems with students taking the wrong courses. The department also hopes to offer more courses in a hybrid or online mode to serve students who need more flexible schedules.

A third method is to provide opportunities for student to form a community within the department. This will be accomplished by developing platforms for students to share their research, internship, job search, and other information, and to provide advice and references for other students. The Department will also support the existing Computer Science club, and continue to conduct regular hackathons and industry visits to campus.

Secondary goals include working with AACE on internship and job recruiting on campus, and managing enrollment in the undergraduate and graduate programs.

i) Provide ongoing support for students who are continuing through the semester conversion.

As the semester conversion will likely cause confusion for the students undergoing the conversion, the Department will provide guides and advise students individually. The Department has already begun developing advisement materials and will continue as necessary. Faculty and staff will be briefed on the use of the guides.

ii) Find funding or substitute for undergraduate advising role.

For the last two years, the Department has supported an Undergraduate Coordinator who has provided proactive advising and a single point of contact for advising to students in the Bachelor's program. The goal of the position was to increase retention rates and decrease time to graduation for our students. This would be accomplished via proactive advising in which the Undergraduate Coordinator would contact at-risk students when they were performing poorly in classes and provide pointers to tutoring and other campus resources including peer tutors in the Computer Science open lab in SC N337. The Coordinator would also help students plan their schedules, and counsel students who were repeating the same course multiple times, and hence were in danger of being dismissed from the major. Unfortunately, the College of Science Dean has indicated that, starting next year, funding will no longer be made available to support the Undergraduate Coordinator position. As a result, the Department must either identify another funding source or develop new mechanisms to achieve the same goals. The Department Chair will work with the Department faculty on a solution.

iii) Raise B.S. graduation rate through improved student experience.

Outside of curriculum issues, retention of students is also affected by the student experience. The Department hopes to improve the student experience by continuing to build a Computer Science student community. The Department has already taken steps in this regard, including supporting a Computer Science club, regular hackathons, visits from industry representatives, and the like. The Department plans to continue these activities as well as provide an online environment for students to share their research activities, internship experiences, job search advice, and other information of interest. Added proactive advising also would provide a feeling of community and caring to the student. The Department has addressed this issue in semester-based curriculum redesign in increasing the number of required courses for both graduates and undergraduates. This should lead to more of a cohort-based environment where students take the same classes together throughout their academic careers rather than a mix of electives. The longer semester classes themselves should also provide more opportunity for students to form bonds.

iv) Reduce time to graduation for B.S. Students, both native CSUEB students and transfer students.

Many CSU students take more time to graduate than their peers at other universities. Much of the added delay is due to work and family responsibilities, but part is also due to lack of advising, and difficulties with scheduling. As described above, the Department hopes to provide more hybrid and online courses under the semester-based to allow students with scheduling difficulties to complete their coursework from home. The increased number of required courses in the undergraduate and graduate programs will lead to more sections of each required course being

offered, which will provide more opportunities for the students as well. Where possible, course prerequisites for courses in the Bachelor's program have been eased in order to eliminate dependencies. This change will allow students more flexibility in scheduling their courses.

v) Implement platforms to make student research projects available to student population. Use same mechanisms for internship experiences, peer advice, and references.

In an effort to increase the amount of student research being done, the Department plans to implement a platform allowing students to showcase their research projects to other students in the department. Often students are not aware of research opportunities that are available or are perhaps wary of such projects due to lack of information. With clear descriptions of current and past projects, including student publications, the students will see that student research is both possible and worthwhile. The Department would hope to provide links to student-level conferences, journals, and magazines as well.

In a related effort, the Department plans to offer a similar or combined platform to showcase student internship experiences. Most students have noted that it is quite laborious to secure an internship, often requiring many applications and multiple rounds of interviews. Once secured though, almost all students have found completing an internship to be extremely worthwhile. The Department hopes to make this process more transparent by providing a forum for students to share their experiences both in securing the internship position, and then completing it. Experienced peers could offer advice to new students, and possibly even serve as references for them. The Department has already begun work on such a site. Students who complete the Co-op class, CS 3898, complete a report and presentation as part of their course requirements. Several of these reports have been posted to a Wiki page on BlackBoard which is available to all Computer Science students. The Department hopes to expand upon this platform, and make it more useful to the students. The department internship coordinator will continue to work on this effort.

vi) Work with AACE to increase recruiting on campus, both for graduates and students seeking internships.

CSUEB On-Campus recruiting for full-time Computer Science positions has been extremely weak for decades. The same may be said for internship recruiting. The Department has been working independently with companies to fill this gap for years already. The Department regularly sponsors visits by tech companies, and directly passes advertisements for positions at these companies to the students via a BlackBoard organization. Several department faculty visited Lawrence Livermore Laboratories last year to discuss an sustained internship program with the Lab's High Performance Computing department. As a result, the Lab has asked for intern references for their program this year. The Department is also in discussions for similar internship programs with the members of our Industry Advisory Board. While the Department has had some success with this kind of ad hoc interaction with industry, it is very time consuming and can end up replicating work that is being attempted by AACE. It is a great disservice to the students not to offer significant on-campus recruitment, especially with the huge demand for tech workers in the Bay Area. The Department hopes to work with AACE to relocate industry communications and recruitment through AACE, and to increase the number of companies that recruit on campus. With over 800 Computer Science majors enrolled in our program, CSUEB

should be a vital resource to tech companies in the Bay Area. San Jose State has a large recruitment program on their campus run by their Career Development Center, and CSUEB should as well.

vii) Develop mechanisms for handling growth in undergraduate program and right-size graduate program to fit department resources.

While the Department hopes to produce as many qualified graduates as possible to help offset the great demand for Computer Science professionals in the Bay Area, it does not have the faculty necessary to teach the number of students currently in the program. It is difficult to hire faculty members as well as lecturers. Both the undergraduate and graduate programs have been growing beyond the capacity of the Department to support them. In addition to conducting searches for new faculty, and advertising to try to find new lecturers, the Department has two other options. The size of the undergraduate program may only be limited if the Department seeks impacted status from the CSU. This is a difficult process and may seem somewhat ill-considered since CSUEB itself is not at capacity. The Department voted last year not to consider seeking impacted status at this time, but this decision may need to be revisited as required. The Department can control the size of the graduate program to some extent by raising or lowering the standards required for admission and specifying in which sessions applications will be accepted. The Department voted last year to significantly decrease the size of the graduate program. Admission prerequisites regarding courses completed and standards for performance on the GRE standardized test were both raised. In addition, the Department chose to accept applications in the Fall session only rather than all year long. Admissions to the graduate program for 2017-2018 were roughly halved from the previous year. The Department plans to maintain these standards to continue reducing the size of the graduate program as needed.

3.3. Faculty

The main goal regarding faculty will continue to be addressing the need for new faculty and lecturers. The Department plans to continue to request new positions in the Department, and carry out the searches to secure new faculty members for the department. The Department will continue to do extensive outreach to local universities and universities which serve under-represented groups, as well as recruiting at conferences and other events where possible. The Department is currently conducting searches for two faculty positions. New avenues for recruiting lecturers will also be explored including working through our Industry Advisory Board.

Another important goal is to improve the functioning of the department by developing department by-laws and encouraging department leadership opportunities. Due to the retirements of many senior faculty, and the separation into an individual department, the Department lacks administrative experience, and more faculty must take on leadership roles. The Department will need to develop requirements or incentives to encourage more faculty to take leadership roles. Regarding by-laws, the Department has typically tried to address department policy issues by attaining consensus on issues. Often, consensus was not possible to achieve and the Department was left to inaction on important issues. As a result, department by-laws must be developed to ensure that divisive issues may be resolved.

Mitigation of workload issues was also a major goal. Since most courses in our programs are worth three semester units, the faculty load will be four sections per semester, a daunting proposition. The Chair has suggested several possible partial solutions. As part of the semester-conversion, both the undergraduate and graduate programs were modified to include more required courses. This will result in the scheduling of more sections of the same course in the same semester. Under semesters, it is envisioned that three sections of many courses will be offered per semester, allowing at least two to be assigned to the same faculty member. In addition, more courses have been approved to be taught in a hybrid or online mode rather than in-person. Finally, all introductory programming courses now include a laboratory component, making them worth four semester units rather than three. Given these tools, the Department Chair will attempt to create schedules which reduce the number of preparations for any given faculty member and address their teaching load concerns.

Secondary goals regarding faculty include encouraging professional development, and addressing support for faculty supervision of student research.

i) Recruit new faculty to reduce reliance on lecturers and to provide opportunities to offer classes and research support in areas of current Computer Science areas of development.

The Department plans to continue to request new positions in the Department, and carry out the searches to secure new faculty members for the department. The Department will continue to do extensive outreach to local universities and universities which serve under-represented groups, as well as recruiting at conferences and other events where possible. The Department is currently conducting searches for two faculty positions.

ii) Encourage professional development.

Computer Science is a very fast changing field with rapid advances in Artificial Intelligence and Computer Networking technologies matched by constant new challenges in the field of Computer Security. It is essential that faculty members be provided the opportunity to engage in professional development, and that they be encouraged to do so. While funds available for attendance at professional conferences and training courses are limited, each faculty member should be allocated some portion, with suggestions made for its use. The Department Chair, and Undergraduate and Graduate Computer Science committees will develop policies to this effect.

iii) Develop department by-laws.

The Department of Computer Science, like the combine Department of Mathematics and Computer Science from which it originated has typically tried to address department policy issues by attaining consensus on issues. While this is a laudable goal, consensus is not always possible to achieve. Often, the Department was left to inaction on important issues. As a result, department by-laws must be developed to ensure that divisive issues may be resolved. The Undergraduate and Graduate Computer Science committees will develop department by-laws.

iv) Develop department leadership.

Due to the retirements of many senior faculty, four in the last few years and one more at the end of 2017-2018, the Department lacks administrative experience. The faculty members serving as Department Chair and Graduate Coordinator have retired, as well as the faculty who had run many of the faculty searches. In addition, due to the separation of the Mathematics and Computer Science programs into two separate departments, expertise that was available in the Mathematics side of the combined department is no longer available. Some faculty members have stepped in to these positions, but often due to dire necessity. Dr. Matt Johnson has since served as Graduate Coordinator and now Department Chair, while Dr. David Yang and now Dr. Kevin Brown have served as Graduate Coordinator. Dr. Leann Christianson has been serving as Undergraduate Coordinator although the College of Science Dean has indicated that no further funding for this position will be made available.

Now that the department is so much smaller than it was when the Mathematics and Computer Science programs were housed in a combined department, it will be necessary for more faculty to take leadership roles. For instance, faculty will be needed to run the faculty searches, chair the curriculum committees, handle department assessment, and so on. The Department has attempted to address this situation by requiring all faculty to serve on either the Graduate Committee or the Undergraduate Committee, and dividing many of the department responsibilities between the two committees. This model has not resulted in much additional involvement of faculty in department matters. The Department will need to develop requirements or incentives to encourage more faculty to take leadership roles. Unfortunately, the University is in the process of re-evaluating and reducing assigned time allocations, so this avenue is not easily accessible. It may be that departmental leadership roles will need to be assigned on a rotating basis to ensure that all faculty participate. All the departmental faculty will need to be involved in crafting a solution to this problem.

v) Address workload of faculty, specifically four course per semester teaching load.

The semester conversion has produced a concern for most faculty at CSUEB. In programs where most of the courses are worth 3 semester units, the faculty load will be four sections per semester. While no more contact hours will be required than that required under the quarter system, it is clearly more difficult to teach four classes simultaneously than three. Faculty members in the Department of Computer Science have expressed great reservations regarding this teaching load. The Chair has suggested several possible partial solutions. As part of the semester-conversion, both the undergraduate and graduate programs were modified to include more required courses. This will result in the scheduling of more sections of the same course in the same semester. Under quarters, perhaps two at most sections of the same course were scheduled in the same session, and due to the need to serve the most students, they were often scheduled on different days, with one section at night and one during the day. As a result, it was difficult for a faculty member to teach two sections of the same course to reduce the number of preparations required. Under semesters, it is envisioned that three sections of many courses will be offered per semester, allowing at least two to be assigned to the same faculty member. In addition, more courses have been approved to be taught in a hybrid or online mode rather than in-person. Finally, all introductory programming courses now include a laboratory component, making them worth four semester units rather than three. Given these tools, the Department Chair will attempt to create schedules which reduce the number of preparations for any given faculty member and address their teaching load concerns.

vi) Address support for faculty supervision of student research.

The College of Science Dean has indicated his strong support for student involvement in research, especially by undergraduate students. In the past, supervision of student research projects through independent study courses or thesis projects has always been done by the faculty with no support or compensation. The University and the College of Science Dean have now suggested proposed policies for compensating faculty for supervising student research. The Department will support university policies through scheduling and administrative support. In addition, the Department will provide a platform for recruiting student researchers and showcasing their work, as described above. Where possible, the Department will work with College of Science to support student travel to conferences to present their work.

3.4. Other Resources

The primary goal regarding resources is to address the need to co-locate faculty, lecturer, and research space to provide opportunities for faculty and students to work together more easily. The Department was pleased that space was made available in the new Student and Faculty Support (SF) building for the department office and faculty offices. Unfortunately, space was not made available for all department faculty, excluding faculty participating in the FERP program, all lecturers, and any new faculty resulting from ongoing searches. Ideally, it would be beneficial to house the entire department in one place with enough made available for desired growth. In addition, the faculty offices are far from both the teaching rooms and labs, making it less convenient for students to attend office hours or seek advising. The Department also suffers from a lack of sufficient teaching and research lab space, regardless of location. The Department is currently in discussions with the Dean of the College of Science to address the lack of teaching lab space.

Another important goal is to continue to work with ITS (Instructional Technology Services) to support teaching and research needs. Centralization of equipment by ITS has proven to be a serious concern, impacting both teaching and research goals of the department. Servers supporting student work and necessary for teaching classes in Database Administration, Network Administration, Network Design, and the like have been taken from departmental control. These servers have either not been replaced at all or have been replaced with virtual counterparts which provide much less functionality the originals. For instance, BayCloud virtual images have been suggested as temporary solutions, but do not provide the functionality needed in the long-term. The Department is in discussions with ITS to attempt to find solutions to this problem.

Secondary goals include upgrading labs and computing environments, addressing library support, and continuing work with our Industry Advisory Board.

i) Facilities for department faculty offices, teaching labs, research labs, including co-locating office space to provide opportunities for faculty to work together more easily.

The Department was pleased that space was made available in the new Student and Faculty Support (SF) building for the department office and faculty offices. Faculty had been spread over

all four floors of both Science buildings previously. Proximity to colleagues and the department office has already led to increased communication between department faculty, more frequent department committee meetings, and increased productivity. Unfortunately, space was not made available for all department faculty. In particular, faculty participating in the FERP program, and all lecturers are still housed in the Science buildings. In addition, there is not enough space in the new building even to house the faculty that would result from successful searches that have been approved for this year. Ideally, it would be beneficial to house the entire department in one place with enough made available for desired growth. In addition, the faculty offices are far from both the teaching rooms and labs, making it less convenient for students to attend office hours or seek advising.

Through the generosity of the College of Science, the department was able to create an open Computer Science Lab for students in N Sci 337. This lab is staffed with student TAs. We have fewer classroom labs, however, which are needed for many of our courses. Currently our classroom labs are VBT 218, N Sci 336, and a small room N Sci 104. We have added lab components to five of our courses for semesters and fear that this shortage will be a dire problem in the future.

As our outside reviewer mentioned, if we choose to seek accreditation, our relative lack of teaching and experimental lab space would be a major concern to the accrediting board. The Department is currently in discussions with the Dean of the College of Science to address the lack of teaching lab space. The lack of co-located office space for new faculty and lecturers must also be addressed.

ii) Improve relationship with ITS (Instructional Technology Services) to support teaching and research needs.

One of the major concerns in the last five year review was the lack of support provided to the department from ITS. A centralization effort by ITS led to the elimination of a department-specific technician as well as the loss of many computing resources necessary for instruction and research efforts. Since then, a technician position has been identified which will support all of the College of Science rather than supporting the Department of Computer Science specifically. This position was filled in January 2018. While this support is a large improvement over the centralized organization, it is still not ideal. Other departments in the College of Science have dedicated support positions, and Computer Science needs a well-trained and dedicated technician to support its needs. The Department will continue to work with ITS and the College of Science Dean regarding this issue.

Centralization of equipment has also proven to be a serious concern, impacting both teaching and research goals of the department. Servers supporting student work and necessary for teaching classes in Database Administration, Network Administration, Network Design, and the like have been taken from departmental control. These servers have either not been replaced at all or have been replaced with virtual counterparts which provide much less functionality the originals. For instance, BayCloud virtual images have been suggested as temporary solutions, but do not provide the functionality needed in the long-term. The Department is in discussions with ITS to attempt

to find solutions to this problem. Ideally, the department technician would work with faculty to identify needs and address these with ITS.

iii) Upgrade labs and environments used for class assignments, student research.

Ideally, the Department would like to provide better environments for student learning and research than have been available in the past. As described above, we are currently trying to restore environments to provide the functionality that was available before centralization. Many instructors have, in the meantime, asked students to use their own laptops or desktops as platforms for their coursework or research projects. This cannot serve as a long or even short term solution due to the characteristics of the CSUEB student population. A large proportion are financially challenged or even homeless. It is unacceptable to require them to provide their own computing equipment. This issue has been discussed with ITS, and solutions are being developed. Once solutions are made available, the Department will identify ways in which they be used to provide state of the art learning environments, and build course content and assignments on top of them.

iv) Address funding for readers, TAs, and travel to academic conferences.

Class assignments that require sophisticated understanding and execution also require detailed and time consuming grading. Programming assignments in particular require detailed evaluation of both the code and the execution results. Ideally, the department would like to support some number of graduate students on teaching assistantships, but typically no more than one or two have been available per year. On the last two years, the Department has again offered funds to hire graders for which the department members are grateful. Limited travel funds have also been made available, although less so than even the local community college. Under the semester system, the department plans to offer a number of service courses and GE courses, which may provide opportunities for teaching assistantships, and also increase FTE to provide more funds for grading and travel.

v) Address need for library resources, specifically to support graduate courses.

Library support for Computer Science research efforts has been limited in the past. At the current date though, the Library provides access to the two most important databases, the ACM Digital Library, and the IEEE XPlore Digital Library. These databases provide access to the most important journals in the Computer Science field and are indispensable for supporting student and faculty research. The databases do not provide access to many important journals outside the ACM and IEEE realms nor to many important conferences. In the Computer Science field, the best conferences are more competitive than the best journals and proceedings from those conferences contain the most up-to-date research necessary for doing new relevant research. The Department will continue to work with the Library to ensure that necessary databases are made available.

vi) Continue to develop Industry Advisory Board

The Department continues to work with local industry through its Industry Advisory Board. The board is meant to provide advice to the Department regarding curriculum and student preparation

for positions in industry. In addition, the Department works with the members of the board to develop internship opportunities and to promote recruiting of CSUEB students. The Department will continue to attempt to grow the Industry Advisor Board and increase the resulting benefits to our students.

4. External Reviewer(s)' Report

FIVE-YEAR PROGRAM REVIEW
COMPUTER SCIENCE (B.S, M.S.); COMPUTER NETWORKS (M.S.)
DEPARTMENT OF COMPUTER SCIENCE
CSU EAST BAY

Sigurd Meldal
(Computer Science and Networks Programs)

Visit Date: June 4, 2018

Introduction and summary

The Department of Computer Science at CSU East Bay (CSUEB) offers a B.S. and an M.S. Computer Science degree, and an M.S. Computer Networks degree. The M.S. Computer Networks degree is in the process of being folded into the M.S. Computer Science degree as a concentration, and presumably being terminated as a separate degree.

The author of this report served as evaluator for the previous review in 2011, and after consultation with the Department Chair the report will be written as an update to the 2011 report, thereby capturing the institutional response to the previous review as well as characterizing the current state of the programs under review.

At the time of the previous review the programs which are the subject of this review were housed in the Mathematics and Computer Science Department, sharing faculty and facilities with other programs. That department was separated into two departments in 2015, with the Department of Computer Science becoming the home department to the programs under review.

For the reader's convenience the programs under review will be referred to collectively as "*the CS programs.*"

The CS programs are supported by 10 tenure-line faculty members (down significantly from the 15 tenure-line faculty members of 2011). In addition there are a number of lecturers (some part-time, some at or close to full-time), three admin support personnel (2.4 full-time equivalents) and one technical support person located in the department (reporting to ITS and with a 15/85 nominal split responsibility to the College of Science and the Computer Science Department).

According to the (latest) 2017 reports, the CS programs enroll 816 students (up from 500 for 2009, reported in the previous review). The average section size is 27.7 students (up from 20.9 in 2009) and the overall student/faculty ratio is 27.8 (up from 21.2 in 2009 and 16.2 in 2008). The number of arriving (first-time enrollment) students is 333 (fall 2016) (up from 114 fall 2012). A significant number of the enrolled students are non-resident aliens, with that group constituting the bulk of the students in the graduate programs, which recruit globally.

To gain some perspective on the student numbers it is reasonable to compare them with those of other CSU campuses, and to those of other practice-dependent disciplines at CSU East Bay.

Broken down as per the Chancellor's Office databases[1], CS at East Bay compares to the CS programs of the CSU:

Level	SFR of CS at East Bay compared to CS across the CSU
ALL	113.5%
LD	103.6%
UD	114.4%
GR	158.5%

The load is overall significantly higher than the system average, and the 58% above the norm of the graduate program is striking.

The graduates of the CS programs enter the software engineering profession, predominantly in Silicon Valley. The discipline of computer science is one of empirical practice supported by theory – a laboratory science (or, arguably, an engineering discipline). With the bulk of the graduates becoming practicing professionals the essential need for practical experience being

[1] From the Academic Planning Database of the Chancellor's Office

incorporated by the degree curriculum is further underscored. In reviewing the learning environment for the CS students it is reasonable to compare it to other laboratory (or practice-oriented) disciplines, such as chemistry, physics and the biological sciences. When comparing the SFR of these disciplines with that of computer science (all at CSU East Bay) we find

Level	SFR compared to chemistry+physics+biological sciences at CSU East Bay
ALL	109.0%
LD	100.6%
UD	122.2%
GR[2]	293.2%

(The lower division numbers are not reasonably comparable, since the other departments all have significant service components for non-majors whereas CS does not.)

After some years of radically reduced enrollment in the majors, CSU East Bay has lately experienced a strong upwards trend in students entering the CS majors, with an overall growth in FTES of 62% from 2009 to 2017. The department does not control the enrollment into the undergraduate program. In order to keep some degree of control of the overall enrollment the department is shrinking the graduate programs. The reviewer's understanding is that the campus will be declared impacted fall 2018. That would make a new set of tools available for enrollment management for the undergraduate programs, and one would expect that these would be employed by the CS programs.

The department is engaged in a continuing process of assessment, reflection and improvement of its curricula, and has created and put into play a number of curriculum revisions in order to conform to curricular standards (such as the ACM model curriculum) and to stay current with the needs of the stakeholders (principally the technology leaders of Silicon Valley). The department has recently converted its curriculum from a quarter to a semester system (commencing fall 2018). The conversion provided an opportunity to rethink curricular structures, and introduced formalized

[2] Of the three comparables, physics is not offering a graduate degree.

laboratory sessions reflecting the importance of engineering practices as essential to a successful launch of careers in computer science and software engineering.

There have been three new tenure-line faculty members hired during the period under review; a number of faculty members have retired. The department has faced significant challenges in recruiting new tenure-line faculty members – non-competitive salary offers[3] being cited as the primary cause of hiring failures.

The faculty gender diversity is less unequal than the national numbers (30% female v. the 20% female average fraction nationally).

The department has priority scheduling and configuration rights to a few (three) instructional laboratories for its 800 students. Additionally the department may schedule instruction into two other laboratories with generic equipment, and the department students have access to an open laboratory staffed with tutors. The latter is open to all the students of the university and is anecdotally reported to be used predominantly by students in other majors than CS. The laboratory situation is an improvement compared to 2011, but is still inadequate for a practice-oriented discipline.

The job market for the graduates of the CS programs is robust, with the profession being among the fastest-growing in the US, and dominant in the region.

The department is well aligned with the mission of the university.

The department serves its students well, and has in place a dedicated faculty and staff. However, the department is in a deteriorating resource position, and the continued well-being of the program and the quality of the learning environment is critically dependent upon an improving resource situation.

The review process

Prior to the visit, the department provided the reviewer with (1) a self-study and (2) supporting material for the self-study.

[3] Compared to other Bay Area CSU campuses as well as to employment opportunities in the region more generally.

The visit itself provided the reviewer with access to the Department Chair, to tenure-line members of the department faculty, to lecturers, to the staff members of the department, to the Dean of the College of Science, and to a sample of upper division and graduate students.

All the conversations were congenial, and the reviewer would like to express his appreciation for the overall welcoming and collegial atmosphere of the visit.

Program Accreditation

The Department Chair and the Dean both indicated an interest in the possibility of an ABET accreditation for the program.

The reviewer agrees that an accreditation by the Accreditation Board for Engineering and Technology (ABET) would be a valuable external, public recognition of the strength of the program. Accreditation may be of importance to the graduates as they embark upon their professional careers: Most computer science graduates enter the software engineering profession, and often into organizations with strong engineering traditions. Engineering organizations typically place a premium on the accreditation status of the student's degree program, and the lack of accreditation may put a graduate at some disadvantage. It is fair to observe that accreditation is less important to pure software development organizations, where an engineering professional tradition may be absent. If CSU East bay is interested in developing an increasingly international student body then an ABET accreditation could be a significant factor when international students are evaluating where they want to pursue their studies in the US.

Most importantly to this reviewer, the ABET accreditation processes provide a framework for systematic assessment of learning effectiveness and program improvement, and its national reach provides the institutions being accredited with a normative framework for evaluating their own learning environments.

The ABET review process and documentary support is significantly different from that employed by CSU East Bay and other CSU campuses in their internal program review processes. Thus this review should *not* be construed as having a scope beyond the review processes of CSU East Bay, and it has no bearing on a possible accreditation process at some future date.

Program Strengths

1. The department faculty members are well qualified. The reviewer met with lecturers and probationary as well as tenured faculty members, and all demonstrated a strong and heartfelt dedication to the department and its students. The dedication manifests itself in a willingness to volunteer for extra tasks, to accept assignments that are personnel-intensive and to discharge these with high professional quality. More broadly, the level of dedication is demonstrated through the innovation and quality of instruction and the strong appreciation articulated by the students in conversations about their learning environment. The faculty members were strongly supportive of each other, and demonstrated a good, collaborative and collegially harmonious team relationship.

2. The faculty members' penchant for high quality student course deliverables and achievements was demonstrated by their enthusiastic descriptions of the courses they were teaching, and confirmed by the students – and also *appreciated* by the students; they articulated well the importance of a good work ethic and ambitious goals for their education.

3. The faculty members seem to be well supported by funds to employ students as graders or general course assistants. This benefits the students financially as well as by bringing them in close contact with faculty members, and the faculty members gain the obvious benefit of assistance in their work.

4. The curriculum and the students' performance are being assessed and updated in a systematic manner. The faculty is current with the Association for Computing Machinery (ACM) recommended model curriculum, and has demonstrated a thoughtfully creative approach to resource optimization of the delivery of the courses in the curriculum. The transition from a quarter-based to a semester-based academic calendar has been utilized to good effect to improve the curriculum (notably formalizing the laboratory components).

On the whole, the department faculty and staff should be applauded for their success under very challenging resource circumstances.

Program Challenges

Faculty

1. Faculty size and workload. The faculty size has declined since the previous review, and the number of FTES has increased by 62%. The SFR has increased by 31%. The challenge reported in the previous review now rises to the level of being *severe.*

   When compared to other practice-oriented disciplines at CSU East Bay the lack of personnel resources commensurate with the number of FTES being generated is very troubling, with the SFR at the upper division (where the focus would be on the program majors) being twice that of comparable disciplines at CSU East Bay, and even more so at the graduate level where the SFR is three times as high as that of chemistry, and 22% higher than the CSU East Bay average for graduate programs, many (one would expect most) of which are *not* laboratory-oriented.

   The averages of the CS programs across the CSU show lower SFR than at CSU East Bay, and the CSU East Bay CS graduate program SFR is a full 58% higher than the average for the CS graduate programs of the CSU.

   There are not enough full-time faculty members to provide continuity, oversight, and stability, to cover the curriculum reasonably, and to allow an appropriate mix of teaching, professional development, scholarly activities, and service for each faculty member. The programs in their current form and mode of delivery are of good quality, but are carried out on the backs of the enthusiasm of the faculty members. In order to meet accreditation standards this situation should be systematically addressed.

   The number of faculty members is inadequate for the number of students they support and the breadth of the discipline they are supposed to cover.

   Facilities and Support.

1. Lack of computer labs: Computer Science is an *experimental science.* To teach the discipline requires laboratories under faculty members' curricular control, as well as open laboratories

where students can congregate to explore the challenges of the discipline and build a culture of innovation and collaborative development.

Program-specific laboratories cannot be replaced by generic computing equipment, much less by virtualized environments. Such an organization of computing "laboratories" deprives the students of the necessary opportunity to engage in the experiments in the discipline necessary for their professional preparation. (To draw an analogy: it would be similar to teaching chemistry without access to any wet labs, with computer simulations being the only mode of experimental exploration). The situation has improved since the previous review, but is still quite inadequate

2. Insufficient faculty influence on curricular infrastructure decisions: The faculty has to be in control of the decisions re. how laboratories are to be used and equipment (efficiently) deployed to serve the curricular needs. In order for the faculty to exercise curriculum control the faculty have to be deeply involved in proposals to change educational infrastructure components such as laboratories, and have the ultimate decision authority when the curriculum has to change to accommodate resource constraints. It seems the CS faculty has been deprived of such authority with respect to how the experimental and experiential curricular components are to be delivered.

3. Insufficient technical support: The daily support is very well managed by the COS-supplied technical support person for the college, but 85% of one person (regardless of report structure) is insufficient to systematically maintain and upgrade the equipment to enable students to achieve the program's outcomes and to support faculty teaching needs and scholarly activities.

   In summary – there is a lack of evidence that the support and resources are sufficient to provide assurance that the program will retain its strength.

Program Concerns.

1. Continuous improvement. The programs have a systematic approach to learning objectives assessment, with the faculty members engaged in a process of assessment-based program improvement, closing the loop and implementing program improvements based on the analysis performed. The current assessment model seems a bit burdensome, and a closer integration of

the assessment processes with the regular student evaluation processes (for grading purposes) might be more efficient while yielding the necessary data for a systematic quality improvement process.

2. Curriculum. The limited use of scheduled instructor-supervised laboratory sections is of concern. Computer Science prepares the students for a career of design, implementation and deployment of software. The importance of supervised experience with turning designs into working implementations cannot be overstated – as in engineering in general, the application of abstract knowledge through repeated (and increasingly challenging) design and implementation experiences is necessary for the proper internalization of the whole range of knowledge necessary for a successful professional. The introduction of more laboratory sections as part of the quarter-to-semester conversion is to be applauded, and every opportunity should be taken to expand the number of structured laboratory experiences.

3. Faculty professional development. The (semester) teaching load of 12 WTU direct instruction with an expected three distinct preparations per term as the norm for tenure-line faculty jeopardizes the ability of faculty members to stay professionally current in the fast-changing discipline of computer science. The reviewer's understanding is that research-active faculty members may benefit from one or two course releases per year to pursue scholarly activities. This is helpful (and one would expect, necessary) for a successful maintenance of professional currency. It does seem that the assignment of such course releases is somewhat unpredictable (based on ad hoc applications each year), and a change of process to ensure predictability for the award process would be beneficial as an institutional personnel development component.

Program Observations

1. The close interaction between students and faculty members is a program advantage. The program would benefit if *informal interactions* were better facilitated by making space available for student-initiated discipline activities, community-building and peer-tutoring.

2. A significant number of students fail to comply with the prerequisite chains of the curriculum, resulting in repeated failures and consequent suboptimal use of resources (theirs as well as the department's). The understanding is that the change in the curriculum structure will alleviate

this problem. However, it warrants a close watch, and one may want to consider the use of probation-related strategies to ensure that students that are unlikely to succeed will be guided into other majors or careers at the earliest reasonable opportunity.

3. The declaration of impaction status by the university would allow for discipline-specific supplemental criteria for admission or transfer. A judicious application of such criteria (e.g., favoring transfer students who have completed the model curricula at a community college) might reduce failure rates and improve the time to graduation average.

4. The Career Center seems to be of limited utility to the (graduating) students. The location of CSU East Bay could be a major, positive differentiator, but it has to be enabled by a close connection from the Career Center to the department, and an ability by the center to bring the students of the department together with relevant, likely, employers. Primary responsibility for contacting employers should lie with the Career Center, in cooperation with the Department.

5. Given the role science and technology – and in particular information technologies – play in shaping our world and our society, CSU East Bay is well positioned to provide curricular leadership in ensuring that the broad student population be technologically literate and well prepared as citizens to participate in social decision-making processes which will be shaped by technologies (e.g., understanding the interplay of policy, privacy and technology is particularly urgent at this time).

   The Computer Science Department has faculty members well prepared to provide the non-science student population with insights in this area, and the reviewer would urge the university to avail itself of their expertise in order to broaden the general offering in computing and information technology use beyond the skills-oriented courses commonly encountered. An increase in service courses, *e.g.*, with a General Education component, would increase department FTES and presumably increase department resources. Such a development would, however, have to be sensitive to the currently excessive workload and would require a significant investment beyond what it would take to bring the degree workload down to a manageable level.

6. On a purely personal note the reviewer would suggest that the curriculum could benefit from an increase in the units spent of systems design, ranging from object-oriented programming methodologies to the design of components, frameworks, larger systems and architectures. With practically all of the graduates of the program entering careers as professional software developers the tradeoff of some of the more esoteric (though foundational) theories in favor of design concepts and practices seems reasonable.

Conclusion

The department benefits from a dedicated faculty and staff who are well prepared to deliver high-quality education. The level of volunteer work they provide to the university is very impressive, and the degree of innovation exhibited within a somewhat constrained version of the standard curriculum is noteworthy. The resource situation is precarious, with a danger of personnel burnout. This should be addressed. The laboratory situation requires immediate attention.

5. Program Response to External Reviewer(s)' Report

Dr. Sigurd Meldal, Professor of Computer Engineering at San Jose State University, spent a day with CSUEB Department of Computer Science faculty, staff, students, and the Dean of the College of Science. He asked questions, solicited opinions, and seemed to get a good sense of the strengths and weaknesses of the Computer Science and Computer Networks programs.

The reviewer identified several strengths of the Computer Science department including well qualified and dedicated faculty members who provide high quality student deliverables, and sufficient current department financial support for use for graders. He also noted that the curriculum met current standards, and that assessment was being done in a systematic manner.

Dr. Meldal went on to describe challenges and concerns facing the Department. Most are discussed in our self-study but were more apparent to the external reviewer given his perspective as a past chair at another CSU.

1. Faculty size and workload. The reviewer reports that "When compared to other practice-oriented disciplines at CSU East Bay the lack of personnel resources commensurate with the number of FTES being generated is very troubling, with the SFR at the upper division (where the focus would be on the program majors) being twice that of comparable disciplines at CSU East Bay, and even more so at the graduate level where the SFR is three times as high as that of chemistry, and 22% higher than the CSU East Bay average for graduate programs…" and "The averages of the CS programs across the CSU show lower SFR than at CSU East Bay, and the CSU East Bay CS graduate program SFR is a full 58% higher than the average for the CS graduate

programs of the CSU." Finally that "The number of faculty members is inadequate for the number of students they support and the breadth of the discipline they are supposed to cover."

The Department concurs that SFR is far too high and that additional faculty are required. Hiring tenure-track faculty is difficult however due to the competition with Silicon Valley firms, and it is also difficult to recruit lecturers to supplement tenure-track faculty for the same reason. Due to the massive increase in enrollment of Bachelor's degree students, the department is extremely understaffed. For several years, the Department has been attempting to recruit faculty with recent degrees in emerging and important areas such as social networking, security, and search, but with little success.

2. Lack of computer labs, faculty influence on infrastructure decisions, and insufficient technical support. The reviewer points out that "Computer Science is an experimental science. To teach the discipline requires laboratories under faculty members' curricular control…" The Department has no research lab space, and limited teaching lab space. Regarding IT support, the reviewer also states that "85% of one person (regardless of report structure) is insufficient to systematically maintain and upgrade the equipment to enable students to achieve the program's outcomes and to support faculty teaching needs and scholarly activities."

The lack of labs and technical support has significantly impacted instruction. The Department thanks the Dean for providing open lab space in SC N337, which has been very useful to our students. This lab space is however shared with the rest of Science as opposed to supporting Computer Science students only. The Department is vitally in need of additional teaching labs as well to allow for practical instructor-supervised classroom experience for the students. Our single IT support position, while primarily supporting Computer Science, is also shared with the rest of Science, while other departments have dedicated support staff.

3. Continuous improvement. While Dr. Meldal was pleased with "the systematic approach to learning objectives assessment" currently used by the department, he stated that it seemed "burdensome" and provided some guidance for more effective assessment. The Department has developed a new assessment program for use under semesters and believes that it will provide better assessment data while requiring less effort from the individual instructors.

4. Curriculum. The reviewer wrote that "The limited use of scheduled instructor-supervised laboratory sections is of concern" and that "The importance of supervised experience with turning designs into working implementations cannot be overstated." The Department had also identified the need for additional lab time as vital to the success of our students. Lab sections were added to the first four programming courses in the semester-based curriculum. Due to budget constraints, however, these lab sections will have to be removed from the curriculum in 2019-2020. The Department will continue to evaluate methods for increasing student lab time without increasing the cost of the program.

5. Faculty professional development. The reviewer wrote that "The (semester) teaching load of 12 WTU direct instruction with an expected three distinct preparations per term as the norm for tenure-line faculty jeopardizes the ability of faculty members to stay professionally current in the fast-changing discipline of computer science." This has been a concern of the Department as well

as all departments in evaluating the move to semesters. The reviewer suggested developing methods by which assigned time may be provided for faculty on a predictable schedule to enhance professional development. It is unclear how this might be done within the department, but the Provost's Office has recently begun a pilot program to provide assigned time for probationary faculty in years 3-5. One might hope that this program would eventually be extended to all faculty.

The reviewer also made several observations regarding the desirability of club/meeting space for students, the need to install a mechanism for ensuring that students complete course prerequisites in the proper order, the importance of regulating the size of the program, perhaps through impaction, the need for better service from the Career Center, and the desirability of providing more service courses to provide non-science students with insight into Computer Science. The Department agrees with these observations and has addressed them all in our self-study and plan.

Appendix A: Data on CS Students Nationwide (from the CRA Taulbee Report)

Table B2. Bachelor's Degrees Awarded by Gender

	CS		CE		I		Total	
Male	14,259	82.1%	2,103	87.4%	2,830	77.1%	19,192	81.9%
Female	3,107	17.9%	304	12.6%	840	22.9%	4,251	18.1%
Total Known Gender	17,366		2,407		3,670		23,443	
Gender Unknown	1,588		204		273		2,065	
Grand Total	18,954		2,611		3,943		25,508	

Table M2. Master's Degrees Awarded by Gender

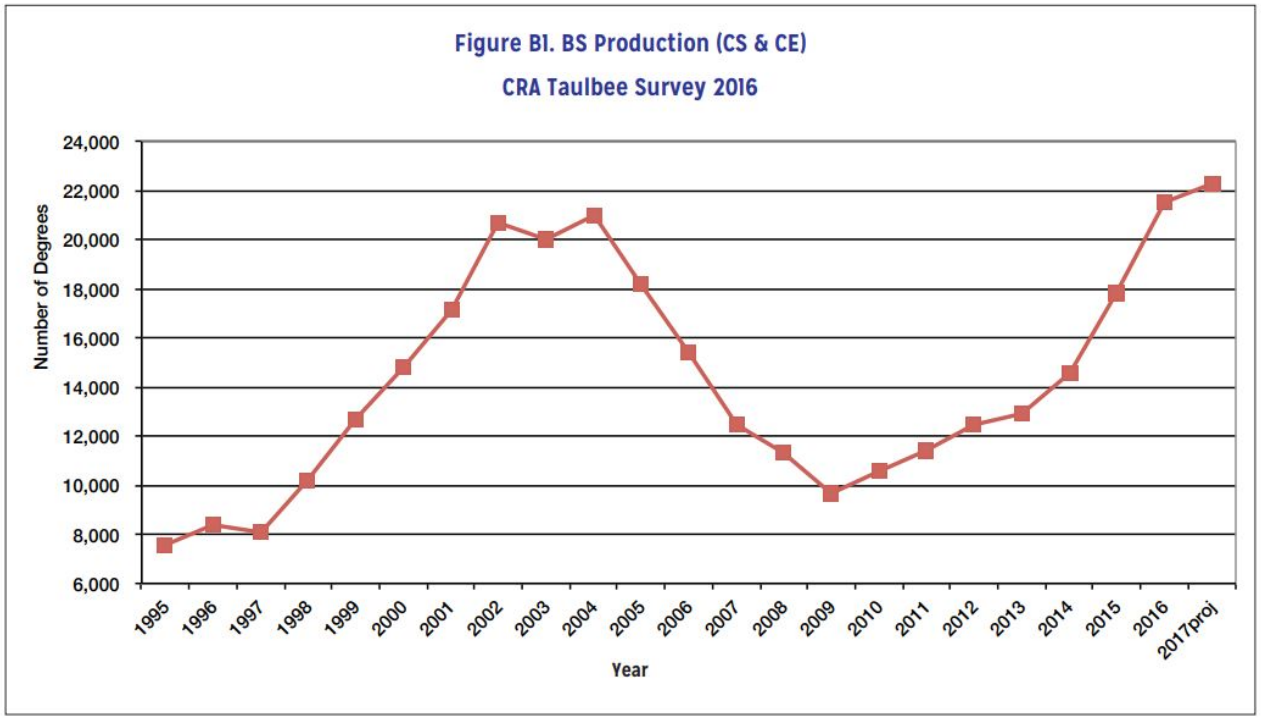
	CS		CE		I		Total	
Male	8,041	74.8%	562	78.6%	1,401	52.1%	10,004	70.6%
Female	2,715	25.2%	153	21.4%	1,288	47.9%	4,156	29.4%
Total Known Gender	10,756		715		2,689		14,160	
Gender Unknown	483		22		66		571	
Grand Total	11,239		737		2,755		14,731	

Table B3. Bachelor's Degrees Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	1,493	10.4%	214	9.0%	188	5.6%	1,895	9.4%
Amer Indian or Alaska Native	53	0.4%	6	0.3%	7	0.2%	66	0.3%
Asian	3,625	25.3%	630	26.4%	596	17.8%	4,851	24.2%
Black or African-American	440	3.1%	99	4.1%	256	7.6%	795	4.0%
Native Hawaiian/Pac Islander	26	0.2%	2	0.1%	18	0.5%	46	0.2%
White	7,202	50.3%	1,172	49.1%	1,760	52.4%	10,134	50.5%
Multiracial, not Hispanic	409	2.9%	59	2.5%	119	3.5%	587	2.9%
Hispanic, any race	1,069	7.5%	205	8.6%	412	12.3%	1,686	8.4%
Total Residency & Ethnicity Known	14,317		2,387		3,356		20,060	
Resident, ethnicity unknown	677		59		116		852	
Residency unknown	3,960		165		471		4,596	
Grand Total	18,954		2,611		3,943		25,508	

Table M3. Master's Degrees Awarded by Ethnicity

	CS		CE		I		Total	
Nonresident Alien	7,883	75.6%	526	73.6%	1,256	49.9%	9,665	70.8%
Amer Indian or Alaska Native	14	0.1%	3	0.4%	9	0.4%	26	0.2%
Asian	731	7.0%	44	6.2%	132	5.2%	907	6.6%
Black or African-American	78	0.7%	4	0.6%	117	4.6%	199	1.5%
Native Hawaiian/Pac Island	8	0.1%	0	0.0%	1	0.0%	9	0.1%
White	1,536	14.7%	111	15.5%	863	34.3%	2,510	18.4%
Multiracial, not Hispanic	48	0.5%	9	1.3%	42	1.7%	99	0.7%
Hispanic, any race	126	1.2%	18	2.5%	97	3.9%	241	1.8%
Total Residency & Ethnicity Known	10,424		715		2,517		13,656	
Resident, ethnicity unknown	285		10		86		381	
Residency unknown	530		12		152		694	
Grand Total	11,239		737		2,755		14,731	



Appendix B: Data on CS Faculty Nationwide (from the CRA Taulbee Report)

Table F6. Gender of Current Faculty

	Full		Associate		Assistant		Teaching		Research		Postdoc		Total	
Male	1,979	85.2%	1,040	77.6%	843	76.2%	893	72.5%	366	81.5%	534	79.7%	5,655	79.4%
Female	345	14.8%	301	22.4%	263	23.8%	339	27.5%	83	18.5%	136	20.3%	1,467	20.6%
Unknown	29		10		0		15		1		35		90	
Total	2,353		1,351		1,106		1,247		450		705		7,212	

Table F7. Ethnicity of Current Faculty

	Full		Associate		Assistant		Teaching		Research		Postdoc		Total	
Nonresident Alien	26	1.2%	11	0.9%	153	15.0%	40	3.6%	58	13.5%	220	36.0%	508	7.8%
American Indian / Alaska Native	3	0.1%	1	0.1%	3	0.3%	1	0.1%	1	0.2%	0	0.0%	9	0.1%
Asian	583	26.8%	375	31.8%	301	29.5%	113	10.0%	78	18.2%	135	22.1%	1,585	24.2%
Black or African-American	15	0.7%	33	2.8%	26	2.5%	57	5.1%	3	0.7%	7	1.1%	141	2.2%
Native Hawaiian / Pacific Islander	2	0.1%	1	0.1%	1	0.1%	14	1.2%	0	0.0%	1	0.2%	19	0.3%
White	1,411	64.8%	685	58.1%	487	47.7%	820	72.9%	265	61.8%	199	32.6%	3,867	59.1%
Multiracial, not Hispanic	11	0.5%	5	0.4%	4	0.4%	4	0.4%	1	0.2%	1	0.2%	26	0.4%
Hispanic, any race	46	2.1%	31	2.6%	20	2.0%	26	2.3%	11	2.6%	13	2.1%	147	2.2%
Resident, race/ethnic unknown	82	3.8%	36	3.1%	26	2.5%	50	4.4%	12	2.8%	35	5.7%	241	3.7%
Total known residency	2,179		1,178		1,021		1,125		429		611		6,543	
Residency Unknown	174		173		85		122		21		94		669	
Total	2,353		1,351		1,106		1,247		450		705		7,212	

Appendix C: Employment Outlook in Computer Science

Software Developers

Note: All Occupations includes all occupations in the U.S. Economy.
Source: U.S. Bureau of Labor Statistics, Employment Projections program

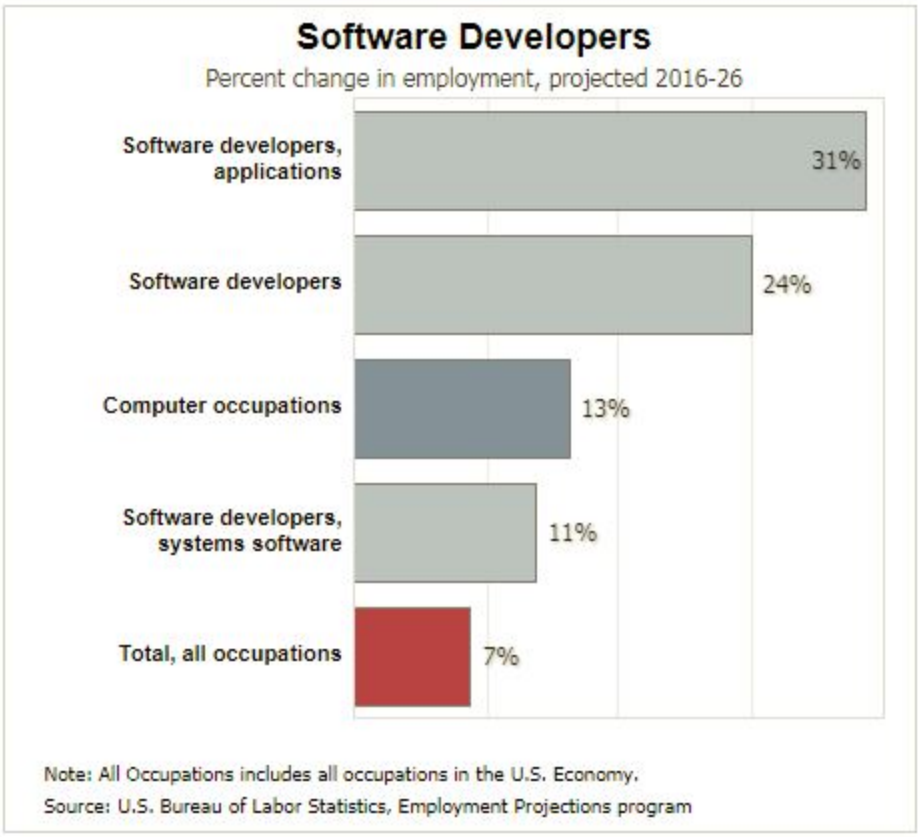
Employment of software developers is projected to grow 24 percent from 2016 to 2026, much faster than the average for all occupations. Employment of applications developers is projected to grow 31 percent, and employment of systems developers is projected to grow 11 percent. The main reason for the growth in both applications developers and systems developers is a large increase in the demand for computer software.

The need for new applications on smart phones and tablets will help increase the demand for applications software developers.

The health and medical insurance and reinsurance carriers industry will need innovative software to manage new healthcare policy enrollments and administer existing policies digitally. As the number of people who use this digital platform increases over time, demand for software developers will grow.

Systems developers are likely to see new opportunities because of an increase in the number of products that use software. For example, more computer systems are being built into consumer electronics and other products, such as cell phones and appliances.

Concerns over threats to computer security could result in more investment in security software to protect computer networks and electronic infrastructure. In addition, an increase in software offered over the Internet should lower costs and allow more customization for businesses, also increasing demand for software developers.



Job Prospects

Job prospects will be best for applicants with knowledge of the most up-to-date programming tools and for those who are proficient in one or more programming languages.

Occupational Title	SOC Code	Employment, 2016	Projected Employment, 2026	Change, 2016-26		Employment by Industry	
				Percent	Numeric		
SOURCE: U.S. Bureau of Labor Statistics, Employment Projections program							
Software developers	—	1,256,200	1,558,700	24	302,500	—	
Software developers, applications	15-1132	831,300	1,086,600	31	255,400		

Software developers, systems software	15-1133	425,000	472,100	11	47,100		

Appendix D: Computer Science Faculty and Student Publications

Faculty Publications Including Joint Work with Students

2017 BOOK: K. Daimi, G. Francia, L. Ertaul, E. El-Sheikh, L. Hernandez, “Computer and Network Security Essentials”, June 2017.

2017 L. Ertaul, A. Woodall, "IoT Security: Performance Evaluation of Grain, MICKEY, and Trivium - Lightweight Stream Ciphers", The 2017 World Congress in Computer Science, Computer Engineering, and Applied Computing (CSCE'17), The 2017 International Conference on Security and Management (SAM'17), July, Las Vegas, 2017.

2017 L. Ertaul, S. K. Rajegowda, "Performance Analysis of CLEFIA, PICCOLO, TWINE Lightweight Block Ciphers in IoT environment", The 2017 World Congress in Computer Science, Computer Engineering, and Applied Computing (CSCE'17), The 2017 International Conference on Security and Management (SAM'17), July, Las Vegas, 2017.

2017 L. Ertaul, K. Venkatachalam,"Security of Software Defined Networks (SDN)", The 2017 World Congress in Computer Science, Computer Engineering, and Applied Computing (CSCE'17), The 16th Int'l Conf on Wireless Networks (ICWN'17), July, Las Vegas, 2017.

2017 L. Ertaul, “Privacy in Location Based Services (LBS) via Composite Functions: The L4NE Protocol”, IJCSNS International Journal of Computer Science and Network Security, Vol. 17, No. 3, pp. 117-123 March.

2016 L. Ertaul, I. Thanki, "EasyAuth – Implementation of a Multi-Factor Authentication Scheme based on Sound, Fingerprint and One Time Passwords (OTP)", WORLDCOMP 2016, International Conference on Security and Management SAM'16, July, Las Vegas, 2016.

2016 L. Ertaul, M. Kaur, V. A. K. R Gudise, “Implementation and Performance Analysis of PBKDF2, Bcrypt, Scrypt Algorithms”, The 2016 International Conference on Wireless Networks, ICWN16, July, Las Vegas, 2016.

2016 L. Ertaul, N. V. Konda, D. G Ramasamy, “Implementation of EAX Mode of Operation within a Real-Time Android Chatting Application”, The 2016International Conference on Wireless Networks, ICWN16, July, Las Vegas, 2016.

2016 L. Ertaul, A. Mudan, N. Sarfaraz, “Performance Comparison of AES-CCM and AES-GCM Authenticated Encryption Modes”, WORLDCOMP 2016, International Conference on Security and Management SAM'16, July, Las Vegas, 2016.

2016 L. Ertaul, S. K L, N. Sanka, “Implementation of Authenticated Encryption Algorithm Offset Code Book (OCB)”, The 2016 International Conference on Wireless Networks, ICWN16, July, Las Ve gas, 2016.

2015 G. Saldamli, Y. J. Baek, L. Ertaul, “Partially Interleaved Modular Karatsuba-Ofman Multiplication”, IJCSNS International Journal of Computer Science and Network Security, Vol. 15 No. 5 pp. 44-49, May.

2015 L. Ertaul, W. M. Baptista, R. Maram, “Storing Credit Card Information Securely using Shamir Secret Sharing in a Multi-Provider Cloud Architecture”, WORLDCOMP2015, The 2015 International Conference on Security and Management SAM'15, July, Las Vegas.

2015 L. Ertaul, J. H. Yang, G. Salsamli, “Analyzing Homomorphic Encryption Schemes in Securing Wireless Sensor Networks (WSN)” IJCSNS International Journal of Computer Science and Network Security, Vol. 15 No. 5 pp. 1-11, May.

2015 L. Ertaul, J. N. Shah, S. Ammar, “A Comparison of HMAC-based and AES-based FFX mode of Operation for Format-Preserving Encryption”, WORLDCOMP2015, The 2015 International Conference on Security and Management SAM'15, July, Las Vegas.

2015 L. Ertaul, Saleha Shakoor, “Implementation of Pinkas Partial Matching (PM)-semi honest protocol using Mixed Multiplicative Homomorphic encryption (MMH) for Location Based Services (LBS)”, IJCSNS International Journal of Computer Science and Network Security, Vol. 15 No. 3 pp. 1-10, March.

2014 L. Ertaul, A. M. Mehta, T. K. Wu, “Implementation of Oblivious Bloom Intersection in Private Set Intersection Protocol (PSI)”, Proceedings of the 2014 Internatioanl Conference on Security & Management SAM’14, July, Las Vegas.

2013 L. Ertaul, B. F. Imagnu, S. Kilaru, “Privacy-Aware Proximity Based Service using Hide & Crypt Protocol: Implementation”, WORLDCOMP2013, The 2013 International Conference on Security and Management SAM'13, July, Las Vegas.

2013 L. Ertaul, A Balluru, A. Perumalsamy, “Private Proximity Testing For Location Based Services”, WORLDCOMP2013, The 2013 International Conference on Security and Management SAM'13, July, Las Vegas.

2013 L. Ertaul, N. Shaikh, S. Kotipalli, “Implementation of Boneh Protocol 3 in Location Based Services (LBS) to Provide Proximity Services”, WORLDCOMP2013, The 2013 International Conference on Security and Management SAM'13, July, Las Vegas.

2013 Y. Martirosyan, L. Ertaul, “Security Evaluation of Web Application Vulnerability Scanners’ Strengths and Limitations Using Custom Web Application”, M.Sc. Thesis, California State University East Bay, February.

2012 L. Ertaul, Y. Martirosyan, “Implementation of a WEB Application for Evaluation of WEB Application Security Scanners”, Proceedings of the 2012 Internatioanl Conference on Security & Management SAM’12, July, Las Vegas.

2012 L. Ertaul, V. Rathod, “ The Zachman Framework, the Owner’s Perpective & Security”, Proceedings of the 2012 Internatioanl Conference on Security & Management SAM’12, July, Las Vegas.

2011 L. Ertaul, S. Vandana, K. Gulati, G. Saldamli, “Enterprise Security Planning using the Zachman Framework – Builder’s Perspective”, Proceedings of Security and Management SAM’11, July, Las Vegas.

2011 L. Ertaul, A. R. Pasham, H. Patel, “ Enterprise Security Planning using Zachman Framework: Designer’s Perspective”, Proceedings of Security and Management SAM’11, July, Las Vegas.

2011 L. Ertaul, A Movasseghi, S. Kumar, “ Enterprise Security Planning with TOGAF-9”, Proceedings of Security and Management SAM’11, July, Las Vegas.

2011 L. Ertaul, A Movasseghi, S. Kumar, “A Strategy for Information Security:TOGAF”, Proceedings of Security and Management SAM’11, July, Las Vegas.

2011 L. Ertaul, J. Hao, “ Enterprise Security Planning with Department of Defense Architecture Framework (DODAF)”, Proceedings of Security and Management SAM’11, July, Las Vegas.

L. Grewe, W. Overell, “Traffic Light Detection and Intersection Crossing Using Mobile Computer Vision”, SPIE DSS, 2017.

E. Blasch, I. Kada, L. Grewe, R. Brooks, W. Yu, A. Kwasinski, S. Thomopoulous, J. Salerno, H. Qi, “Panel summary of cyber-physical systems (CPS) and Internet of Things (IoT) opportunities with information fusion”, SPIE, 2017.

L. Grewe, W. Overell, “ Road following for blindBike: an assistive bike navigation system for low vision persons”, SPIE DSS, 2017.

L. Grewe, C. Lagali, W. Overell, “Information Fusion in Challenging Environments for Human-Centric Cyber Physical Systems”, SPIE International Conference on Defense Security and Sensing, 2016.

L. Grewe and S. Magana-Zook, “Occlusion, Optimization, Emergency Response and Partial Falls in a Senior Collapse Detection System”, SPIE International Conference on Defense Security and Sensing, 2015.

L. Grewe and S. Magana-Zook, “A Cyber Physical System for Seniors Living at Home”, SPIE Newsroom, in progress, due March 2014.
L. Grewe and S. Magana-Zook, “A Cyber-Physical System for Senior Collapse Detection”, SPIE International Conference on Defense Security and Sensing, 2014.

L. Grewe,” Consumer-oriented social data fusion: controlled learning in social environments, social advertising and more”, SPIE International Conference on Defense Security and Sensing, 2013.

L. Grewe and Ben Shahshahani, “Image Processing Background”, Distributed Sensor Networks, 2nd Edition , Chapter 6, ISBN 8781439883204, 2012

L. Grewe, “The Interest Graph and Beyond-- Social Modeling and Information Fusion”, Invited Discussion on Real-World Issues and Challenges in Social/Cultural Modeling with Applications to Information Fusion, Baltimore, Maryland, SPIE International Conference on Defense Security and Sensing, 2012.

L. Grewe, “Detecting and Counteracting Atmospheric Effects”, Distributed Sensor Networks, 2nd Edition, Chapter 12, ISBN 8781439883204, 2012

R. Brooks and L. Grewe, “Data Registration”, Distributed Sensor Networks, 2nd Edition, Chapter 21, ISBN 8781439883204, 2012

Bing Jiao, Xiaomin, Zhu, Xiaojun Ruan, Xiao Qin, Shu Yin, “DuoFS: A Hybrid File System Balancing Energy-Efficiency, Reliability, and Performance”, 26th Euromicro International Conference on Parallel, Distributed, and Network-Based Processing (PDP), Bambridge, UK, March 21-23, 2018.

Yuhong Liu, Xiaojun Ruan, Songjie Cai, Ruiwen Li, and Hanxiao He, “An optimized VM Allocation Strategy to Make a Secure and Energy-Efficient Cloud Against Co-residence Attack”, International Conference on Computing, Networking and Communications, Communications and Information Security Symposium (ICNC 2018), Maui, Hawaii, USA, March 5-8, 2018.

X. Gao, Y. Yang, G. Chen, X. Lu, J. Zhong. Global Optimization for Multi-Channel Wireless Data Broadcast with AH-Tree Indexing Scheme. IEEE Transactions on Computers (TC). Vol. 65, Issue 7, 2016.

D. Kim, J. Zhong, M. Lee, D. Li, Y. Li, A.O. Tokuta. Efficient respondents selection for biased survey using homophily-high social relation graph. Discrete Mathematics, Algorithms and Applications (DMAA), Vol. 8, No. 04, Dec 2016.
S. Yu, F. Xia, K. Zhang, Z. Ning, J. Zhong and C. Liu. Team Recognition in Big Scholarly Data: Exploring Collaboration Intensity, The 3rd IEEE International Conference on Big Data

Intelligence and Computing (DataCom), Orlando, Florida, USA, November 6th-10th, 2017. Best Paper Award.

M. Liao, X. Liu, X. Gao, J. Zhong, G. Chen. iSim: An Efficient Integrated Similarity Based Collaborative Filtering Approach for Trust Prediction in Service-Oriented Social Networks. In International Conference on Service-Oriented Computing, pp. 501-516. Springer International Publishing, 2016.

H. Yang, J. Zhong, D. Ha, H. Oh. Rumor Propagation Detection System in Social Network Services. The 5th International Conference on Computational Social Networks (CSoNet), 2016.

S. Gupta, J. Zhong, T. Evans. A High-throughput, Web-based Tool to Determine Protein Hydrogen Bond Number. The 25th International Conference on Software Engineering and Data Engineering, September 26-28, Denver, CO, USA, 2016.

Student Master's Theses

Roohi Mandrekar, "Faulty Tolerant Cloud Systems", June 2011
Hema Srinivasan, "CSU East Bay Student Services Application in Android with focus on Human Computer Interaction," April 2012
Yuliana Martirosyan, "Security Evaluation of Web Application Vulnerability Scanners' Strengths and Limitations," December 2012
Steven Magana-Zook, "A Senior Collapse Monitoring System using the Microsoft Kinect Sensor." November 2014
Christopher Lagali, "Light Detection and Intersection Crossing Assistance for BlindBike – An Assistive Bike Navigation System for Low Vision Persons," June 2016
Will Overell, "Road Following for BlindBike: An Assistive Bike Navigation System for Low Vision Persons," June 2016

Appendix E: CSUEB APR Summary Data

Please note the Computer Science and Mathematics programs were housed in the same department until July, 2015 Institutional Research did not calculate separate data for the Math and Computer Science programs,

E.1 - Student Demographics:

A2 Race/Ethnicity (%)

IPEDS Ethni..	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016
Nonresident	32.86	39.46	43.95	33.39	33.59
Asian	26.19	22.13	21.45	28.76	29.42
White	21.19	16.70	13.15	13.72	12.12
Hispanic	8.57	9.81	10.21	12.40	14.14
Black	4.52	3.76	4.15	4.46	3.54
Unknown	4.52	4.80	3.81	3.31	2.40
Multiple Race	1.43	2.71	2.25	2.65	3.66
Hawaiian	0.71	0.63	1.04	1.32	1.14
Grand Total	100.00	100.00	100.00	100.00	100.00

A3 Gender (%)

Gender	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016
Male	77.86	79.54	72.49	75.37	75.63
Female	22.14	20.46	27.51	24.63	24.37
Grand Total	100.00	100.00	100.00	100.00	100.00

A4 Average SCU Enrolled

Degree Level	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016
Bachelor	13.0	13.3	13.1	13.2	13.0
PostBaccalaureate		12.0	12.0		
Master	7.4	8.2	8.7	8.1	9.3

A5 First-time Students

First Time	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016
Firsts-time freshmen	34	42	47	87	101
First-time Transfer	54	58	60	80	133
Firsrt-time Graduate	26	98	45	42	99
Grand Total	114	198	152	209	333

A6 Full Time/Part Time

Full Time/Part Time	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016
Full-time	297	331	387	428	598
Part-time	123	148	191	177	194
Grand Total	420	479	578	605	792

A7 Average Age

Degree Level	Fall 2012	Fall 2013	Fall 2014	Fall 2015	Fall 2016
Bachelor	24.4	24.4	23.8	23.3	23.1
PostBaccalaureate		36.0	37.0		
Master	29.3	26.4	25.3	26.4	26.5

BS Computer Science		Fall 2011	Fall 2012	Fall 2013	Fall 2014	Fall2015
Female	Black, non-Hispanic	3	2	3	5	6
	American Indian					
	Asian	18	21	10	17	20
	Asian Pacific Islander		2			1
	Hispanic	3	5	7	6	12
	White	7	2	4	8	6
	Multiple ethnicity	2		2		1
	Race/ethnicity unknown	1	2	3	3	1
	Nonresident aliens	15	5	3	5	7
	Total	**41**	**39**	**29**	**44**	**54**
Male	Black, non-Hispanic	24	15	12	16	20
	American Indian					
	Asian	81	76	82	98	139
	Asian Pacific islander	3	1	3	5	6
	Hispanic	22	29	39	53	63
	White	55	74	70	64	67
	Multiple Ethnicity	5	6	10	9	14
	Race/ethnicity unknown	11	15	20	19	17
	Nonresident aliens	48	60	61	47	42
	Total	**249**	**276**	**297**	**311**	**368**
Total	Black, non-Hispanic	27	17	15	21	26
	American Indian					

	Asian	99	97	92	115	159
	Asian Pacific Islanders	3	3	3	5	7
	Hispanic	25	34	46	59	75
	White	62	76	74	72	73
	Multiple ethnicity	7	6	12	12	15
	Race/ethnicity unknown	12	17	20	19	18
	Nonresident aliens	55	65	64	52	49
	Total	**290**	**315**	**326**	**355**	**422**

M.S. Computer Science		**Fall 2009**	**Fall 2010**	**Fall 2011**	**Fall 2012**	**Fall 2013**	**Fall 2014**	**Fall 2015**
Female	**Black, non-Hispanic**							
	American Indian or Alaska Native		1					
	Asian	24	14	7	5	7	4	5
	Pacific Islander							
	Hispanic	1	1	1	1			
	White	2	6	5	2	2	2	2
	Multiple ethnicity		2					
	Race/ethnicity unknown	8	12	6	3	1	1	1
	Nonresident aliens	51	59	56	43	59	108	87
Male	**Black, non-Hispanic**	3	2	1	2	3	3	1
	American Indian or Alaska Native							
	Asian	6	9	11	5	4	4	10
	Pacific Islander							
	Hispanic		2	1	1	1		
	White	7	12	10	10	3	2	7
	Multiple ethnicity					1	1	1
	Race/ethnicity unknown	10	5	4	3	5	3	3
	Nonresident aliens	71	59	46	30	66	94	66
Total	**Black, non-Hispanic**	3	2	1	2	3	3	1
	American Indian or Alaska Native		1					
	Asian	30	23	18	10	11	9	15
	Pacific Islander							
	Hispanic	1	3	2	2	1		
	White	9	18	15	12	5	3	9
	Multiple ethnicity		2			1	1	1
	Race/ethnicity unknown	18	17	10	6	6	4	4
	Nonresident aliens	122	118	102	73	125	202	153

Computer Network	**Fall 2011**	**Fall 2012**	**Fall 2013**	**Fall 2014**	**Fall2015**

Female	**Black, non-Hispanic**					
	Asian		**2**	**2**		
	White		**1**	**1**		
	Race/ethnicity unknown		**1**	**3**		
	Nonresident aliens	**15**	**14**	**16**	**15**	**16**
Male	**Black, non-Hispanic**		**1**	**1**	**1**	
	Asian		**1**	**3**	**1**	
	White			**2**	**2**	**1**
	Race/ethnicity unknown					
	Nonresident aliens	**10**	**7**	**28**	**35**	**19**
Total	**Black, non-Hispanic**		**1**	**1**	**1**	
	Asian		**3**	**5**	**1**	
	White		**1**	**3**	**2**	**1**
	Race/ethnicity unknown		**1**	**3**		
	Nonresident aliens	**25**	**21**	**44**	**50**	**35**

E.2 - Student Headcount:

		Fall Quarter				
Headcount Enrollment	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Computer Science						
1. Undergraduate	315	326	355	424	581	598
2. Postbaccalaureate	8	1	1	0	0	0
3. Graduate	105	152	222	183	211	217
4. Total Number of Majors	428	479	578	607	792	815
Computer Network						
1. Undergraduate	0	0	0	0	0	0
2. Postbaccalaureate	0	0	0	0	0	0
3. Graduate	26	53	57	37	29	13
4. Total Number of Majors	26	53	57	37	29	13

E.3 - Degrees Awarded:

		College Years				
Degrees Awarded	**11-12**	**12-13**	**13-14**	**14-15**	**15-16**	**16-17**
Computer Science						
1. Undergraduate	55	74	74	72	64	85
2. Graduate	89	57	31	59	110	74
3. Total Number of Majors	144	131	105	131	174	159
Computer Network						
1. Undergraduate	0	0	0	0	0	0
2. Graduate	16	12	18	17	28	21
3. Total Number of Majors	16	12	18	17	28	21

E.4 - Faculty Information:

The following tables from Institutional Research combine the Computer Science and Mathematics programs together. Separate data for the two programs was not available as the two programs were housed in the same department.

Please see above (Self-Study Section 2.4) for information on Computer Science and Computer Network faculty.

	Fall Quarter					
	2010	**2011**	**2012**	**2013**	**2014**	**2015**
C. Faculty						
Tenured/Track Headcount	Computer Science and Mathematics Combined					
1. Full-Time	25	25	23	21	22	19
2. Part-Time	4	2	1	1	2	3
3a. Total Tenure Track	29	27	24	22	24	22
3b. % Tenure Track	80.6%	62.8%	58.5%	52.4%	57.1%	48.9%
Lecturer Headcount	Computer Science and					

	Mathematics Combined					
4. Full-Time	1	1	1	2	2	4
5. Part-Time	6	15	16	18	16	19
6a. Total Non-Tenure Track	7	16	17	20	18	23
6b. % Non-Tenure Track	19.4%	37.2%	41.5%	47.6%	42.9%	51.1%
7. Grand Total All Faculty	36	43	41	42	42	45
Instructional FTE Faculty (FTEF)	Computer Science and Mathematics Combined					
8. Tenured/Track FTEF	22.4	19.4	16.5	17.4	17.0	21.0
9. Lecturer FTEF	11.1	18.1	19.0	19.3	18.4	13.7
10. Total Instructional FTEF	33.5	37.4	35.4	36.7	35.4	34.7
Lecturer Teaching	Computer Science and Mathematics Combined					
11a. FTES Taught by Tenure/Track	439.1	307.1	288.1	314.9	356.4	260.3
11b. % of FTES Taught by Tenure/Track	58.7%	38.7%	36.0%	36.2%	39.4%	28.3%
12a. FTES Taught by Lecturer	308.5	487.1	513.2	553.9	547.3	660.0
12b. % of FTES Taught by Lecturer	41.3%	61.3%	64.0%	63.8%	60.6%	71.7%
13. Total FTES taught	747.7	794.2	801.3	868.7	903.7	920.4
14. Total SCU taught	11215.0	11913.0	12019.0	13031.0	13566.0	13806.0

E.5 - Student Faculty Ratios:

	Fall Quarter					
	2010	**2011**	**2012**	**2013**	**2014**	**2015**

D. Student Faculty Ratios	Computer Science					
1. Tenured/Track	16.8	14.7	17.1	19.4	20.9	23.1
2. Lecturer	26.4	23.6	27.5	30.2	29.2	25.6
3. SFR By Level (All Faculty)	17.5	15.5	18.5	21.5	23.0	24.0
4. Lower Division	24.6	22.5	20.8	24.9	28.9	26.2
5. Upper Division	17.0	17.5	20.2	21.4	23.8	23.2
6. Graduate	15.9	10.1	14.5	19.8	19.9	23.6

E.6 - Sections:

	Fall Quarter					
	2010	**2011**	**2012**	**2013**	**2014**	**2015**

E. Sections						
1. Number of Sections Offered	39.7	47.8	37.0	45.8	49.0	47.0
2. SCU taught	3016.0	2962.0	3054.0	3938.0	4556.0	3872.0
3. Average Section Size	21.1	17.8	20.9	22.5	24.0	22.9
4. Average Section Size for LD	33.5	26.4	29.5	27.0	27.0	25.9
5. Average Section Size for UD	20.2	18.8	21.4	22.9	25.5	22.5

6. Average Section Size for GD	18.7	12.5	15.5	19.5	21.1	21.3
7. LD Section taught by Tenured/Track	4	5	5	5	2	2
8. UD Section taught by Tenured/Track	18	21	19	21	15	14
9. GD Section taught by Tenured/Track	16	18	10	12	16	12
10. LD Section taught by Lecturer	0	2	1	3	7	8
11. UD Section taught by Lecturer	1	0	3	5	5	5
12. GD Section taught by Lecturer	2	3	3	3	4	6

Appendix F: Courses Offered Fall 2017 with Enrollments

Quarter-Based System Courses Offered

Undergraduate

CS 1020 Introduction to Computers
CS 1160 Introduction to Computer Science I
CS 1162 Introduction to Computer Science I Lab
CS 2020 Introduction to Web Design and Technology
CS 2360 Introduction to Computer Science II
CS 2370 Introduction to Computer Science III
CS 2430 Computer Organization and Assembly Language
CS 3120 Programming Language Concepts
CS 3240 Data Structures and Algorithms
CS 3340 Introduction OOP and Design
CS 3430 Computer Architecture
CS 3432 Digital Design Lab
CS 3434 Microprocessor Lab
CS 3520 Web Site Development
CS 3560 Introduction to Systems Programming
CS 3590 Data Communications and Networking
CS 3752 Introduction to Digital Signal Processing
CS 3860 Computer Music Programming
CS 3898 Cooperative Education
CS 4020 Computers and Social Responsibility
CS 4110 Compiler Design
CS 4170 Theory of Automata
CS 4245 Analysis of Algorithms
CS 4310 Software Engineering I
CS 4311 Software Engineering II
CS 4320 Testing and Quality Assurance
CS 4330 Building Secure Software
CS 4432 VLSI Circuit Design
CS 4435 Computer Architecture II
CS 4521 Mobile and Topics in Web Programming
CS 4525 Principles of Network Security

CS 4526 Security in Wireless and Mobile Computing
CS 4560 Operating Systems
CS 4590 Computer Networks
CS 4592 Network Operations and Administration
CS 4594 Broadband Networks and Communications
CS 4596 Wireless and Mobile Networking
CS 4660 Database Architecture
CS 4665 Database Operations and Administration
CS 4810 Artificial Intelligence
CS 4835 Human-Computer Interaction
CS 4840 Computer Graphics
CS 4848 Computer Animation Programming
CS 4849 Game Programming
CS 4865 Graphical User Interface Programming

Graduate

CS 6000 - Research Methodologies
CS 6110 - Theory and Design of Compilers
CS 6170 - Automata and Formal Languages
CS 6260 - Computation and Complexity
CS 6310 - Advanced Software Engineering
CS 6320 - Software Engineering of Web-Based Systems
CS 6325 - Advanced Software Testing
CS 6330 - Secure Software Development
CS 6432 - VLSI Systems Design
CS 6520 - Cryptography and Data Security
CS 6522 - Advanced WWW Software Development
CS 6525 - Network Security
CS 6526 - Security in Wireless, Mobile, Grid and Pervasive Computing
CS 6527 - Network Security Management
CS 6560 - Operating Systems Design
CS 6570 - Distributed Computation
CS 6575 - Parallel Programming
CS 6580 - Distributed Systems
CS 6591 - Communication Network Analysis and Design
CS 6592 - Network Management
CS 6593 - Cloud Computing
CS 6594 - Broadband and Multimedia Networks
CS 6596 - Wireless and Mobile Network Architecture
CS 6660 - Database Systems
CS 6665 - Database Systems Administration
CS 6715 - Data Compression
CS 6750 - Topics in Numerical Analysis
CS 6752 - Digital Signal Processing
CS 6810 - Topics in Artificial Intelligence

CS 6820 - Machine Learning
CS 6825 - Computer Vision
CS 6831 - Statistical Learning and Data Analysis
CS 6865 - Topics in Graphical User Interface Programming
CS 6870 - Computer Simulation
CS 6899 - Project
CS 6900 - Independent Study
CS 6901 - Graduate Synthesis in Computer Science
CS 6909 - Departmental Thesis

Semester-Based System Courses Offered

Undergraduate

CS 100 - Computer Programming for Everyone
CS 101 - Computer Science I
CS 180 - Computer Literacy
CS 200 - Computers Programming for Everyone II
CS 201 - Computer Science II
CS 211 - Mathematical Foundations of Computer Science
CS 221 - Computer Organization and Assembly Programming
CS 231 - Computers and Social Responsibility
CS 250 - Web Technology
CS 300 - Discovering Computer Science
CS 301 - Data Structures and Algorithms
CS 311 - Programming Language Concepts
CS 321 - Computer Architecture
CS 350 - Databases for Social and Health Sciences
CS 351 - Website Development
CS 400 - Computer Programming for Science
CS 401 - Software Engineering
CS 410 - Computer Programming for Science
CS 411 - Automata and Computation
CS 413 - Analysis of Algorithms
CS 421 - Operating Systems
CS 431 - Database Architecture
CS 441 - Computer Networks
CS 453 - Mobile Programming
CS 455 - Computer Graphics
CS 461 - Artificial Intelligence
CS 471 - Security and Information Assurance
CS 490 - Independent Study
CS 498 - Cooperative Education

Graduate

CS 601 - Advanced Algorithms and Analysis
CS 603 - Advanced Software Development
CS 605 - Information Coding and Cryptography
CS 607 - Parallel Programming
CS 611 - Theory of Computation
CS 613 - Compiler Design
CS 621 - Operating Systems Design
CS 623 - Cloud Computing
CS 625 - Advanced Computer Architecture
CS 631 - Database Systems
CS 641 - Advanced Computer Networks
CS 643 - Distributed Systems
CS 645 - Network Analysis and Design
CS 651 - Web Systems
CS 661 - Advanced Artifical Intelligence
CS 663 - Computer Vision
CS 665 - Human-Computer Interaction
CS 671 - Cybersecurity
CS 681 - Digital Signal Processing
CS 683 - Computer Simulation
CS 690 - Independent Study
CS 692 - Capstone Examination
CS 693 - Capstone Project
CS 697A - Topics in Computer Science
CS 697B - Topics in Computer Networks
CS 699 - Capstone Thesis

Appendix G: CSUEB CS Comparison to other CSU CS Programs

The following table compares the quarter-based CSUEB CS Bachelor's program with two other CSU Bachelor's programs. Both programs were quarter-based until they also recently converted to semesters. CSUEB and Sonoma State were quite similar (16 required CS courses vs. 17). CSULA had 26-27 required CS courses. Course names and materials were quite similar.

CSUEB	**Sonoma State**	**CSULA**
Required LD CS: 4	Required LD CS: 4	Required LD CS: 6
Required UD CS: 5	Required UD CS: 8	Required UD CS: 14
Limited Choice UD CS: 4	Limited Choice UD CS: 1	Elective UD CS: 6-7
Elective UD CS: 3	Elective UD CS: 3	Math & Stat: 6
Math & Stat: 5	Math & Stat: 4	

	COMPARISON CSUEB, SONOMA STATE, CSULA	
CSUEB	**Sonoma State (not accredited)**	**CSU LA (ABET accredited)**
84 quarter units	**124 semester units**	**126-129 sem units**
Math Requirements (20 units)	**Major Core Requirements**	**LD requirements (60-63 units)**
	CS 115 Prog. I(4)	CS 120 Intro. to Web Site Dev (3)
MATH 1304, 1305 Calculus I, II (8)	CS 210 Intro. to Unix (1)	CS 122 Using Relational DBs and SQL (
MATH 2101 Elemts of Linear Alg (4)	CS 215 Prog. II(4)	CS 201 Intro. to Prog. (5)
MATH 2150 Discrete Structures (4)	CS 242 Disc StrucT for C.S.(4)	CS 202 Intro. to Object Oriented Prog
STAT 3601 Intro Stat & Prob for Sc/Eng (	CS 252 Intro Comp. Org(4)	CS 203 Prog. with Data Structures (5)
(or STAT 3401 or 3502)	CS 315 Data Structures(4)	CS 245 Using OS & Networks (3)
	CS 351 Comp. Architecture(4)	MATH 206 Calculus I (4)
LD C.S. Required Courses	CS 355 DB Management Syst(4)	MATH 207 Calculus II (4)
CS 1160 Intro. to C.S. I (4)	CS 370 Software Design & Dev(4)	MATH 208 Calculus III (4)
CS 2360 Intro. to C.S. II (4)	CS 415 Algorithm Analysis(4)	MATH 248 Discrete Mathematics (4)
CS 2370 Intro. to C.S. III (4)	CS 450 Operating Systems(4)	MATH 255 Intro. to Matrix Theory (4)
CS 2430 Comp. Org. & Assem. Lang. Pro	CS 454 Theory of Computation(4)	MATH 270 Prob with Applications (4)
	CS 460 Prog. Languages(4)	PHYS 101 or 211 Gen Phys I or Mech
U.D. C.S.: Required Courses (20 units)		PHYS 102 or 212 Gen Phys II or Waves
CS 3120 Prog. Language Concepts (4)	Total units in the major core: 49	PHYS 103 or 213 Gen Phys III or Elec
CS 3240 Data Struct & Algor (4)		
CS 3340 Intro. to OOP and Design (4)	**Major Electives**	**UD required courses (42 units)**
CS 3430 Comp. Architecture (4)	9 units of elective courses	CS 301 Comp. Ethics in the Info Age (1
CS 4560 Operating Systems (4)		CS 312 Data Struct & Algorithms (4)
	Capstone Experience Requirement	CS 320 Web and Internet Prog. (3)
UD Concentration: 4 courses from	One course from the following:	CS 332F Functional Prog. (2)
CS 3560 Intro. to Systems Prog. (4)	CS 470 Adv Software Design Proj(3)	CS 332L Logic Prog. (2)
CS 3590 Data Comm. & Networking (4)	CS 495 Special Studies 3 units	CS 332C C++ Object Oriented Prog. (2)
CS 4660 Database Architecture (4)		CS 337 Software Design (3)
CS 4110 Compiler Design (4)	**Required Supporting Courses**	CS 386 Intro. to Automata Theory (4)
CS 4170 Theory of Automata (4)	MATH 161 Calc & Anal Geom I(4)	CS 437 Software Engineering (5)
CS 4245 Analysis of Algorithms (4)	Two courses from the following:	CS 440 Intro. to O.S. (4)
CS 4310 Software Engineering I (4)	MATH 165 Elem Statistics(4)	EE 444 Comp. Architecture (4)
MATH/CS 3750 Numerical Analysis I (4)	MATH 211 Calcu & Anal Geom II(4)	CS 490 C.S. Recapitulation (2)
	MATH 222 Linear Algebra(3)	CS 491A Software Design Lab (3)
UD Electives: 3 courses	MATH 241 Calculus III (4)	CS 491B Software Design Lab (3)
	MATH 306 Number Theory(3)	
	MATH 316 Graph Theory(3)	**Elecitives (24 units)**
	MATH 352 Numerical Analysis(3)	Select 24 units of CS electives
	MATH 416 Graph Theory(3)	
	MATH 430 Linear Systems Theory(3)	
	MATH 470 Mathematical Models(3)	
	PHYS 214 Intro. to Phys II(4)	

Appendix H : Transfer Model Curriculum

Transfer Model Curriculum –
Updated December 4, 2012
5-Year Review Update October 14, 2016

CCC Major: *Computer Science*

CSU Major or Majors: *Computer Science*

Total units: *28*
(all units indicated are minimum semester units)

Degree Type : AS-T__X__

"Core" Courses –
Minimum Units *28 units (at least 7 units double count as GE credit)*

Title (typical units)	C-ID Designation	Rationale
Programming Concepts & Methodology I (CS1) (min. 3 units)	COMP 122	ACM/IEEE recommendation for a four semester introductory sequence
Programming Concepts & Methodology II (CS2) (min. 3 units)	COMP 132	
Computer Architecture & Organization (min. 3 units)	COMP 142	
Discrete Structures (min. 3 units)	COMP 152	
Single Variable Calculus I and II – Early Transcendentals (min. 8 units) or Single Variable Calculus I and II – Late Transcendentals (min. 8 units) or Single Variable Calculus Sequence (min. 8 units)	MATH 210 and 220 or MATH 211 and 221 or MATH 900S	Double count for GE B4
Calculus-Based Physics for Scientists and Engineers: A (min. 4 units)	PHYS 205	Double count for GE B1 and B3

Calculus-Based Physics for Scientists and Engineers: B (min. 4 units) or Cell and Molecular Biology (min. 4 units) or General Chemistry for Science Majors I, with Lab (min. 5 units)	PHYS 210 or BIOL 190 or BIOL 140 or CHEM 110	 Double count for GE B2 and B3 Double count for GE B1 and B3

Summary of Feedback Including Issues and Concerns - Items of concern from the vetting process, along with the results of a direct survey of the CSUs involved (with a high response rate), were addressed: Requirement of Physics and Calculus. After reviewing the feedback, and in light of separate ABET accreditation requirements for Computer Science programs, the FDRG determined that students would continue to need both Calculus courses to be successful. To allow many more community colleges to implement this TMC, however, two alternatives to PHYS 210 were implemented which students could double-count for GE, specifically to meet Area B2.

Appendix I: Current Quarter-Based Program Assessment Plan

College of Science
Department of Computer Science

Assessment Plan
Computer Science and Computer Networks

Programs:

Computer Science offers the following instructional programs:

1. Bachelor of Science in Computer Science
2. Bachelor of Science in Computer Science with Computer Engineering Option
3. Bachelor of Science in Computer Science with Networking and Data Communications Option
4. Bachelor of Science in Computer Science with Software Engineering Option
5. Master of Science in Computer Science
6. Master of Science in Computer Networks

Institutional Learning Outcomes (ILOs):

Graduates of CSUEB will be able to:

1. think critically and creatively and apply analytical and quantitative reasoning to address complex challenges and everyday problems
2. communicate ideas, perspectives, and values clearly and persuasively while listening openly to others
3. apply knowledge of diversity and multicultural competencies to promote equity and social justice in our communities
4. work collaboratively and respectfully as members and leaders of diverse teams and communities
5. act responsibly and sustainably at local, national, and global levels
6. demonstrate expertise and integration of ideas, methods, theory and practice in a specialized discipline of study

Program Learning Outcomes (PLOs):

Bachelor of Science in Computer Science

Students graduating with a Bachelor of Science in Computer Science will be able to:

9. apply knowledge of mathematics and computational theory to appropriate problems in computer science
10. analyze a problem, and identify and define the resources and requirements needed for its solution
11. design and implement a program to meet stated needs
12. develop and maintain computer-based systems, processes, and platforms
13. recognize and distinguish the mechanisms, components and architecture of computing systems
14. employ current techniques, skills, and tools necessary for computing practice
15. identify professional, ethical, legal, and security issues and responsibilities and the impact of computing on individuals, organizations, and society
16. perform successfully on teams to accomplish a common goal, and communicate effectively in written and oral form

ILO #1 is addressed by PLOs #1, #2, #3, #4, #5 and #6
ILO #2 is addressed by PLOs #2, #3, #6 and #8
ILO #3 is addressed by PLOs #7 and #8
ILO #4 is addressed by PLO #8
ILO #5 is addressed by PLOs #6, #7 and #8
ILO #6 is addressed by PLOs #1, #2, #3, #4, #5, #6, #7 and #8

Students taking one of the Options for the Bachelor in Computer Science receive focused emphasis on particular PLOs as follows:

- The Computer Engineering Option emphasizes PLOs #4, #5 and #6 above.
- The Networking and Data Communications Option emphasizes #1, #3, and #4 above.

- The Software Engineering Option emphasizes #1, #2, #3 and #6 above.

Master of Science in Computer Science

Students graduating with a Master of Science in Computer Science will be able to:

1. apply advanced computer science theory to computational problems
2. demonstrate advanced understanding of the mechanisms, components and architecture of current computing systems
3. apply emerging technologies and advanced algorithmic design
4. critique, plan and produce complex software applications
5. research and analyze current computer science literature

ILO #1 is addressed by PLOs #1, #2, #3, #4, and #5
ILO #2 is addressed by PLOs #1 and #5
ILO #4 is addressed by PLO #4
ILO #5 is addressed by PLO #5
ILO #6 is addressed by PLOs #1, #2, #3, #4, and #5

Master of Science in Computer Networks

Students graduating with a Master of Science in Computer Networks will be able to:

1. exhibit mastery of advanced computer science theory as applied to the field of computer networks
2. employ current techniques, skills, tools, and coding practices necessary for application and system development
3. apply critical thinking and problem solving skills by analyzing problems, designing solutions, and evaluating results
4. demonstrate communication skills in both written and oral form, and work in a team environment
5. independently acquire new computer related skills through analysis of current computer science literature and industrial practices

ILO #1 is addressed by PLOs #1, #2, #3, #4, and #5
ILO #2 is addressed by PLO #4
ILO #3 is addressed by PLO #4
ILO #4 is addressed by PLO #4
ILO #5 is addressed by PLO #2 and #5
ILO #6 is addressed by PLOs #1, #2, #3, #4, and #5

Degree Maps (Course by Program):

There is a great deal of course overlap between the Bachelor of Science in Computer Science, the Master of Science in Computer Science, and the Master of Science in Networks. The curricular map below indicates which courses are required for each degree program, and shows (by color) which program has primary control over each course and administers its assessment.

SEE APPENDIX I

Curricular Maps (Course by PLO):

Bachelor of Science in Computer Science
SEE APPENDIX II

Bachelor of Science in Computer Science with Computer Engineering Option
SEE APPENDIX III

Bachelor of Science in Computer Science with Networking and Data Communications Option
SEE APPENDIX IV

Bachelor of Science in Computer Science with Software Engineering Option
SEE APPENDIX V
Master of Science in Computer Science
SEE APPENDIX VI

Master of Science in Computer Networks
SEE APPENDIX VII

Assessment Mechanisms:

Not surprisingly, all three Computer Science programs have adopted a computationally-based assessment strategy. With the exception of only three courses (CS 3898, CS 6899 and CS 6901, see below), all other components of the Bachelor of Science in Computer Science, the Master of Science in Computer Science, and the Master of Science in Computer Networks will be assessed online through Blackboard Outcomes.

Each course built on Blackboard will have an attached Assessment Exam which students are required to complete before the end of the quarter. Each exam will consist of a series of multiple choice questions, with each question linked to one of the PLOs for the course (and ILOs, where appropriate). These exams can then be auto-tabulated through Blackboard, generating a report by PLO for each course.

CS 3898 Cooperative Education is a student internship program offered through the Bachelor of Science in Computer Science (without option). Students must give a final presentation on their

work experience, and submit a summary paper. They also receive evaluative reports from their internship supervisor.

CS 6899 Project is the culminating experience in the Master of Science in Computer Networks. Students in this course develop and implement an advanced research project in computer networks.

CS 6901 Graduate Capstone Experience is the culminating experience of the Master of Science in Computer Science. Students enrolled in this course take three separate comprehensive exams in the areas of Hardware, Software, and Theory.

APPENDIX I

Assessed through Computer Science B.S. program
Assessed through Computer Science M.S. program
Assessed through Computer Networking M.S. program
Assessed by Engineering (these courses are dual-listed with Computer Engineering)
Assessed by other programs, or a service course

KEY:

R course is required by the program
C course is in the program's concentration
B course is in the program's breadth requirement
***** course is an elective in the program
- course is a restricted or limited elective option

	B.S. in Computer Science Options				Graduate Programs	
	General	Computer Engineering	Networking	Software Engineering	Computer Science	Computer Networks
CS 1020 Introduction to Computers	service course for non-majors					
CS 1160 Introduction to Computer Science I	R	R	R	R		
CS 1162 Introduction to Computer Science I Lab	R	R	R	R		
CS 2020 Introduction to Web Design and Technology	service course for non-majors					
CS 2360 Introduction to Computer Science II	R	R	R	R		
CS 2370 Introduction to Computer Science III	R	R	R	R		
CS 2430 Computer Organization and Assembly Language	R	R	R	R		
CS 3120 Programming Language Concepts	R	R	R	R		
CS 3240 Data Structures and Algorithms	R	R	R	R		
CS 3340 Introduction OOP and Design	R	R	R	R		
CS 3430 Computer Architecture	R	R	R	R		
CS 3432 Digital Design Lab	*	C			-	-

CS 3434 Microprocessor Lab	*	C			-	-
CS 3520 Web Site Development	*		*	*	-	-
CS 3560 Introduction to Systems Programming	C	*		C	-	-
CS 3590 Data Communications and Networking	C	C	R	C	-	-
CS 3752 Introduction to Digital Signal Processing	*				-	-
CS 3860 Computer Music Programming	*					
CS 3898 Cooperative Education	*					
CS 4020 Computers and Social Responsibility	*				-	-
CS 4110 Compiler Design	C		C	C	-	-
CS 4170 Theory of Automata	C		C	C		
CS 4245 Analysis of Algorithms	C		C	C	*	
CS 4310 Software Engineering I	C	*	C	R	-	-
CS 4311 Software Engineering II	*			R	-	-
CS 4320 Testing and Quality Assurance	*			R	-	-
CS 4330 Building Secure Software	*			*		
CS 4432 VLSI Circuit Design	*	C			-	-
CS 4435 Computer Architecture II	*	C			-	-
CS 4521 Mobile and Topics in Web Programming	*				-	-
CS 4525 Principles of Network Security	*		*		-	-
CS 4526 Security in Wireless and Mobile Computing	*					
CS 4560 Operating Systems	R	R	R	R		
CS 4590 Computer Networks	*	*	R		-	-
CS 4592 Network Operations and Administration	*		*			
CS 4594 Broadband Networks and Communications	*	*	*			B
CS 4596 Wireless and Mobile Networking	*	*	*			
CS 4660 Database Architecture	*		C	*	-	-
CS 4665 Database Operations and Administration	*					
CS 4810 Artificial Intelligence	*					
CS 4835 Human-Computer Interaction	*			*		
CS 4840 Computer Graphics	*	*		*	-	-
CS 4848 Computer Animation Programming	*				-	-
CS 4849 Game Programming	*				-	-
CS 4865 Graphical User Interface Programming	*			*		
CS 6000 Research Methods					R	*
CS 6110 Theory and Design of Compilers					B	*
CS 6140 Language Design					B	*
CS 6170 Automata and Formal Languages					B	*
CS 6260 Computation and Complexity					R	*
CS 6310 Advanced Software Engineering					B	*
CS 6320 Software Engineering and Web-Based Systems					B	B
CS 6330 Secure Software Development					*	*
CS 6430 Computer System Architecture					B	*
CS 6432 VLSI Systems Design					B	*
CS 6520 Cryptography and Data Security					B	*
CS 6522 Advanced WWW Software Development					B	B
CS 6525 Network Security					B	B

CS 6526 Security in Wireless and Mobile Computing					*	*
CS 6560 Operating Systems Design					R	R
CS 6570 Distributed Computation					B	*
CS 6575 Parallel Programming					B	*
CS 6580 Distributed Systems					B	R
CS 6591 Communication Networks Analysis and Design					*	R
CS 6592 Network Management					*	B
CS 6594 Broadband and Multimedia Networks					*	*
CS 6596 Wireless and Mobile Network Architecture					*	*
CS 6660 Database Systems					B	*
CS 6665 Database Systems Administration					B	*
CS 6715 Data Compression					B	B
CS 6752 Digital Signal Processing					B	*
CS 6810 Artificial Intelligence					B	*
CS 6820 Machine Learning					B	*
CS 6825 Computer Vision					B	*
CS 6835 Statistical Pattern Recognition					B	*
CS 6865 Topics in Graphical User Interface Programming					*	*
CS 6870 Computer Simulation					B	*
CS 6899 Project						R
CS 6901 Graduate Capstone					R	

As applied mathematical disciplines, the Bachelor of Science in Computer Science, the Master of Science in Computer Science, and the Master of Science in Networks require coursework in other programs such as Mathematics and Engineering as shown below.

Degree Components Not Offered Through Computer Science

	B.S. in Computer Science Options				Graduate Programs	
	General	Computer Engineering	Networking	Software Engineering	Computer Science	Computer Networks
ENGR 3280 Electronics	*					
MATH 1304 Calculus I	R	R	R	R		
MATH 1305 Calculus II	R	R	R	R		
MATH 2101 Linear Algebra	R	R	R	R		
MATH 2150 Discrete Structures	R	R	R	R		
MATH 3151 Combinatorics	*				*	
MATH 3750 Numerical Analysis I	C		C	C	B	

MATH 4151 Graph Theory	*					
MATH 6750 Topics in Numerical Analysis					*	*
PHIL 3002 Modern Logic	*				*	
PHYS 2702 Heat, Sound, Electricity and Magnetism		C				
STAT 3401 Introduction to Probability Theory	R	R	R	R		

APPENDIX II

B.S. in Computer Science

I = PLO is Introduced D = PLO is Developed M = PLO is Mastered	1	2	3	4	5	6	7	8
CS 1160 Introduction to Computer Science I			I			I		
CS 1162 Introduction to Computer Science I Lab			I			I		
MATH 1304 Calculus I	I							
MATH 1305 Calculus II	I							
MATH 2101 Linear Algebra	I							
MATH 2150 Discrete Structures	I					I		
CS 2360 Introduction to Computer Science II		I	I			I		
CS 2370 Introduction to Computer Science III		I	I			I		
CS 2430 Computer Organization and Assembly Language				I	I			
PHIL 3002 Modern Logic	I							
CS 3120 Programming Language Concepts	I		D					
MATH 3151 Combinatorics	D	D						
CS 3240 Data Structures and Algorithms		D	D			D		
ENGR 3280 Electronics				D	D			
CS 3340 Introduction to OOP and Design		D	D			D		
STAT 3401 Introduction to Probability Theory	D	D						
CS 3430 Computer Architecture				D	D			

CS/ENGR 3432 Digital Design Lab				**D**	**D**			
CS/ENGR 3434 Microprocessor Lab				**D**	**D**			
CS 3520 Web Site Development				**D**		**D**		
CS 3560 Introduction to Systems Programming		**D**	**D**		**D**			
CS 3590 Data Communications and Networking	**D**			**D**	**D**			
MATH 3750 Numerical Analysis I	**D**	**D**				**D**		
CS/ENGR 3752 Introduction to Digital Signal Processing				**D**	**D**			
CS 3860 Computer Music Programming		**D**	**D**					
CS 3898 Cooperative Education						**D**		**I**
CS 4020 Computers and Social Responsibility							**I**	**I**
CS 4110 Compiler Design	**D**	**M**	**D**					
MATH 4151 Graph Theory	**M**	**M**						
CS 4170 Theory of Automata	**M**	**M**						
CS 4245 Analysis of Algorithms	**M**	**M**				**M**		
CS 4310 Software Engineering I		**M**	**D**					**D**
CS 4311 Software Engineering II		**M**	**M**					
CS 4320 Testing and Quality Assurance						**M**	**D**	
CS 4330 Building Secure Software			**M**				**D**	
CS/ENGR 4432 VLSI Design				**M**	**M**			
CS/ENGR 4435 Computer Architecture II				**M**	**M**			
CS 4521 Mobile and Topics in Web Programming		**M**			**M**			**M**
CS 4525 Principles of Network Security					**M**		**M**	**M**
CS 4526 Principles of Wireless Security					**M**		**M**	**M**
CS 4560 Operating Systems				**M**	**M**			
CS 4590 Computer Networks	**M**			**M**	**M**			
CS 4592 Network Operations and Administration				**M**	**M**	**M**		
CS 4594 Broadband Networks and Communications		**M**		**M**	**M**			
CS 4596 Wireless and Mobile Networking	**M**			**M**		**M**		
CS 4660 Database Architecture				**M**		**M**		
CS 4665 Database Operations and Administration				**M**		**M**		
CS 4810 Artificial Intelligence	**M**		**M**				**M**	
CS 4835 Human-Computer Interaction						**M**	**M**	
CS 4840 Computer Graphics		**M**				**M**		
CS 4848 Computer Animation Programming		**M**	**M**					
CS 4849 Game Programming		**M**	**M**					
CS 4865 Graphical User Interface Programming			**M**			**M**		

APPENDIX III

B.S. in Computer Science
Computer Engineering Option

I = PLO is Introduced D = PLO is Developed M = PLO is Mastered	1	2	3	4	5	6	7	8
CS 1160 Introduction to Computer Science I			I			I		
CS 1162 Introduction to Computer Science I Lab			I			I		
MATH 1304 Calculus I	I							
MATH 1305 Calculus II	I							
MATH 2101 Linear Algebra	I							
MATH 2150 Discrete Structures	I					I		
CS 2360 Introduction to Computer Science II		I	I			I		
CS 2370 Introduction to Computer Science III		I	I			I		
CS 2430 Computer Organization and Assembly Language				I	I			
PHYS 2702 Heat, Sound, Electricity and Magnetism	I			I	I			
CS 3120 Programming Language Concepts	I		D					
CS 3240 Data Structures and Algorithms		D	D			D		
CS 3340 Introduction to OOP and Design		D	D			D		
STAT 3401 Introduction to Probability Theory	D	D						
CS 3430 Computer Architecture				D	D			
CS/ENGR 3432 Digital Design Lab				D	D			
CS/ENGR 3434 Microprocessor Lab				D	D			

CS 3560 Introduction to Systems Programming		D	D		D			
CS 3590 Data Communications and Networking	D			D	D			
CS 4310 Software Engineering I		M	D					D
CS/ENGR 4432 VLSI Design				M	M			
CS/ENGR 4435 Computer Architecture II				M	M			
CS 4560 Operating Systems				M	M			
CS 4590 Computer Networks	M			M	M			
CS 4594 Broadband Networks and Communications		M		M	M			
CS 4596 Wireless and Mobile Networking	M			M		M		
CS 4840 Computer Graphics		M				M		

APPENDIX IV

B.S. in Computer Science
Networking and Data Communications Option

I = PLO is Introduced D = PLO is Developed M = PLO is Mastered	1	2	3	4	5	6	7	8
CS 1160 Introduction to Computer Science I			I			I		
CS 1162 Introduction to Computer Science I Lab			I			I		
MATH 1304 Calculus I	I							
MATH 1305 Calculus II	I							
MATH 2101 Linear Algebra	I							
MATH 2150 Discrete Structures	I					I		
CS 2360 Introduction to Computer Science II		I	I			I		
CS 2370 Introduction to Computer Science III		I	I			I		
CS 2430 Computer Organization and Assembly Language				I	I			
PHIL 3002 Modern Logic	I							
CS 3120 Programming Language Concepts	I		D					
CS 3240 Data Structures and Algorithms		D	D			D		
CS 3340 Introduction to OOP and Design		D	D			D		
STAT 3401 Introduction to Probability Theory	D	D						
CS 3430 Computer Architecture				D	D			
CS 3520 Web Site Development				D		D		

CS 3590 Data Communications and Networking	D			D	D			
MATH 3750 Numerical Analysis I	D	D				D		
CS/ENGR 3752 Introduction to Digital Signal Processing				D	D			
CS 4110 Compiler Design	D	M	D					
CS 4170 Theory of Automata	M	M						
CS 4245 Analysis of Algorithms	M	M				M		
CS 4310 Software Engineering I		M	D					D
CS 4521 Mobile and Topics in Web Programming		M			M			M
CS 4525 Principles of Network Security					M		M	M
CS 4560 Operating Systems				M	M			
CS 4590 Computer Networks	M			M	M			
CS 4592 Network Operations and Administration				M	M	M		
CS 4594 Broadband Networks and Communications		M		M	M			
CS 4596 Wireless and Mobile Networking	M			M		M		
CS 4660 Database Architecture				M		M		

APPENDIX V

B.S. in Computer Science
Software Engineering Option

I = PLO is Introduced D = PLO is Developed M = PLO is Mastered	1	2	3	4	5	6	7	8
CS 1160 Introduction to Computer Science I			I			I		
CS 1162 Introduction to Computer Science I Lab			I			I		
MATH 1304 Calculus I	I							
MATH 1305 Calculus II	I							
MATH 2101 Linear Algebra	I							
MATH 2150 Discrete Structures	I					I		
CS 2360 Introduction to Computer Science II		I	I			I		
CS 2370 Introduction to Computer Science III		I	I			I		
CS 2430 Computer Organization and Assembly Language				I	I			
PHIL 3002 Modern Logic	I							
CS 3120 Programming Language Concepts	I		D					
CS 3240 Data Structures and Algorithms		D	D			D		
CS 3340 Introduction to OOP and Design		D	D			D		
STAT 3401 Introduction to Probability Theory	D	D						

CS 3430 Computer Architecture				D	D			
CS 3520 Web Site Development				D		D		
CS 3560 Introduction to Systems Programming		D	D		D			
CS 3590 Data Communications and Networking	D			D	D			
CS 4110 Compiler Design	D	M	D					
CS 4170 Theory of Automata	M	M						
CS 4245 Analysis of Algorithms	M	M				M		
CS 4310 Software Engineering I		M	D					D
CS 4311 Software Engineering II		M	M					
CS 4320 Testing and Quality Assurance						M	D	
CS 4330 Building Secure Software			M				D	
CS 4560 Operating Systems				M	M			
CS 4660 Database Architecture				M		M		
CS 4835 Human-Computer Interaction						M	M	
CS 4840 Computer Graphics		M				M		
CS 4865 Graphical User Interface Programming			M			M		

APPENDIX VI

M.S. in Computer Science

I = PLO is Introduced D = PLO is Developed M = PLO is Mastered	1	2	3	4	5
CS 3120 Programming Language Concepts	I				
CS 3240 Data Structures and Algorithms				I	
CS 3340 Introduction to OOP and Design				I	
STAT 3401 Introduction to Probability Theory	I				
CS 3430 Computer Architecture		I			
CS 4110 Compiler Design	I		I	I	
CS 4245 Analysis of Algorithms	I		I		
CS 4650 Operating Systems		I	I		
CS 6000 Research Methods		D			D
CS 6110 Theory and Design of Compilers	D	D	D		
CS 6140 Language Design		D	D		
CS 6170 Automata and Formal Languages	D		D		
CS 6260 Computation and Complexity	D		D		
CS 6310 Advanced Software Engineering		D		D	
CS 6320 Software Engineering and Web-Based Systems		D		D	
CS 6330 Secure Software Development			D		
CS/ENGR 6430 Computer System Architecture		D			

CS/ENGR 6432 VLSI Systems Design		D			
CS 6520 Cryptography and Data Security	D		D		
CS 6522 Advanced WWW Software Development		D		M	
CS 6525 Network Security		D		M	
CS 6526 Security in Wireless and Mobile Computing		D			M
CS 6560 Operating Systems Design		D	D		
CS 6570 Distributed Computation		D	D		
CS 6575 Parallel Programming		D	D		
CS 6580 Distributed Systems		D	D		
CS 6591 Communication Networks Analysis and Design		D			
CS 6592 Network Management		D			M
CS 6594 Broadband and Multimedia Networks		D			M
CS 6596 Wireless and Mobile Network Architecture		D			
CS 6660 Database Systems		D	D		
CS 6665 Database Systems Administration		D			
CS 6715 Data Compression	D	D			
MATH 6750 Topics in Numerical Analysis	D		D	D	
CS/ENGR 6752 Digital Signal Processing	D		D		
CS 6810 Artificial Intelligence	D		D		
CS 6820 Machine Learning	D		D		
CS 6825 Computer Vision	D		D		
CS 6835 Statistical Pattern Recognition	D		D		
CS 6865 Topics in Graphical User Interface Programming	D		D		
CS 6870 Computer Simulation		D		M	
CS 6901 Graduate Capstone	M	M	M		

APPENDIX VII

M.S. in Computer Networks

I = PLO is Introduced D = PLO is Developed M = PLO is Mastered	1	2	3	4	5
CS 3240 Data Structures and Algorithms	I		I		
STAT 3401 Introduction to Probability Theory		I	I		
CS 3560 Introduction to Systems Programming		I	I		
CS 3590 Data Communications and Networking	I		I		
CS/ENGR 4435 Computer Architecture II	I		I		
CS 4560 Operating Systems	I		I		
CS 4590 Computer Networks	I		I		
CS 6110 Theory and Design of Compilers	D	D	D		
CS 6140 Language Design	D		D		
CS 6170 Automata and Formal Languages	D		D		
CS 6260 Computation and Complexity	M		M		
CS 6310 Advanced Software Engineering		D	D		
CS 6320 Software Engineering and Web-Based Systems		D	D		
CS 6330 Secure Software Development	D		D		
CS/ENGR 6430 Computer System Architecture	D	D			
CS/ENGR 6432 VLSI Systems Design	D	D			
CS 6520 Cryptography and Data Security	D	D			
CS 6522 Advanced WWW Software Development		D	M		
CS 6525 Network Security	D			D	D
CS 6526 Security in Wireless and Mobile Computing	D			D	D
CS 6560 Operating Systems Design	M		D		M

CS 6570 Distributed Computation	D		D		
CS 6575 Parallel Programming	D		D		
CS 6580 Distributed Systems	D		D		
CS 6591 Communication Networks Analysis and Design	D	M		D	
CS 6592 Network Management	D		D	D	
CS 6594 Broadband and Multimedia Networks	D			D	D
CS 6596 Wireless and Mobile Network Architecture	D		D	D	
CS 6660 Database Systems	D	D			
CS 6665 Database Systems Administration	D	D			
CS 6715 Data Compression	D		D	D	
CS/ENGR 6752 Digital Signal Processing	D		D		
CS 6810 Artificial Intelligence	D		D		
CS 6820 Machine Learning	D		D		
CS 6825 Computer Vision	D		D		
CS 6835 Statistical Pattern Recognition	D		D		
CS 6865 Topics in Graphical User Interface Programming		D	D		
CS 6870 Computer Simulation	D		D		
CS 6899 Project			M	M	M

Appendix J: Requests for Tenure Track Faculty Positions

CALIFORNIA STATE UNIVERSITY
EAST BAY

Department of Mathematics and Computer Science
25800 Carlos Bee Boulevard, Hayward, California 94542-3083
Telephone: 510-885-3441

August 12, 2013

TO: James Houpis, Provost, and Vice President, Academic Affairs

VIA: Michael Leung, Dean, College of Science

FROM: Matt Johnson, Chair, Department of Math and Computer Science

RE: Recruitment Plan

Attached please find our Department's Recruitment Plan for our Tenure Track Search in Computer Science for 2013-14.

Matt Johnson, Chair, Dept. of Math and Computer Science

CALIFORNIA STATE UNIVERSITY, EAST BAY

Office of Academic Affairs

Faculty Recruitment Plan for Tenure Track of Full Time Annual Lecturers 2013-2014

Electronic version located at: http://www20.csueastbay.edu/oaa/files/policy_files/frptt.pdf

GOALS:

□ To engage in a proactive recruitment process, which includes advertising as widely as possible to attract a diverse pool of qualified applicants.

□ To identify a final set of candidates with background, experience and expertise to best serve the needs of our students, curriculum, department and relationships within our regional community.

Date of Submission:

Name of Department: Department of Mathematics and Computer Science

Search Committee: Kevin Brown (chair), Levent Ertaul, Eddie Reiter, David Yang

Position:

□ Full Time Annual Lecturer
X Assistant Professor
□ Associate Professor
□ Full Professor
□ Department Chair

Position Number:

Position Beginning Date: Fall quarter, 2014

I. Profile of Department's Faculty/Student Composition

	Students Computer Science Fall 2011	**Faculty** Math & Computer Science Fall 2012 **Lecturer**	**Faculty** Math & Computer Science Fall 2012 **Tenured & Tenure Track**
Ethnicity			
Black	24	2	
Asian/Pacific	95	2	3
Hispanic	26	1	1
White	81	10	20
American Indian			

Multiple Ethnicity	4		
Unknown	55		
Non-resident Aliens	157		
Other		2	
Gender			
Female	117	10	9
Male	325	7	15
Total	442	17	24

II. Advertisement of the Position:

Communications of the ACM magazine (Primary Computer Science publication)
Print ad in September 2013 issue plus 90 days web ad on ACM website beginning August 15.

IEEE Computer magazine (Primary Computer Science publication)
Print ad in September 2013 issue plus 60 days web ad on IEEE website beginning September 1.

Chronicle of Higher Education
University is running group ad for all positions.

DiverseEducation (Outreach to under-represented groups)
Web ad for 60 days on DiverseJobs website beginning September 1.

SACNAS (Outreach to Hispanic and Native American applicants in the Sciences)
Web ad for 60 days on SACNAS website beginning September 1.

Association for Women in Science (Outreach to female applicants in the Sciences)
Web ad for 60 days on AWIS website beginning September 1.

Faculty for the Future (Outreach to under-represented groups in the Sciences)
Web ad for 60 days on FFTF website beginning September 1.

III. Recruiting at Meetings and Conferences:

None. There are no discipline-wide Computer Science meetings or conferences where recruiting is done.

IV. Direct Mailing to Individuals, Groups, Institutions, Organizations:

The long ad will be sent to all University of California campuses. The long ad will also be posted to the SIGCSE mailing list. SIGCSE is a special interest group in Computer Science education.

V. Networking and Personal Contacts:

The long ad will be sent to the universities from which the hiring committee members received their doctorate degrees. These consist of the University of Sussex, Columbia University, the University of Cincinnati, and the University of South Carolina.

VI. Potential Candidates in the Pipeline:

The long ad will be sent to lecturers working in the department.

VII. Position Description Qualifications: (Required, Preferred, Desirable)

The position description given in the long ad lists the following qualifications:

Required:

1. Possession of a Ph.D. in Computer Science by Fall 2014.

Preferred:

2. Expertise in theoretical Computer Science.
3. Ability to teach a wide range of graduate and undergraduate classes, especially the introductory programming sequence.
4. Have a demonstrated ability to teach, advise, and mentor students from diverse educational and cultural background.
5. Have a record of scholarly activity.
6. Ability to support offerings for grad students (teaching, guiding thesis, developing exams.)
7. Willingness to participate in departmental activities (curriculum development, assessment, outreach.)

VIII. Criteria for Screening, Selection and Priority Rating: (Prepare a screening form based on the qualifications and duties in position announcement.) Attach Rating Form. Differential criteria values should be noted.

During the execution of the recruitment plan, all candidates will be evaluated on the basis of the following criteria. Please note that i) the ordering of the criteria below does not reflect their order of importance, and ii) different criteria may be applied in different stages of the recruitment process as and when deemed relevant.

1. Possession of a Computer Science Ph.D.
2. Quality and quantity of past and potential teaching experience, particularly in courses similar to those needed by the department.
3. Quality and quantity of peer-reviewed scholarship both past and potential.
4. Performance in presentation during campus interview as judged by audience (which is usually comprised of faculty.)
5. Quality and adequacy of application materials (using rubric which follows)
6. Interpersonal and communication skills
7. Demonstrated ability to teach, advise, work with, and conduct research with students from diverse educational and cultural backgrounds.
8. Overlap between the applicant's knowledge base and department needs.
9. Authorization to work in the United States by Fall 2014 (anticipated start date.)
10. Potential for internal university service contributions.
11. Likelihood of achieving tenure in the department.
12. Desirability as a colleague.
13. Ability to serve as a role model and mentor for students and as an ambassador of the department, college, and university in the external community.

Rubric for Assessing Application Materials

Evaluation	Criteria
Outstanding	Applicant's discipline is Computer Science High probability of Ph.D. in hand by Fall 2014 Research area is theoretical Computer Science High-quality publications in peer-reviewed conferences or journals Recent presentations at professional conferences Relevant and extensive teaching experience Was instructor or TA Taught Computer Science Taught students of diverse backgrounds Compelling teaching philosophy Supportive letters of recommendation Professional letter of inquiry Specific interest in Department, CSUEB or California
Fair	Applicant's discipline is Computer Science High probability of Ph.D. in hand by Fall 2014 Research area other than theoretical Computer Science Some publications in conferences or journals Some presentations at professional conferences

	Some teaching experience Adequate teaching philosophy Adequate letters of recommendation Adequate letter of inquiry Interest in California
Poor	Applicant's discipline is not Computer Science Low probability of Ph.D. in hand by Fall 2014 Research area other than theoretical Computer Science No publications in conferences or journals No presentations at professional conferences No teaching experience Remaining application materials not submitted or of low quality

IX. Telephone Interview Questions:

After an initial screening, telephone interviews will be completed.

Telephone Interview Evaluation Form

Candidate Name:
Date:
Degree, Institution, Completion Date:

	Question	Topic	Rating
1.	Do you have your Ph.D.? If not, how far along is your work and when do you expect your degree to be granted?	Fitness	1 2 3 4 5 Poor Average Excellent
2.	Please describe your main area of interest within Computer Science.	Fitness	1 2 3 4 5 Poor Average Excellent
3.	Our department offers Bachelor's and Master's degrees only. How does that fit with your teaching interests and research plans?	Fitness	1 2 3 4 5 Poor Average Excellent
4.	Have you taught before? If so, where, when, and which courses?	Teaching	1 2 3 4 5 Poor Average Excellent
5.	How would you describe your teaching style?	Teaching	1 2 3 4 5 Poor Average Excellent
6.	CSUEB students come from diverse educational and cultural backgrounds. Do you have any experience teaching such a population? How would you tailor your teaching approach to this population?	Teaching	1 2 3 4 5 Poor Average Excellent
7.	What courses that we now offer would you like to teach and be most comfortable teaching? In particular, please address Computer Science theory	Teaching	1 2 3 4 5 Poor Average Excellent

	or introductory programming courses.		
8.	Are there courses that are not part of our current curriculum that you might like to develop?	Teaching	1 2 3 4 5 Poor Average Excellent
9.	Please describe any research you have completed. Was this research published or presented at a conference?	Research	1 2 3 4 5 Poor Average Excellent
10.	Please describe any ongoing research projects you have and any plans for future research.	Research	1 2 3 4 5 Poor Average Excellent
11.	Have you written or applied for any grants? If so, were you successful? Do you have plans to apply for grants in the future?	Research	1 2 3 4 5 Poor Average Excellent
12.	Do you have any questions about CSUEB or our position?		
13.	We may want to contact the people you have listed as references as well as people who you have not listed. Is there anyone who you would rather we not contact?		

Notes:

X. Reference Checks: Attach questions with rating protocol.

The long ad requests three references as part of the application packet. After an initial screening and telephone interviews have been completed, reference checks will be completed.

Reference Check Evaluation Form

Reference Name:
Date:
Candidate Name:
Degree, Institution, Completion Date:

	Question	Topic	Rating
1.	How long have you known the candidate? In what capacity?		1 2 3 4 5 Poor Average Excellent
2.	Please describe your knowledge of the candidate's ability to effectively develop and teach a Computer Science curriculum at the university level.	Teaching	1 2 3 4 5 Poor Average Excellent
3.	What would students say about this candidate's accessibility and willingness to provide help and guidance? To the best of your knowledge, what do students think of the candidate?	Advising	1 2 3 4 5 Poor Average Excellent
4.	How would you describe the candidate's	Teaching	1 2 3 4 5

	experience working in a multicultural environment?		Poor Average Excellent
5.	How would you characterize the candidate's commitment to the faculty? To the best of your knowledge, what do faculty think of the candidate?		1 2 3 4 5 Poor Average Excellent
6.	What research and/or grants are you aware of with which they have been most recently involved?	Research	1 2 3 4 5 Poor Average Excellent
7.	How would you compare the performance of <candidate name> with that of others who have held the same job?		1 2 3 4 5 Poor Average Excellent
8.	Please describe <candidate name>'s work ethic, in terms of attitude, dependability and trustworthiness.		1 2 3 4 5 Poor Average Excellent
9.	Does the candidate work well with other faculty and administration? Please give an example if possible.		1 2 3 4 5 Poor Average Excellent
10.	Are there any limitations or factors that might interfere with this candidate's ability to be an effective faculty member?		1 2 3 4 5 Poor Average Excellent
11.	Is there anyone else you would recommend we talk to regarding this candidate's qualifications?		
12.	Do you have any other comments you wish to offer?		

Notes:

TIME TABLE FOR POSITION RECRUITMENT

ACTION	TARGET DATE
I. Submission of position announcement	6/7/2013
II. Meet with DELO	6/13/2013
III. Prepare Recruitment Plan	8/15/2013
IV. Engage in proactive recruitment of candidates	8/15/2013
V. Application review and screening. (Identify Candidates for telephone interviews)	10/15/2013
VI. Conduct telephone interviews	11/15/2013
VII. Select candidates for on-site interviews and proposed date for visit	12/1/2013
VIII. Complete reference checks	12/15/2013

IX. Conduct on-site interviews	1/15/2014-2/21/2014
X. Recommendation to Chair	2/28/2014
XI. Recommendation to Dean	3/3/2014
XII. Decision on final candidate	3/10/2014

Note: Goal is to complete by end of Winter quarter.

cc: Department Chair
College Dean
Diversity and Equity Liaison Officer

CALIFORNIA STATE UNIVERSITY
EAST BAY

Mathematics & Computer Science

25800 Carlos Bee Boulevard, CA 94542-3083, Mathematics & Computer Science
Telephone: (510) 885-3414

Memorandum

Date:	July 15, 2014
To:	James Houpis, Provost and Vice-President, Academic Affairs
Via:	Michael Leung, Dean, College of Science
Via	Matt Johnson, Chair, Mathematics & Computer Sciences Department
From:	CS Faculty Recruitment Committee: Lynne Grewe (chair), Levent Ertaul, Leann Christianson
Subject:	Faculty Position Statements (3) and Faculty Recruitment Plan

Please find attached three Faculty Position Statements and the Faculty Recruitment Plan. We have the following 3 versions of the Faculty Position Statement:

- Full Position Statement (electronic name CS_PositionAnnouncment_2014_15)
- Short Position Statement (electronic name CS_SHORT_PositionAnnouncement_2014_15)
- Very Short Position Statement (electronic name CS_VERYSHORT_PositionAnnouncement_2014_15)

The reasoning behind the 2 shorter versions of the position statement is to save money on advertising and to utilize either one depending on costs over the third longer statement.

If you have any questions, please do not hesitate to contact me. Note that Leann Christianson was able to meet with the diversity representative of the university and all suggestions made to her are incorporated in these documents.

Thank you,

Lynne Grewe
Chair of the CS Faculty Recruitment Committee for 2014-2015.

CALIFORNIA STATE UNIVERSITY, EAST BAY

Office of Academic Affairs

Faculty Recruitment Plan for Tenure Track of Full Time Annual Lecturers 2014-2015

Electronic version located at: *****

GOALS:

To engage in a proactive recruitment process, which includes advertising as widely as possible to attract a diverse pool of qualified applicants.

To identify a final set of candidates with background, experience and expertise to best serve the needs of our students, curriculum, department and relationships within our regional community.

Date of Submission: July, 2014

Name of Department: Department of Mathematics and Computer Science

Search Committee: Lynne Grewe (chair) , Kevin Brown, Levent Ertaul, Leann Christianson

Position:

□ Full Time Annual Lecturer

X Assistant Professor

□ Associate Professor

□ Full Professor

□ Department Chair

Position Number: *******

Position Beginning Date: Fall quarter, 2015

I. Profile of Department's Faculty/Student Composition

	Students Computer Science Fall 2013	**Faculty** Math & Computer Science Fall 2013 **Lecturer**	**Faculty** Math & Computer Science Fall 2013 **Tenured & Tenure Track**
Ethnicity			
Black	28		
Asian/Pacific	315	3	3
Hispanic	53	2	1
White	110	13	17
5American	3		

Indian			
Multiple Ethnicity	17		
Unknown	2		
Non-resident Aliens	233		
Other	34	2	
Gender			
Female	139	11	8
Male	483	9	13
Total	622	20	21

II. Advertisement of the Position:

Communications of the Association for Computing Machinery (ACM) magazine (A primary Computer Science publication)

Print ad in September 2014 issue plus 90 days web ad on ACM website beginning August 15.

Cost

Print ad in September issue plus 90 days web ad on ACM website.

ACM: http://jobs.acm.org/r/jobs/post/index.cfm?site_id=1603

Single 30-Day Job Posting Web Only (500 characters max) 30 days		*$495.00*
Single 30-Day Job Posting Web Only (1,500 characters max)	*30 days*	*$995.00*
60-Day Job Posting Web Only (3,000 characters max)	*60 days*	*$1,095.00*
Communications of the ACM Print Publication + 90 Days Online	*90 days*	*$2,495.00*

Also flexible pricing options available

30 or 60 day web posting?

Communications of the ACM- Print Publication + 30 Day Online Posting	***30 days***	***$325.00 + variable***

This cost is for the first 6-lines of text (based on a 40-character line) and $32.50 for each additional line.

deadline for Sept.print is July 21

IEEE Computer magazine (A Primary Computer Science publication)

Print ad in September 2014 issue plus 60 days web ad on IEEE website beginning September 1.
Cost
IEEE Computer magazine print ad in September issue plus 60 days web ad on IEEE site.
IEEE: http://careers.computer.org/rates.cfm
I'm assuming IEEE Computer Society as opposed to whole IEEE. Correct?
Single 30 day web posting $399 ($699 for 60 days)
Print ad in Computer magazine plus 30 day web ad $400/column inch, $600 minimum
deadline for Sept.print is Aug. 15

Chronicle of Higher Education, Hispanic Outlook in Higher Education, Inside Higher Education, and the National Registry of Diverse and Strategic Faculty
The University running group ad for all positions (need confirmation)

DiverseEducation (Outreach to under-represented groups)
Web ad for 30 days on DiverseJobs website beginning September 1.
DiverseEducation: http://diversejobs.net/
(Very general but looks reputable)

Single Job Posting	*Unlimited*	*30 Days*	*$275*
Single Job Posting	*Unlimited*	*60 Days*	*$450*

SACNAS (Outreach to Hispanic and Native American applicants in the Sciences)
Web ad for 30 or 60 days on SACNAS website beginning September 1.
SACNAS: http://sacnas.org/institutions/advertising/web-ads
Oriented towards Hispanic and Native American clients in the Sciences

30 days	*500 words text only with links for job vacancies and logo*	*$300*
60 days	*500 words text only with links for job vacancies and logo*	*$500*

Association for Women in Science (Outreach to female applicants in the Sciences)
Web ad for 30 or 60 days on AWIS website beginning September 1.
Association for Women in Science: (maybe too general?)
http://awis.associationcareernetwork.com/Common/HomePage.aspx

Single 30 day web only	*$300*
Single 60 day web only	*$575*

Faculty for the Future (Outreach to under-represented groups in the Sciences)
Web ad for 60 days on FFTF website beginning September 1.
Faculty for the Future: http://www.engr.psu.edu/fff/misc/services_positions.asp

$20 million grant from GE to increase minority/women participation in engineering and sciences Apparently no cost, can't hurt. Linked off CRA-W(omen) site.

III. Recruiting at Meetings and Conferences:

Unlike some other disciplines such as Mathematics, there are no meetings or conferences dedicated to recruitment of Computer Science professionals.

A hiring committee member has received a scholarship to attend the Grace Hopper Celebration of Women in Computing, a conference for computing professionals, educators, and students to be held October 8-11 in Phoenix AZ. Informal recruiting will be done at this event.

IV. Direct Mailing to Individuals, Groups, Institutions, Organizations:
The long ad will be sent to all University of California campuses. The long ad will also be posted to the ACM Special Interest Group for Computer Science Education (SIGCSE) mailing list.

A long ad with cover letter will be sent to those Hispanic Serving Institutions (HSIs) and Historically Black Colleges and Universities (HBCUs) that offer PhD programs in Computer Science. A few are listed below:

Howard University
Bowie State
North Carolina A&T
Tennessee State University
University of New Mexico
University of Texas, El Paso

V. Networking and Personal Contacts:
The long ad will be sent to the universities from which the hiring committee members and department faculty received their doctorate degrees. These consist of the Purdue, University of Sussex, Columbia University, the University of Cincinnati, University of South Carolina, University of California - San Diego and Berkeley, College of William and Mary, Georgia Institute of Technology, and Northeastern.

VI. Potential Candidates in the Pipeline:
The long ad will be sent to lecturers working in the department who have the required terminal degree (PhD).

VII. Position Description Qualifications: (Required, Preferred, Desirable)
The position description given in the long ad lists the following qualifications:

Required:

1. Possession of a Ph.D. in Computer Science by Fall 2015.

Preferred:

2. Expertise in emerging area of Computer Science preference to emerging areas of computer science such as big data, cloud computing, mobile app development, data mining) starting Fall 2015.
3. Ability to teach a wide range of graduate and undergraduate classes, especially the introductory programming sequence.
4. Have a demonstrated ability to teach, advise, and mentor students from diverse educational and cultural background.
5. Have a record of scholarly activity.
6. Ability to support offerings for grad students (teaching, guiding thesis, developing exams.)
7. Willingness to participate in departmental activities (curriculum development, assessment, outreach.)

VIII. Criteria for Screening, Selection and Priority Rating: (Prepare a screening form based on the qualifications and duties in position announcement.) Attach Rating Form. Differential criteria values should be noted.

During the execution of the recruitment plan, all candidates will be evaluated on the basis of the following criteria. Please note that i) the ordering of the criteria below does not reflect their order of importance, and ii) different criteria may be applied in different stages of the recruitment process as and when deemed relevant.

1. Possession of a Computer Science Ph.D.
2. Quality and quantity of past and potential teaching experience, particularly in courses similar to those needed by the department.
3. Quality and quantity of peer-reviewed scholarship both past and potential.
4. Performance in presentation during campus interview as judged by audience (which is usually comprised of faculty.)
5. Quality and adequacy of application materials (using rubric which follows)
6. Interpersonal and communication skills
7. Demonstrated ability to teach, advise, work with, and conduct research with students from diverse educational and cultural backgrounds.
8. Overlap between the applicant's knowledge base and department needs.
9. Authorization to work in the United States by Fall 2015 (anticipated start date.)
10. Potential for internal university service contributions.
11. Likelihood of achieving tenure in the department.
12. Desirability as a colleague.

13. Ability to serve as a role model and mentor for students and as an ambassador of the department, college, and university in the external community.

Rubric for Assessing Application Materials

Evaluation	Criteria Score of 1 through 5 5 - Outstanding 4 - Good Average 3 - Average 2 - Poor 1 - Inadequate
	Applicant's discipline is Computer Science High probability of Ph.D. in hand by Fall 2015 Research area is in an emerging area of Computer Science High-quality publications in peer-reviewed conferences or journals Recent presentations at professional conferences Relevant and extensive teaching experience Was instructor or TA Taught Computer Science Interacted with diverse communities Compelling teaching philosophy Supportive letters of recommendation Professional letter of inquiry Appears to be a team player Specific interest in Department, CSUEB or California

IX. Reference Checks: Attach questions with rating protocol.
The long ad requests three references as part of the application packet. After an initial screening and telephone interviews have been completed, reference checks will be completed.

Reference Check Evaluation Form

Reference Name:
Date:
Candidate Name:
Degree, Institution, Completion Date:

	Question	Topic	Rating
1.	How long have you known the candidate? In what capacity?		1 2 3 4 5 Poor Average Excellent

2.	Please describe your knowledge of the candidate's ability to effectively develop and teach a Computer Science curriculum at the university level.	Teaching	1 2 3 4 5 Poor Average Excellent
3.	What would students say about this candidate's accessibility and willingness to provide help and guidance? To the best of your knowledge, what do students think of the candidate?	Advising	1 2 3 4 5 Poor Average Excellent
4.	How would you describe the candidate's experience working in a multicultural environment?	Teaching	1 2 3 4 5 Poor Average Excellent
5.	How would you characterize the candidate's commitment to the faculty? To the best of your knowledge, what do faculty think of the candidate?		1 2 3 4 5 Poor Average Excellent
6.	What research and/or grants are you aware of with which they have been most recently involved?	Research	1 2 3 4 5 Poor Average Excellent
7.	How would you compare the performance of <candidate name> with that of others who have held the same job?		1 2 3 4 5 Poor Average Excellent
8.	Please describe <candidate name>'s work ethic, in terms of attitude, dependability and trustworthiness.		1 2 3 4 5 Poor Average Excellent
9.	Does the candidate work well with other faculty and administration? Please give an example if possible.		1 2 3 4 5 Poor Average Excellent
10.	Are there any limitations or factors that might interfere with this candidate's ability to be an effective faculty member?		1 2 3 4 5 Poor Average Excellent
11.	Is there anyone else you would recommend we talk to regarding this candidate's		

	qualifications?		
12.	Do you have any other comments you wish to offer?		

Notes:

Will add up scores and compute the average for each candidate

X. Telephone Interview Questions:

After an initial screening, telephone interviews will be completed.

Telephone Interview Evaluation Form

Candidate Name:

Date:

Degree, Institution, Completion Date:

	Question	Topic	Rating
1.	Do you have your Ph.D.? If not, how far along is your work and when do you expect your degree to be granted?	Fitness	1 2 3 4 5 Poor Average Excellent RUBRIC

Point	Reason
1	2+ years from graduation
2	2 years from graduation
3	1.5 years from graduation
4	1 year from graduation
5	<1 year or have degree

<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Please describe your main area of interest within Computer Science.</td><td>Fitness</td><td>1 2 3 4 5
Poor Average Excellent

RUBRIC
<table><tr><td>Point</td><td>Reason</td></tr><tr><td>1-2</td><td>Non-emergent areas of CS</td></tr><tr><td>3</td><td>Utilize emergent technologies</td></tr><tr><td>4-5</td><td>Strong component / focus on Emergent Technologies</td></tr></table></td></tr>
<tr><td>3.</td><td>Our department offers Bachelor's and Master's degrees only. How does that fit with your teaching interests and research plans?</td><td>Fitness</td><td>1 2 3 4 5
Poor Average Excellent

RUBRIC
<table><tr><td>Point</td><td>Reason</td></tr><tr><td>1</td><td>Expresses dissatisfaction</td></tr><tr><td>2</td><td>Not able to answer clearly</td></tr><tr><td>3</td><td>Expresses interest</td></tr><tr><td>4</td><td>Has experience working with B.S. and M.S students</td></tr><tr><td>5</td><td>Expresses interest and Has experience working with B.S. and M.S</td></tr></table></td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td><table><tr><td></td><td>students</td></tr></table></td></tr>
<tr><td>4.</td><td>Have you taught before? If so, where, when, and which courses?</td><td>Teaching</td><td>1 2 3 4 5
Poor Average Excellent

RUBRIC<table><tr><td>Point</td><td>Reason</td></tr><tr><td>1</td><td>No experience and expresses no interest in teaching</td></tr><tr><td>2-3</td><td>No experience</td></tr><tr><td>4</td><td>Little experience - minimum taught 1 -2 courses</td></tr><tr><td>5</td><td>More than 2 courses taught in past</td></tr></table></td></tr>
<tr><td>5.</td><td>How would you describe your teaching style?</td><td>Teaching</td><td>1 2 3 4 5
Poor Average Excellent

RUBRIC<table><tr><td>Point</td><td>Reason</td></tr><tr><td>1</td><td>Expresses does not want to teach</td></tr><tr><td>2</td><td>Not able to answer clearly</td></tr><tr><td>3</td><td>Explains general approach but, little examples</td></tr><tr><td>4</td><td>Goes into greater detail</td></tr><tr><td>5</td><td>Goes into</td></tr></table></td></tr>
</table>

			detail and has experience with one of: outcomes based learning, project-based learning, industry liaison in classroom or other of interest pedagogical approaches
6.	CSUEB students come from diverse educational and cultural backgrounds. Do you have any experience teaching such a population? How would you tailor your teaching approach to this population?	Teaching	1 2 3 4 5 Poor Average Excellent RUBRIC Point: Reason 1: Expresses does not want to teach 2: Not able to answer clearly 3: No experience but, expresses some general ideas. 4: Either has experience or expresses some specific ideas (learning w/ different modalities, group learning, etc). 5: Experience +expresses some specific ideas (learning w/ different modalities, group learning, etc).

<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>7.</td><td>What courses that we now offer would you like to teach and be most comfortable teaching? In particular, please address Computer Science application oriented courses and introductory programming courses.</td><td>Teaching</td><td>1 2 3 4 5
Poor Average Excellent

RUBRIC
<table><tr><td>Point</td><td>Reason</td></tr><tr><td>1</td><td>Expresses does not want to teach</td></tr><tr><td>2</td><td>Not able to answer clearly</td></tr><tr><td>3</td><td>Expresses some general ideas and/or metions some specific classes we offer</td></tr><tr><td>4</td><td>Discusses some of our more application oriented classes</td></tr><tr><td>5</td><td>Experience +Discusses some of our more application oriented classes</td></tr></table></td></tr>
<tr><td>8.</td><td>Are there courses that are not part of our current curriculum that you might like to develop, especially in emerging areas of Computer Science?</td><td>Teaching</td><td>1 2 3 4 5
Poor Average Excellent

RUBRIC
<table><tr><td>Point</td><td>Reason</td></tr><tr><td>1</td><td>Expresses does not want to teach</td></tr><tr><td>2</td><td>Not able to answer clearly</td></tr><tr><td>3</td><td>Expresses</td></tr></table></td></tr>
</table>

			<table><tr><td></td><td>some general ideas</td></tr><tr><td>4</td><td>Discusses concretely some emerging area courses</td></tr><tr><td>5</td><td>Experience w/ either teaching in proposed area or discusses incorporation of research + Discusses concretely some emerging area course</td></tr></table>
9.	Please describe any research you have completed. Was this research published or presented at a conference?	Research	1 2 3 4 5 Poor Average Excellent RUBRIC <table><tr><td>Point</td><td>Reason</td></tr><tr><td>1</td><td>Expresses has done little research. No publications</td></tr><tr><td>2</td><td>Not able to answer clearly. Only 1 or minor publications</td></tr><tr><td>3</td><td>Is able to explain clearly research performed and has 1 major publication</td></tr><tr><td>4</td><td>Able to express with enthusiasm research performed and has 1 or more major</td></tr></table>

			<table><tr><td></td><td>publications</td></tr><tr><td>5</td><td>Able to express with enthusiasm research performed and has 2 or more major publications and possible experience with funded research</td></tr></table>
10.	Please describe any ongoing research projects you have and any plans for future research.	Research	1 2 3 4 5 Poor Average Excellent RUBRIC <table><tr><td>Point</td><td>Reason</td></tr><tr><td>1</td><td>Expresses little interest</td></tr><tr><td>2</td><td>Not able to answer clearly. Vague ideas of extension</td></tr><tr><td>3</td><td>Is able to explain clearly future work</td></tr><tr><td>4</td><td>Able to express with enthusiasm future research, and either planned publication or funding to continue at CSUEB</td></tr><tr><td>5</td><td>Able to express with enthusiasm future research, and either planned publication AND funding</td></tr></table>

<table>
<tr><td></td><td></td><td></td><td><table><tr><td></td><td>to continue at CSUEB</td></tr></table></td></tr>
<tr><td>11.</td><td>Have you written or applied for any grants? If so, were you successful? Do you have plans to apply for grants in the future?</td><td>Research</td><td>1 2 3 4 5
Poor Average Excellent

RUBRIC<table><tr><td>Point</td><td>Reason</td></tr><tr><td>1</td><td>Expresses little interest</td></tr><tr><td>2</td><td>Not able to answer clearly.</td></tr><tr><td>3</td><td>Has some general plans to apply for funding.</td></tr><tr><td>4</td><td>Has received funding (or lab has) and has some specific plans to apply</td></tr><tr><td>5</td><td>Has applied and received funding. Has Plans with specific organizations to continue research.</td></tr></table></td></tr>
<tr><td>12.</td><td>Do you have any questions about CSUEB or our position?</td><td></td><td></td></tr>
<tr><td>13.</td><td>We may want to contact the people you have listed as references as well as people who you have not listed. Is there anyone who you would rather we not contact?</td><td></td><td></td></tr>
</table>

Notes:

Post telephone interview evaluation

Rank 1 through 5
5 outstanding
4 good
3 average
2 fair
1 poor

Does the candidate appear to be a team player?
Is the candidate a good fit for the department?

XI. On-Campus Interview Questions:
The following serves as the rubric and questions for on-campus interview. Follow-on and interviewee driven questions are also possible.

On-Campus Interview Evaluation Form
Candidate Name:
Date:
Reviewer:

General Rubric for Questions

Point Value	**Reasoning**
1	Unable to answer question, Has no experience related to topic
2	Vague answer. Only little experience.
3	Able to answer question but, without great detail. Moderate Experience. Answer often match Job Position Qualifications.
4	Answers question fully, gives concrete examples. Fair amount of experience. Answers mostly match Job Position Qualifications.

5	Answers question fully, gives concrete and detailed examples. Shows level of enthusiasm. Good level of experience. Answers mostly match Job Position Qualifications.

	Question	Topic	Rating
1.	What made you want to become a Computer Science professor?	Fitness/ Teaching	1 2 3 4 5 Poor Average Excellent
2.	What is unique about your teaching style? How do you encourage your students to succeed?	Teaching	1 2 3 4 5 Poor Average Excellent
3.	How do you feel about online teaching? What positives or negatives do you see in using this method?	Teaching	1 2 3 4 5 Poor Average Excellent
4.	How have you dealt (or would you deal) with cheating in in-person or online classes?	Teaching	1 2 3 4 5 Poor Average Excellent
5.	Where do you think CS departments should be going in the next 10 years? What changes to the standard curriculum would you like to see?	Research/ Teaching	1 2 3 4 5 Poor Average Excellent
6.	Tell us how your research has influenced your teaching. In what ways have you been able to or could you bring the insights of your research to courses at the undergraduate level?	Research	1 2 3 4 5 Poor Average Excellent
7.	How do you define diversity in the CS student population? Can you suggest ways to improve enrollment and success among underrepresented groups?	Teaching	1 2 3 4 5 Poor Average Excellent

8.	What 3 characteristics that you possess do you think best qualify you for this position?	Fitness	1 2 3 4 5 Poor Average Excellent
9.	Why are you interested in this particular position at CSUEB?	Fitness	1 2 3 4 5 Poor Average Excellent
10.	What do you think is important in an introductory CS course? Is the language used important? What is important?	Teaching	1 2 3 4 5 Poor Average Excellent
11.	How do you feel theory fits into the BS and MS programs in CS? What is/is not important about theory?	Fitness/ Teaching	1 2 3 4 5 Poor Average Excellent
12.	What are the top 3 things you are looking for in an academic job?	Fitness	1 2 3 4 5 Poor Average Excellent
13.	Where do you see yourself in ten years?	Fitness	1 2 3 4 5 Poor Average Excellent
14.	What part of university administration interests you? How do you feel you can contribute to the Department and the University?	Fitness	1 2 3 4 5 Poor Average Excellent
15.	What teaching methods do you use? (PPT, chalk lecture, small groups, etc). Which methods work best for you?	Teaching	1 2 3 4 5 Poor Average Excellent
16.	What have you found helpful in improving your teaching, and how could the university support your teaching?	Teaching	1 2 3 4 5 Poor Average Excellent
17.	What has helped you in your research? How would you like CSUEB to support	Research	1 2 3 4 5 Poor Average Excellent

	your research program?		
18.	The standard teaching load at CSUEB is 3 courses/quarter. Do you think you can handle this load and still find time to do research?	Research	1 2 3 4 5 Poor Average Excellent
19.	Do you have any questions about CSUEB or our position?	Interest	1 2 3 4 5 Poor Average Excellent
20.	Do you have any additional information that you would like to share?	Fitness	1 2 3 4 5 Poor Average Excellent

Notes:

XII. Interview Summary Report

The following serves as a general format for the Interview Summary Report.

Name	Telephone Interview Score	Telephone Interview Summary/Highlights	On-Campus Interview Score	On-Campus Interview Summary/Highlights

TIME TABLE FOR POSITION RECRUITMENT

ACTION	TARGET DATE
I. Submission of position announcement	7/1/2014
II. Meet with DELO	7/14/2014
III. Prepare Recruitment Plan	7/15/2014
IV. Engage in proactive recruitment of candidates	8/15/2014
V. Application review and screening. (Identify Candidates for telephone interviews)	11/1/2014

VI. Conduct telephone interviews	11/15/2014
VII. Select candidates for on-site interviews and proposed date for visit	12/1/2014
VIII. Complete reference checks	12/15/2014
IX. Conduct on-site interviews	1/15/2015-2/21/2015
X. Recommendation to Chair	2/28/2015
XI. Recommendation to Dean	3/3/2015
XII. Decision on final candidate	3/10/2015

Note: Goal is to complete by end of Winter quarter.

cc: Department Chair
College Dean
Diversity and Equity Liaison Officer

MEMO

DATE: 11/10/2015

TO: Carolyn Nelson, Provost, Academic Affairs

VIA: Michael Leung, Dean, College of Science

VIA: Matt Johnson, Chair, Department of Computer Science

FROM:: CS hiring committee, 2015 - Lynne Grewe(chair), Leann Christianson (diversity rep), Levent Ertaul

SUBJECT: CS Faculty Search for OAA Position No. OAA Position No 15-16 CS-DATA/CLOUD/CORE-TT: Faculty Recruitment Plan

Please find attached the Faculty Recruitment Plan that we had submitted last June to the acting department head and thought had been approved by the Diversity Office after meeting with the DELO by our Diversity Representative, Leann Christianson. The committee was surprised to learn yesterday that somewhere along the process something was not passed. We obviously are responding immediately by submitting once again the document we submitted in June and asking for its approval by the provost. We would appreciate expediency in processing this as we had thought it was approved.

Thank you,

Lynne Grewe
Chair faculty recruitment committee
Professor, Computer Science,
CSUEB

CALIFORNIA STATE UNIVERSITY, EAST BAY

Office of Academic Affairs

Faculty Recruitment Plan for Tenure Track of Full Time Annual Lecturers 2015-2016

Electronic version located at: *****

GOALS:

To engage in a proactive recruitment process, which includes advertising as widely as possible to attract a diverse pool of qualified applicants.

To identify a final set of candidates with background, experience and expertise to best serve the needs of our students, curriculum, department and relationships within our regional community.

Date of Submission: May, 2015

Name of Department: Department of Mathematics and Computer Science

Search Committee: Lynne Grewe (chair) , Levent Ertaul, Leann Christianson

Position: TWO positions

□ Full Time Annual Lecturer

X Assistant Professor

□ Associate Professor

□ Full Professor

□ Department Chair

Positions Number: ******* **and** *******

Positions Beginning Date: Fall quarter, 2016

I. Profile of Department's Faculty/Student Composition

	Students Computer Science Fall 2014	**Faculty** Math & Computer Science Fall 2013 **Lecturer**	**Faculty** Math & Computer Science Fall 2013 **Tenured & Tenure Track**
Ethnicity			
Black	32		
Asian/Pacific	521	3	3
Hispanic	61	2	1
White	108	13	17
American Indian	2		
Pacific Islanders	7		

Multiple Ethnicity	21		
Unknown	40		
Gender			
Female	224	11	8
Male	600	9	13
Total	824	20	21

II. Advertisement of the Position:

Communications of the Association for Computing Machinery (ACM) magazine (A primary Computer Science publication)

Print ad in August and September 2015 ACM issues plus 90 days web ad on ACM website beginning in July

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Cost

Print ad in September issue plus 90 days web ad on ACM website.

ACM: http://jobs.acm.org/r/jobs/post/index.cfm?site_id=1603

Single 30-Day Job Posting Web Only (500 characters max) 30 days		*$495.00*
Single 30-Day Job Posting Web Only (1,500 characters max)	*30 days*	*$995.00*
60-Day Job Posting Web Only (3,000 characters max)	*60 days*	*$1,095.00*
Communications of the ACM Print Publication + 90 Days Online	*90 days*	*$2,495.00*

Also flexible pricing options available

deadline for August print is probably June 22 see http://jobs.acm.org/employer/pricing/

IEEE Computer magazine (A Primary Computer Science publication)

Print ad in August 2015 issue plus 60 days web ad on IEEE website beginning August.

Cost

IEEE Computer magazine print ad in September issue plus 60 days web ad on IEEE site.

IEEE: http://careers.computer.org/rates.cfm

Single 30 day web posting $399 ($699 for 60 days)

Print ad in Computer magazine plus 30 day web ad $400/column inch, $600 minimum

deadline for August print is July. 15

Chronicle of Higher Education, Hispanic Outlook in Higher Education, Inside Higher Education, and the National Registry of Diverse and Strategic Faculty
The University running group ad for all positions (need confirmation)

DiverseEducation (Outreach to under-represented groups)
Web ad for 30 days on DiverseJobs website beginning August
DiverseEducation: http://diversejobs.net/
(Very general but looks reputable)

Single Job Posting	*Unlimited*	*30 Days*	*$295*
Single Job Posting	*Unlimited*	*60 Days*	*$485*

SACNAS (Outreach to Hispanic and Native American applicants in the Sciences)
Web ad for 30 or 60 days on SACNAS website beginning August.
SACNAS: http://sacnas.org/institutions/advertising/web-ads
Oriented towards Hispanic and Native American clients in the Sciences

30 days	*500 words text only with links for job vacancies and logo*	*$300*
60 days	*500 words text only with links for job vacancies and logo*	*$500*

Association for Women in Science (Outreach to female applicants in the Sciences)
Web ad for 30 or 60 days on AWIS website beginning August.
Association for Women in Science: (maybe too general?)
http://awis.associationcareernetwork.com/Common/HomePage.aspx

Single 30 day web only	*$300*
Single 60 day web only	*$575*

Faculty for the Future (Outreach to under-represented groups in the Sciences)
Web ad for 60 days on FFTF website beginning September 1.
Faculty for the Future: http://www.engr.psu.edu/fff/misc/services_positions.asp
$20 million grant from GE to increase minority/women participation in engineering and sciences
Apparently no cost, can't hurt. Linked off CRA-W(omen) site.

III. Recruiting at Meetings and Conferences:

Unlike some other disciplines such as Mathematics, there are no meetings or conferences dedicated to recruitment of Computer Science professionals.

A hiring committee member has received a scholarship to attend the Grace Hopper Celebration of Women in Computing, a conference for computing professionals, educators, and students to be held October 8-11 in Phoenix AZ. Informal recruiting will be done at this event.

IV. Direct Mailing to Individuals, Groups, Institutions, Organizations:
The long ad will be sent to all University of California campuses. The long ad will also be posted to the ACM Special Interest Group for Computer Science Education (SIGCSE) mailing list.

A long ad with cover letter will be sent to those Hispanic Serving Institutions (HSIs) and Historically Black Colleges and Universities (HBCUs) that offer PhD programs in Computer Science. A few are listed below:

Howard University
Bowie State
North Carolina A&T
Tennessee State University
University of New Mexico
University of Texas, El Paso

V. Networking and Personal Contacts:
The long ad will be sent to the universities from which the hiring committee members and department faculty received their doctorate degrees. These consist of the Purdue, University of Sussex, Columbia University, the University of Cincinnati, University of South Carolina, University of California - San Diego and Berkeley, College of William and Mary, Georgia Institute of Technology, and Northeastern.

VI. Potential Candidates in the Pipeline:
The long ad will be sent to lecturers working in the department who have the required terminal degree (PhD).

VII. Position Description Qualifications: (Required, Preferred, Desirable)
The position description given in the long ad lists the following qualifications:
Required:

1. Possession of a Ph.D. in Computer Science by Fall 2016.

Preferred:

2. Ability to teach a wide range of graduate and undergraduate classes, especially the introductory programming sequence.

4. Have a demonstrated ability to teach, advise, and mentor students from diverse educational and cultural background.
5. Have a record of scholarly activity.
6. Ability to support offerings for grad students (teaching, guiding thesis, developing exams.)
7. Willingness to participate in departmental activities (curriculum development, assessment, outreach.)

VIII. Criteria for Screening, Selection and Priority Rating: (Prepare a screening form based on the qualifications and duties in position announcement.) Attach Rating Form. Differential criteria values should be noted.

During the execution of the recruitment plan, all candidates will be evaluated on the basis of the following criteria. Please note that i) the ordering of the criteria below does not reflect their order of importance, and ii) different criteria may be applied in different stages of the recruitment process as and when deemed relevant.

1. Possession of a Computer Science Ph.D.
2. Quality and quantity of past and potential teaching experience, particularly in courses similar to those needed by the department.
3. Quality and quantity of peer-reviewed scholarship both past and potential.
4. Performance in presentation during campus interview as judged by audience (which is usually comprised of faculty.)
5. Quality and adequacy of application materials (using rubric which follows)
6. Interpersonal and communication skills
7. Demonstrated ability to teach, advise, work with, and conduct research with students from diverse educational and cultural backgrounds.
8. Overlap between the applicant's knowledge base and department needs.
9. Authorization to work in the United States by Fall 2016 (anticipated start date.)
10. Potential for internal university service contributions.
11. Likelihood of achieving tenure in the department.
12. Desirability as a colleague.
13. Ability to serve as a role model and mentor for students and as an ambassador of the department, college, and university in the external community.

Rubric for Assessing Application Materials

Evaluation	Criteria Score of 1 through 5 5 - Outstanding 4 - Good Average 3 - Average 2 - Poor 1 - Inadequate

	Applicant's discipline is Computer Science High probability of Ph.D. in hand by Fall 2016 Active Research High-quality publications in peer-reviewed conferences or journals Recent presentations at professional conferences Relevant and extensive teaching experience Was instructor or TA Taught Computer Science Interacted with diverse communities Compelling teaching philosophy Supportive letters of recommendation Professional letter of inquiry Appears to be a team player Specific interest in Department, CSUEB or California

IX. Reference Checks: Attach questions with rating protocol.
The long ad requests three references as part of the application packet. After an initial screening and telephone interviews have been completed, reference checks will be completed.
Reference Check Evaluation Form

Reference Name:
Date:
Candidate Name:
Degree, Institution, Completion Date:

	Question	Topic	Rating
1.	How long have you known the candidate? In what capacity?		1 2 3 4 5 Poor Average Excellent
2.	Please describe your knowledge of the candidate's ability to effectively develop and teach a Computer Science curriculum at the university level.	Teaching	1 2 3 4 5 Poor Average Excellent
3.	What would students say about this candidate's accessibility and willingness to provide help and guidance? To the best of your knowledge, what do students think of the candidate?	Advising	1 2 3 4 5 Poor Average Excellent

4.	How would you describe the candidate's experience working in a multicultural environment?	Teaching	1 2 3 4 5 Poor Average Excellent
5.	How would you characterize the candidate's commitment to the faculty? To the best of your knowledge, what do faculty think of the candidate?		1 2 3 4 5 Poor Average Excellent
6.	What research and/or grants are you aware of with which they have been most recently involved?	Research	1 2 3 4 5 Poor Average Excellent
7.	How would you compare the performance of <candidate name> with that of others who have held the same job?		1 2 3 4 5 Poor Average Excellent
8.	Please describe <candidate name>'s work ethic, in terms of attitude, dependability and trustworthiness.		1 2 3 4 5 Poor Average Excellent
9.	Does the candidate work well with other faculty and administration? Please give an example if possible.		1 2 3 4 5 Poor Average Excellent
10.	Are there any limitations or factors that might interfere with this candidate's ability to be an effective faculty member?		1 2 3 4 5 Poor Average Excellent
11.	Is there anyone else you would recommend we talk to regarding this candidate's qualifications?		
12.	Do you have any other comments you wish to offer?		

Notes:

Will add up scores and compute the average for each candidate

X. Telephone Interview Questions:

After an initial screening, telephone interviews will be completed.

Telephone Interview Evaluation Form
Candidate Name:
Date:
Degree, Institution, Completion Date:

<table>
<tr><th></th><th>Question</th><th>Topic</th><th>Rating</th></tr>
<tr><td>1.</td><td>Do you have your Ph.D.? If not, how far along is your work and when do you expect your degree to be granted?</td><td>Fitness</td><td>1 2 3 4 5
Poor Average Excellent

RUBRIC
<table><tr><th>Point</th><th>Reason</th></tr><tr><td>1</td><td>2+ years from graduation</td></tr><tr><td>2</td><td>2 years from graduation</td></tr><tr><td>3</td><td>1.5 years from graduation</td></tr><tr><td>4</td><td>1 year from graduation</td></tr><tr><td>5</td><td><1 year or have degree</td></tr></table></td></tr>
<tr><td>2.</td><td>Please describe your main area of interest within Computer Science.</td><td>Fitness</td><td>1 2 3 4 5
Poor Average Excellent

RUBRIC
<table><tr><th>Point</th><th>Reason</th></tr><tr><td>1-2</td><td>Secondary Area of CS</td></tr><tr><td>3</td><td>Area of CS with</td></tr><tr><td>4-5</td><td>Strong component</td></tr></table></td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td><table><tr><td></td><td>/ focus on Emergent Technologies in CS</td></tr></table></td></tr>
<tr><td>3.</td><td>Our department offers Bachelor's and Master's degrees only. How does that fit with your teaching interests and research plans?</td><td>Fitness</td><td>1 2 3 4 5
Poor Average Excellent

RUBRIC<table><tr><td>Point</td><td>Reason</td></tr><tr><td>1</td><td>Expresses dissatisfaction</td></tr><tr><td>2</td><td>Not able to answer clearly</td></tr><tr><td>3</td><td>Expresses interest</td></tr><tr><td>4</td><td>Has experience working with B.S. and M.S students</td></tr><tr><td>5</td><td>Expresses interest and Has experience working with B.S. and M.S students</td></tr></table></td></tr>
<tr><td>4.</td><td>Have you taught before? If so, where, when, and which courses?</td><td>Teaching</td><td>1 2 3 4 5
Poor Average Excellent

RUBRIC<table><tr><td>Point</td><td>Reason</td></tr><tr><td>1</td><td>No experience and expresses no interest in teaching</td></tr><tr><td>2-3</td><td>No experience</td></tr></table></td></tr>
</table>

			<table><tr><td>4</td><td>Little experience - minimum taught 1 -2 courses</td></tr><tr><td>5</td><td>More than 2 courses taught in past</td></tr></table>
5.	How would you describe your teaching style?	Teaching	1 2 3 4 5 Poor Average Excellent RUBRIC <table><tr><td>Point</td><td>Reason</td></tr><tr><td>1</td><td>Expresses does not want to teach</td></tr><tr><td>2</td><td>Not able to answer clearly</td></tr><tr><td>3</td><td>Explains general approach but, little examples</td></tr><tr><td>4</td><td>Goes into greater detail</td></tr><tr><td>5</td><td>Goes into detail and has experience with one of: outcomes based learning, project-based learning, industry liaison in classroom or other of interest pedagogical approaches</td></tr></table>
6.	CSUEB students come from diverse educational and cultural backgrounds. Do	Teaching	1 2 3 4 5 Poor Average Excellent RUBRIC

<table>
<tr>
<td></td>
<td>you have any experience teaching such a population? How would you tailor your teaching approach to this population?</td>
<td></td>
<td>
<table>
<tr><th>Point</th><th>Reason</th></tr>
<tr><td>1</td><td>Expresses does not want to teach</td></tr>
<tr><td>2</td><td>Not able to answer clearly</td></tr>
<tr><td>3</td><td>No experience but, expresses some general ideas.</td></tr>
<tr><td>4</td><td>Either has experience or expresses some specific ideas (learning w/ different modalities, group learning, etc).</td></tr>
<tr><td>5</td><td>Experience +expresses some specific ideas (learning w/ different modalities, group learning, etc).</td></tr>
</table>
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<tr>
<td>7.</td>
<td>What courses that we now offer would you like to teach and be most comfortable teaching? In particular, please address Computer Science application oriented courses and introductory programming courses.</td>
<td>Teaching</td>
<td>1 2 3 4 5
Poor Average Excellent

RUBRIC
<table>
<tr><th>Point</th><th>Reason</th></tr>
<tr><td>1</td><td>Expresses does not want to teach</td></tr>
<tr><td>2</td><td>Not able to answer clearly</td></tr>
<tr><td>3</td><td>Expresses some general ideas and/or metions some specific classes we</td></tr>
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<tr><td></td><td></td><td></td><td>
<table>
<tr><td></td><td>offer</td></tr>
<tr><td>4</td><td>Discusses some of our more application oriented classes</td></tr>
<tr><td>5</td><td>Experience +Discusses some of our more application oriented classes</td></tr>
</table>
</td></tr>
<tr><td>8.</td><td>Are there courses that are not part of our current curriculum that you might like to develop?</td><td>Teaching</td><td>1 2 3 4 5
Poor Average Excellent

RUBRIC
<table>
<tr><td>Point</td><td>Reason</td></tr>
<tr><td>1</td><td>Expresses does not want to teach</td></tr>
<tr><td>2</td><td>Not able to answer clearly</td></tr>
<tr><td>3</td><td>Expresses some general ideas</td></tr>
<tr><td>4</td><td>Discusses concretely some details</td></tr>
<tr><td>5</td><td>Experience w/ either teaching in proposed area or discusses incorporation of research</td></tr>
</table>
</td></tr>
<tr><td>9.</td><td>Please describe any research you have completed. Was this research published or presented at a conference?</td><td>Research</td><td>1 2 3 4 5
Poor Average Excellent

RUBRIC</td></tr>
</table>

			<table><tr><th>Point</th><th>Reason</th></tr><tr><td>1</td><td>Expresses has done little research. No publications</td></tr><tr><td>2</td><td>Not able to answer clearly. Only 1 or minor publications</td></tr><tr><td>3</td><td>Is able to explain clearly research performed and has 1 major publication</td></tr><tr><td>4</td><td>Able to express with enthusiasm research performed and has 1 or more major publications</td></tr><tr><td>5</td><td>Able to express with enthusiasm research performed and has 2 or more major publications and possible experience with funded research</td></tr></table>
10.	Please describe any ongoing research projects you have and any plans for future research.	Research	1 2 3 4 5 Poor Average Excellent RUBRIC <table><tr><th>Point</th><th>Reason</th></tr><tr><td>1</td><td>Expresses little interest</td></tr><tr><td>2</td><td>Not able to answer</td></tr></table>

			<table><tr><td></td><td>clearly. Vague ideas of extension</td></tr><tr><td>3</td><td>Is able to explain clearly future work</td></tr><tr><td>4</td><td>Able to express with enthusiasm future research, and either planned publication or funding to continue at CSUEB</td></tr><tr><td>5</td><td>Able to express with enthusiasm future research, and either planned publication AND funding to continue at CSUEB</td></tr></table>
11.	Have you written or applied for any grants? If so, were you successful? Do you have plans to apply for grants in the future?	Research	1 2 3 4 5 Poor Average Excellent RUBRIC <table><tr><td>Point</td><td>Reason</td></tr><tr><td>1</td><td>Expresses little interest</td></tr><tr><td>2</td><td>Not able to answer clearly.</td></tr><tr><td>3</td><td>Has some general plans to apply for funding.</td></tr><tr><td>4</td><td>Has received funding (or lab has) and has some</td></tr></table>

			specific plans to apply 5 Has applied and received funding. Has Plans with specific organizations to continue research.
12.	Do you have any questions about CSUEB or our position?		
13.	We may want to contact the people you have listed as references as well as people who you have not listed. Is there anyone who you would rather we not contact?		

Notes:

Post telephone interview evaluation

Rank 1 through 5
5 outstanding
4 good
3 average
2 fair
1 poor

Does the candidate appear to be a team player?
Is the candidate a good fit for the department?

XI. On-Campus Interview Questions:
The following serves as the rubric and questions for on-campus interview. Follow-on and interviewee driven questions are also possible.

On-Campus Interview Evaluation Form

Candidate Name:
Date:
Reviewer:

General Rubric for Questions

Point Value	Reasoning
1	Unable to answer question, Has no experience related to topic
2	Vague answer. Only little experience.
3	Able to answer question but, without great detail. Moderate Experience. Answer often match Job Position Qualifications.
4	Answers question fully, gives concrete examples. Fair amount of experience. Answers mostly match Job Position Qualifications.
5	Answers question fully, gives concrete and detailed examples. Shows level of enthusiasm. Good level of experience. Answers mostly match Job Position Qualifications.

	Question	Topic	Rating
1.	What made you want to become a Computer Science professor?	Fitness/ Teaching	1 2 3 4 5 Poor Average Excellent
2.	What is unique about your teaching style? How do you encourage your students to succeed?	Teaching	1 2 3 4 5 Poor Average Excellent
3.	How do you feel about online teaching? What positives or negatives do you see in using this method?	Teaching	1 2 3 4 5 Poor Average Excellent

4.	How have you dealt (or would you deal) with cheating in in-person or online classes?	Teaching	1 2 3 4 5 Poor Average Excellent
5.	Where do you think CS departments should be going in the next 10 years? What changes to the standard curriculum would you like to see?	Research/ Teaching	1 2 3 4 5 Poor Average Excellent
6.	Tell us how your research has influenced your teaching. In what ways have you been able to or could you bring the insights of your research to courses at the undergraduate level?	Research	1 2 3 4 5 Poor Average Excellent
7.	How do you define diversity in the CS student population? Can you suggest ways to improve enrollment and success among underrepresented groups?	Teaching	1 2 3 4 5 Poor Average Excellent
8.	What 3 characteristics that you possess do you think best qualify you for this position?	Fitness	1 2 3 4 5 Poor Average Excellent
9.	Why are you interested in this particular position at CSUEB?	Fitness	1 2 3 4 5 Poor Average Excellent
10.	What do you think is important in an introductory CS course? Is the language used important? What is important?	Teaching	1 2 3 4 5 Poor Average Excellent
11.	How do you feel theory fits into the BS and MS programs in CS? What is/is not important about theory?	Fitness/ Teaching	1 2 3 4 5 Poor Average Excellent
12.	What are the top 3 things you are looking for in an academic job?	Fitness	1 2 3 4 5 Poor Average Excellent

13.	Where do you see yourself in ten years?	Fitness	1 2 3 4 5 Poor Average Excellent
14.	What part of university administration interests you? How do you feel you can contribute to the Department and the University?	Fitness	1 2 3 4 5 Poor Average Excellent
15.	What teaching methods do you use? (PPT, chalk lecture, small groups, etc). Which methods work best for you?	Teaching	1 2 3 4 5 Poor Average Excellent
16.	What have you found helpful in improving your teaching, and how could the university support your teaching?	Teaching	1 2 3 4 5 Poor Average Excellent
17.	What has helped you in your research? How would you like CSUEB to support your research program?	Research	1 2 3 4 5 Poor Average Excellent
18.	The standard teaching load at CSUEB is 3 courses/quarter. Do you think you can handle this load and still find time to do research?	Research	1 2 3 4 5 Poor Average Excellent
19.	Do you have any questions about CSUEB or our position?	Interest	1 2 3 4 5 Poor Average Excellent
20.	Do you have any additional information that you would like to share?	Fitness	1 2 3 4 5 Poor Average Excellent

Notes:

XII. Interview Summary Report

The following serves as a general format for the Interview Summary Report.

Name	Telephone Interview Score	Telephone Interview Summary/Highlights	On-Campus Interview Score	On-Campus Interview Summary/Highlights

TIME TABLE FOR POSITION RECRUITMENT

ACTION	TARGET DATE
I. Submission of position announcement	5/30/2015
II. Meet with DELO	June 2015
III. Prepare Recruitment Plan	5/30/2015
IV. Engage in proactive recruitment of candidates	8/15/2015
V. Application review and screening. (Identify Candidates for telephone interviews)	11/1/2015
VI. Conduct telephone interviews	11/15/2015
VII. Select candidates for on-site interviews and proposed date for visit	12/1/2015
VIII. Complete reference checks	12/15/2015
IX. Conduct on-site interviews	1/15/2016-2/21/2015
X. Recommendation to Chair	2/28/2016
XI. Recommendation to Dean	3/3/2016
XII. Decision on final candidate	3/10/2016

Note: Goal is to complete by end of Winter quarter.

cc: Department Chair

College Dean

Diversity and Equity Liaison Officer

CALIFORNIA STATE UNIVERSITY
EAST BAY

Office of the Provost and Vice President
Academic Affairs
25800 Carlos Bee Boulevard, Hayward CA 94542
510.885.3711 (phone) • 510.885.2295 (fax) • www.csueastbay.edu/OAA

MEMORANDUM **DATE:** June 20, 2016

TO: Jason Singley, Dean
College of Science

FROM: Carolyn Nelson
Interim Provost and Vice President, Academic Affairs

SUBJECT: Combining Tenure-track Searches for 2016-2017

This is to acknowledge receipt of your request to combine the following tenure-track searches for 2016-2017:

1) 15-16 CS-DATA/COULD/CORE-TT
2) 17-18 CS-PROG/HUMANCOMP-TT (programming, human-computer interaction)

After review and consultation, you are authorized to combine the two searches into one, as follows: 17-18 CS-GENERAL/CORE-TT. The search will be conducted in academic year 2016-2017 for appointment in 2017-2018. A new position announcement and faculty recruitment plan will have to be formulated for the combined positions and forwarded via the Interfolio process.

If you have any questions about the process, please contact Karen Ling or Gina Traversa.

CN:jat

xc: Linda S. Dobb, Associate Provost
Matt Johnson, Chair, Computer Science
Robin Hale Yeary, Faculty Contract Specialist, Academic Affairs
Karen Ling, Faculty Immigration Advisor/Interfolio Co-Director
Gina Traversa, Special Asst. to the Provost

CALIFORNIA STATE UNIVERSITY
EAST BAY

Department of Computer Science

25800 Carlos Bee Boulevard, attn: Computer Science, Hayward, CA 94542-3083
Telephone: (510) 885-3414

Memorandum

DATE: June 10, 2016
TO: Carolyn Nelson, Interim Provost and Vice-President of Academic Affairs
VIA: Jason Singley, Dean, College of Science
FROM: Matt Johnson, Chair, Department of Computer Science
SUBJECT: Combining 2016-2017 Job Openings for CS-DATA/CLOUD/CORE-TT and CS-PROGRAMMING/HUMAN-COMPUTER-INTERACTION-TT

Computer Science is requesting that the two job openings for faculty searches in 2016-2017 be combined into one job opening with two positions as was done for 2015-2016. One of the two positions in the CS-DATA/CLOUD/CORE-TT job opening was left unfilled this year and rolled over into 2016-2017. The CS-PROGRAMMING/HUMAN-COMPUTER-INTERACTION-TT opening is new for this upcoming year.

It was never the intention of Computer Science to be overly specific in the two job descriptions. The CS-DATA/CLOUD/CORE-TT opening seeks a candidate "able to teach most or all of the core subject matter in computer science, and have expertise in one of the emerging fields of computation". Similarly, CS-PROGRAMMING/HUMAN-COMPUTER-INTERACTION-TT seeks someone "able to teach most or all of the core subject matter in computer science, and have expertise in graphics, animation, game programming, visualization or human-computer interaction." It perhaps needs explanation that graphics, animation, game programming, visualization and human-computer interaction are all emerging fields of computation as mentioned in CS-DATA/CLOUD/CORE-TT.

We are requesting that both job openings be renamed CS-GENERAL/CORE-TT in order to correctly classify the two positions and avoid confusion.

It is a daunting task to make a new hire in Computer Science. We receive few applicants from qualified candidates as: 1) CS doctorates are in great demand; 2) almost every computer science program attempts to make hires each year; and 3) CSUEB offers $15,000 - $20,000 less that SJSU and SFSU. Computer Science does not have the luxury of being very specific in our job searches, as this would further diminish the number of applicants we would receive.

Thank you for your time and attention,

Matt Johnson, Ph.D.

CALIFORNIA STATE UNIVERSITY EAST BAY
Department of Computer Science
25800 Carlos Bee Boulevard, Hayward, California 94542-3083
Telephone: 510-885-3441

DATE: May 26, 2016
TO: Carolyn Nelson, Interim Provost and Vice-President of Academic Affairs
VIA: Jason Singley, Dean, College of Science
FROM: Matt Johnson, Chair, Department of Computer Science
SUBJECT: Rollover of Job Opening CS-DATA/CLOUD/CORE-TT, Positions #00001011

Computer Science is hereby requesting that Job Opening CS-DATA/CLOUD/CORE-TT, Positions #00001011, be rolled over (again). We were awarded a new faculty search for 2017-2018, so it will be time and cost effective to conduct two searches simultaneously during the next academic year.

Regards,

Matt Johnson, Ph.D.
Chair, Computer Science

CALIFORNIA STATE UNIVERSITY EAST BAY
Department of Computer Science
25800 Carlos Bee Boulevard, Hayward, California 94542-3083
Telephone: 510-885-3441

DATE: April 17, 2017
TO: Edward Inch, Provost and Vice-President of Academic Affairs
VIA: Jason Singley, Dean, College of Science
FROM: Matt Johnson, Chair, Department of Computer Science
SUBJECT: Rollover of Job Opening CS-DATA/CLOUD/CORE-TT, Position #00001011

Since Computer Science doctorates are in great demand, almost every computer science program nationwide attempts to make hires each year. Salary is the biggest challenge to hiring qualified candidates in our field.

Our department was fortunate this year to hire Dr. Xiaojun Ruan for job opening 17-18 CS-GENERAL/CORE-TT, Position #00000994. Job Opening 17-18 CS-DATA/CLOUD/CORE-TT, Position #00001011 remains unfilled.

Computer Science is hereby requesting that Job Opening 17-18 CS-DATA/CLOUD/CORE-TT, Position #00001011 be rolled over (yet again) to the following year. We were awarded a new faculty search for 2018-2019, so it will be time and cost effective to conduct two searches simultaneously during the next academic year.

Regards,

Matt Johnson, Ph.D.
Chair, Computer Science

CALIFORNIA STATE UNIVERSITY EAST BAY
Department of Computer Science
25800 Carlos Bee Boulevard, Hayward, California 94542-3083
Telephone: 510-885-3441

DATE: June 20th, 2017
TO: Edward Inch, Provost and Vice-President of Academic Affairs
VIA: Jason Singley, Dean, College of Science
FROM: Matt Johnson, Chair, Department of Computer Science
SUBJECT: Rollover of Job Opening 17-18 CS-GENERAL/CORE-TT, Position #00000994

Since Computer Science doctorates are in great demand, almost every computer science program nationwide attempts to make hires each year. Salary is the biggest challenge to hiring qualified candidates in our field.

Our department was fortunate this year to hire Dr. Xiaojun Ruan for Job Opening 17-18 CS-DATA/CLOUD/CORE-TT, Position #00001011. Job Opening 17-18 CS-GENERAL/CORE-TT, Position #00000994 remains unfilled. **Computer Science is hereby requesting that Job Opening 17-18 CS-GENERAL/CORE-TT, Position #00000994 be rolled over (yet again) to the following year.**

Computer Science was awarded an additional faculty search for 2018-2019 under CS-EMERGING-TECHNOLOGIES-TT. As we will be conducting two faculty searches this year that focus on the core content of the discipline, **we are also requesting that both positions be combined under the Job Opening CS-GENERAL/CORE-TT with two positions numbers**.

Regards,

Matt Johnson, Ph.D.
Chair, Computer Science

CAL STATE EAST BAY College of Science

Date: July 6, 2018

To: Committee on Planning and Academic Review

From: Jason Singley, Dean, College of Science

Subject: Department of Computer Science Five-Year Review

I have reviewed the department's Five-Year program review document including the self-study, five-year plan, external reviewer's report, and the program's response to the reviewer's report. I will monitor the department's response to any forthcoming CAPR recommendations and work with the department to implement their five-year plan within existing budgetary constraints.