Appendix A: TEMPLATE FOR ANNUAL PROGRAM REPORT REVIEW *(See preceding document for detailed descriptions for each section)*

ANNUAL PROGRAM REPORT

College	College of Science
Department	Computer Science
Program	M.S. Computer Science
Reporting for Academic Year	2022-2023
Last 5-Year Review	2022-2023
Next 5-Year Review	2027-2028
Department Chair	Levent Ertaul
Author of Review	Leann Christianson
Date Submitted	10/1/2023

I. SELF-STUDY *(suggested length of 1-2 pages)*

A. Five-Year Review Planning Goals

Present your planning goals from your last 5-year plan.

The last 5-year review for the Department of Computer Science was conducted during the 2022-2023 academic year. The subsequent report was finalized in May 2023; therefore, we will refer to that report in this document. Our 5-year review lists new department goals for the following five years. These goals relate to the university goals of reducing time to graduation, increasing retention of students, and eliminating equity gaps. Goals are summarized by category here.

Curriculum:

1. To teach students the most important skills that are required by the industry
2. To educate students as unique individuals equipped with quality and depth of information in the diverse fields of computer science empowered by inspiring intellectual curiosity, critical thinking, and creativity
3. To prepare students for full and ethical participation in a diverse, multi-cultural society and encourage them to be lifelong learners who will contribute positively to the economic well-being of our region and nation
4. To prepare students to tackle complex 21st century challenges facing the world

Students:

1. Provide ongoing support for student advising at both the undergraduate and graduate level.
2. Improve student experience and B.S. graduation rate.

3. Reduce time to graduation for B.S. Students, both native CSUEB students and transfer students.
4. Implement mechanisms to make student research projects available to the student population. Use same mechanisms for internship experiences, peer advice, and references.
5. Work with AACE to increase recruiting on campus, both for graduates and students seeking internships.
6. Develop mechanisms for handling growth in the undergraduate program and right-size graduate program to fit department resources.

Faculty:

1. 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.
2. Encourage professional development.
3. Develop department by-laws.
4. Develop department leadership.
5. Address workload of faculty, specifically four course per semester teaching load.
6. Address support for faculty supervision of student research.

Resources:

1. Find facilities for department faculty offices, teaching labs, and research labs, including co-locating office space to provide opportunities for faculty to work together more easily.
2. Improve relationship with ITS (Instructional Technology Services. to support teaching and research needs.
3. Upgrade labs and environments used for class assignments, student research.
4. Address funding for readers, TAs, and travel to academic conferences.
5. Address need for library resources, specifically to support graduate courses.
6. Continue to develop Industry Advisory Board

B. Progress Toward Five-Year Review Planning Goals

Report on your progress toward achievement of the 5-Year Plan. Include discussion of problems reaching each goal, revised goals, and any new initiatives taken with respect to each goal.

New 5 year plan was just created

Curriculum

As previously mentioned our new 5 year plan was created in Fall 2022. Our department faculty strive to meet our department goals by providing education on the most up to date and current technologies. We aim to inspire intellectual curiosity, critical thinking, and creativity. Computer Science and computing technologies are changing rapidly. At the same time, modern society grows ever more dependent on this technology. The computer science curriculum faces constant evolutionary pressure to integrate new topics and technologies. Recent advanced topics in Networking, Cyber Security, Artificial Intelligence (AI), Machine Learning, Extended Reality (XR)/Immersive Computing (IC), Gaming and Drone technologies have been integrated into our graduate and undergraduate curriculum. We are developing new labs and

purchasing equipment via A2E2 funds in order to provide hands-on project-based experiences in these areas for our students.

The MS Computer Science program continues to grow with 246 students enrolled (see Table 1). The degree offers two concentrations: Computer Science and Computer Networking. Both concentrations share five (15 units) of required courses with the remaining 15 units being electives and a capstone experience. The Computer Science concentration is currently the most popular among students with only 1 current student in the computer Network concentration (See Table 3). We are considering removing the Computer Network concentration and replacing it with a Machine Learning concentration.

All graduate courses are offered in the on ground or hybrid 50/50 mode to accommodate our international student population who must comply with ICE regulations for F1 students. We will continue to offer courses in these formats. New graduate courses that have been added to the curriculum include: Internet of Things (CS 697) and Machine Learning (CS 667). Courses that have been offered as Topics(CS 697) courses include: Advanced Systems Design and Augmented Virtual Reality. We planned to offer a topics course in Drones for Fall 2023, however, CSUEB regulatory requirements forced the course to be canceled.

Computer Science is a laboratory-based science. Unfortunately, for a long time, the CSUEB CS students were missing hands-on lab experiences for advanced, graduate courses. We have rectified this and currently, the CSUEB CS Department has five labs as shown below, to support various hands-on, project-based courses in both the graduate and undergraduate program. The issue with some of these labs, however, is that they are not large enough to support an entire class of students. This is due to restricted space on campus.

Supported classes Graduate Program:

CNNS (Computer Networks Network Security) Lab

- CS 641 Advanced Computer Networks
- CS 671 Cyber Security

IoT Lab

- CS 697 IoT Technologies (new elective course)

AI/Deep Learning Lab

- CS 607 Parallel Programming
- CS 661 Advanced AI
- CS 667 Machine Learning
- CS 697 Game Development (new elective course)

XR/IC Lab

- CS 697 Topics in Computer Science–Immersive Computing Technology: Extended Reality (XR)

Drone Lab (currently under development)

- CS 697 Drone Technologies

A2E2 funds were used for equipment to support our Computer Networks, Advanced Computer Networks, Wireless Networks, Network Security, Cyber Security, IoT, XR/IC, Gaming, AI and Deep Learning Labs.

In the past year, we have worked on adding a Drone Lab. These funds enabled our department to move our current curriculum toward a hands-on approach.

The MS Computer Science program offers three choices for a capstone experience: comprehensive exams, project, or thesis. Students give zoom presentations of their work to faculty and students at the end of each semester. A shared google drive is used to archive capstone projects making them available to other interested students. Students are also encouraged to archive their capstone projects with the CSUEB library.

In the past year we had 10 projects completed and one thesis as listed below:

Capstone Projects (CS 693) Fall 2022-Spring 2023

- Sravani Prakki, advisor Dr. Moayed Daneshyari, "Graph Neural Network Based Travel/Trip Recommendation System"
- Ashriel Waghmare & Kavitha Dilli Babu, advisor Dr. Varick Erickson, "Body Fat Measurement Using Bioeletrical Impedance"
- Vatsal Pathak, advisor Dr. Varick Erickson, "Categorizing Medicinal Leaves"
-
- Krina Patel, advisor Dr. Moayed Daneshyari, "Detection of Fake Customer Reviews on E-commerce with Supervised Machine Learning"
- Sidhdharth Pandya, advisor Dr. Moayed Daneshyari, "Content Based Music Genre Classification using Temporal and Spectral Features"
- Soujanya Nayak: advisor: Dr. Lynne Grewe, "StrokeChange: Computer Vision ML based detection of stroke related facial patterns - towards an in-situ patient recovery/status monitoring system"
- Akash Mhatre, advisor Dr. Hongmin Li, "Identifying COVID-19 Low-Income Households Related Tweets with Semi-Supervised Approaches"
- Rishab Parekh and Shashiraj Walsetwar, advisor Dr. Varick Erickson, "Low Cost IoT Based Smart Irrigation System"
- Akshith Simha Katragada & Kavya Vuribindi, Dr. Varick Erickson, "Real-time Suspicious Activity Detection on ATMs Using YOLO Object Detection Algorithm"

Capstone Thesis Fall 2022:

- Manish Kakarla, advisor Dr. Moayed Daneshyari ,"Improving the mobilenetV1 using improved Pointwise Convolution"

Our ILO and PLO assessment schedule has been updated for the next 5 years. We maintained and distributed assessments through Blackboard. With the move to the Cavas course delivery system, we are in the process of moving these assessment quizzes into Google forms.

Students

The graduate program consists primarily of international students coming from India. Table 5 shows that 96% of our students identify as International with 4% identifying as Asian, 1% Latinx, and 1% White. Formal advising is imperative to help international students navigate their immigration, academic and post-graduation requirements. In the past we have seen ~50/50 mix of male and female graduate students, however over the past year, females have reduced to 40% with males 60% (See Table 4). The graduate coordinator, Dr. Christianson, continues to advise interested applicants, process applications, and advise

current graduate students. Despite the pandemic, interest in our program has been growing. Application numbers have increased from 600 to 1300 with an approximate 18-20% acceptance rate. Due to resource demands such as faculty, we have aimed to reduce the number of graduate students in our program over the last few years. This has been a slow process due to increased student demand and enrollment has actually increased each year. Statistics available from Pioneer Insights Fall 2018-Fall 2022 (see Table 1) show the graduate program growing from 153 to 246 students. We have made a modest move towards reducing numbers this Fall 2023. Currently, we have 203 students enrolled in our graduate program.

Students pursuing internships (CS 698) have been hired to work at the following sites: Thermo Systems, Wanclouds, Perjury AI, Delisis Inc., Caterpillar Inc., Live Nation Entertainment, Magnit Global, Brave Spaces LLC, and Atmecs Global. Students in CS 698 complete a report on their internship experiences which is shared with all students. This way others can learn about internship experiences and the companies recruiting our students. Our department works with AACE to facilitate and advertise internship and recruiting events.

To help students form a community within the department, we sponsor Hackathons and a chapter of the ACM-W, a woman in computing organization. Our department and faculty also facilitate zoom and on campus presentations from industry leaders.

Faculty

One of our primary goals is to recruit and retain new faculty. Both the undergraduate and graduate programs are growing at 763 and 246 respectively (See Table 1), requiring additional sections of courses. Our department will have two faculty members retire at the end of this academic year. We struggle with 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 space made available for desired growth.

C. Program Changes and Needs

Report on changes and emerging needs not already discussed above. Include any

changes related to your programs such as program additions and changes, Diversity, Equity and Inclusion efforts (including closing the equity gaps), and any significant events which have occurred or are imminent, program demand projections, notable changes in resources, retirements/new hires, curricular changes, honors received, etc., and their implications for attaining program goals. Organize your discussion using the following subheadings.

Overview:

faculty retiring, program growth – already stated above

Curriculum:

Removed Math 225 as prerequisite, adding ML concentration

Students:

90% of students are international

Faculty:

Faculty: as of spring 2023

Name	Time Base
Brown, Kevin	1.0
Chen, TianTian *new hire for 2023	1.0
Christianson, Leann	1.0
Danesharya, Moayed	1.0
Derakshandeh, Zahra	1.0
Erickson, Varick	1.0
Ertaul, Levent	1.0
Grewe, Lynne	1.0
Johnson, Matt	1.0
Li, Hongmin	1.0
Roophavar, Farzan	1.0
Ruan, Xiaojun	1.0
Yang, David	1.0
Zhong, Fay	1.0
TOTAL FTEF	14.0

We were able to hire Dr. TianTian Chen in Spring 2023. Her expertise Social Media Machine Learning. We had 14 tenure track faculty members at the end of Spring 2023 as shown above and approximately 17 lecturers. However, David Yang retired as of Spring 2023 and Matt Johnson and Farzan Roophavar will retire in FALL 2024. Luckily, we have one tenure track faculty hire for this year. A search is currently in progress for a tenure track faculty. Salary disparities between academic and industry positions, the high cost of living in the Bay area, and workload continue to be the reason faculty applicants reject tenure track positions offered by our department.

In Fall 2022 our department offered 63 undergraduate sections of which 53 were taught by lecturers or FERP faculty. Graduate sections in Fall 2022 numbered 18 with 5 taught by lecturers with PhD credentials. In Spring 2023 we offered 64 undergraduate sections and labs of which 41 were taught by lecturers or FERP faculty. We are in dire need of new faculty due to retirements. Dr. David Yang retired at the end of Spring 2023, and we have

two other faculty members retiring next year. In Spring 2023 the David Valdovinos and Stephanie Carr Computer Science Faculty Excellence Award was given to one of our faculty members, Dr. Moayed Daneshyari.

Staff:

All College of Science administration staff were combined into "Hubs" for the 2023-24 academic year. We are sharing administrative staff with the engineering department.

Resources: (facilities, space, equipment, etc.)

Currently our classroom labs are SC N336, AE 0393 and a small room SC N104 which are all shared. They are just CS teaching Labs. With the growth of the Department that is 28% in last five year, the needs for adequate classrooms have been increasing. Specifically, classes with lab components have also increased the demand for classrooms with computer labs. Since we do not have adequate lab spaces, we are having difficulty with offering new courses such as XR, Deep Learning, and Introduction to Drones. Therefore, we need more instructional labs to offer those classes.

The department also needs more physical lab space for research. Currently, we have seven labs including the computer networks and network security lab (CNNS), XR lab, AI and deep learning lab, parallel computing lab, drone lab, IoT lab, and iLAB. We have more than 50 types of lab equipment including routers, sensors, GPU servers, XR headsets, drones, 3D printers, robotic arm, etc. However, we do not have any dedicated rooms for each lab, but only a small room in VBT 218 for the computer networks and network security lab, which is an instructional lab for teaching CS 441. We temporarily share space with other departments in SCS 125 to store our lab equipment for the other six labs. However, this lab will be converted to a classroom for another department to use starting next year. Therefore, we desperately need more lab space to store the equipment and to allow computer science faculty and more than 1,000 computer science students to work on their research projects.

The need for additional resources to fund graders, Teaching Assistants, and travel to academic conferences continues to be critical for the Department. 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. This greatly affects the ability of new tenure-track faculty to pursue research.

These labs are up and running currently. Drs., Zahra, Moayed, Zhong, and Li were awarded an A2E2 grant in which funds will be used to improve an Extended Reality lab, Deep Learning Lab and Drones lab. however, space has not yet been allocated to the department for these labs to teach above courses.

To facilitate these labs the Computer Science department in needs of a dedicated Information Technology administrator. Our current administrator is shared with the faculty and programs of the College of Science and he is leaving this semester.

Other resources that would benefit the department include travel funds for research conferences and presentations, funds for student activities such as clubs and hackathons, funds for teaching assistants and graders, and funds for research equipment, software, and classroom needs.

Assessment:

Semester conversion allowed the department to standardize and organize assessment practices. Assessments were maintained and deployed through the Blackboard course management system. With the recent change from Blackboard to Canvas we must restructure the deployment of our assessment tools. We have begun migrating our assessments to Google forms for ease of deployment and to aid evaluation over academic years. Our assessment process is addressed below in section II.

DEI Initiatives:

The DEI initiatives are focused on the undergraduate Computer Science courses. Please refer to the BS Computer Science annual report for a list of these initiatives and plans to address inequities.

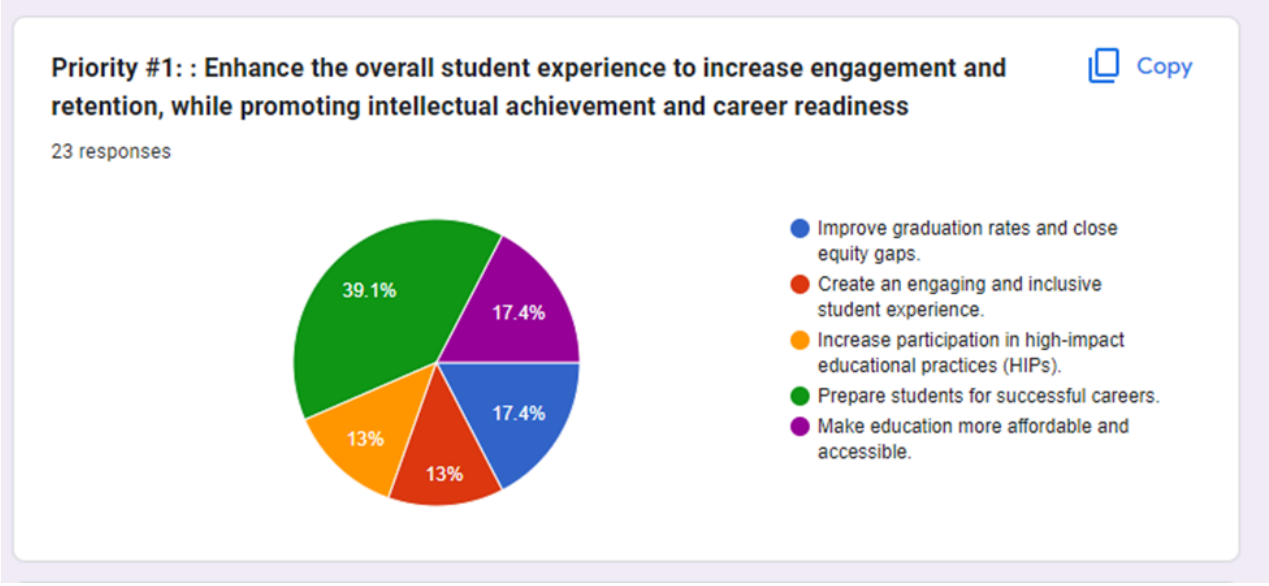
Other: (e.g., major program modifications)

We updated the catalog descriptions for two courses, Advanced Algorithms (CS 601) and Machine Learning (CS 667). In addition, we will no longer be cross listing Machine Learning with the Math Department.

CS Future Directions and Action Plan

Recently, the CSUEB CS Department identified four out of the five priorities defined by CSUEB for the department's future directions and prepared an action plan for the identified priorities as shown below.

Priority #1: Prepare students for successful careers.



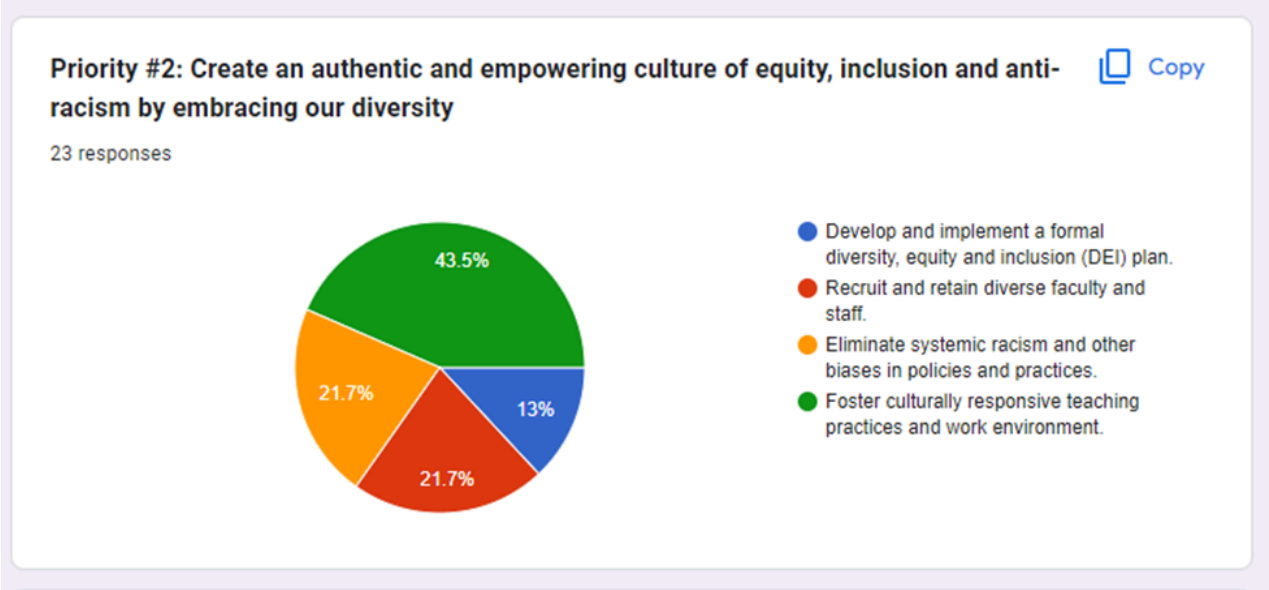
Actions for Priority 1.

1. Track activities that are relevant for preparing students for successful carriers, e.g., interview class, labs, industry talks, resume workshops, etc.

2. Track special topics classes - make sure that they cover current industry trends in the CS field

3. Track Internships

Priority #2: Foster culturally responsive teaching practices and work environment.

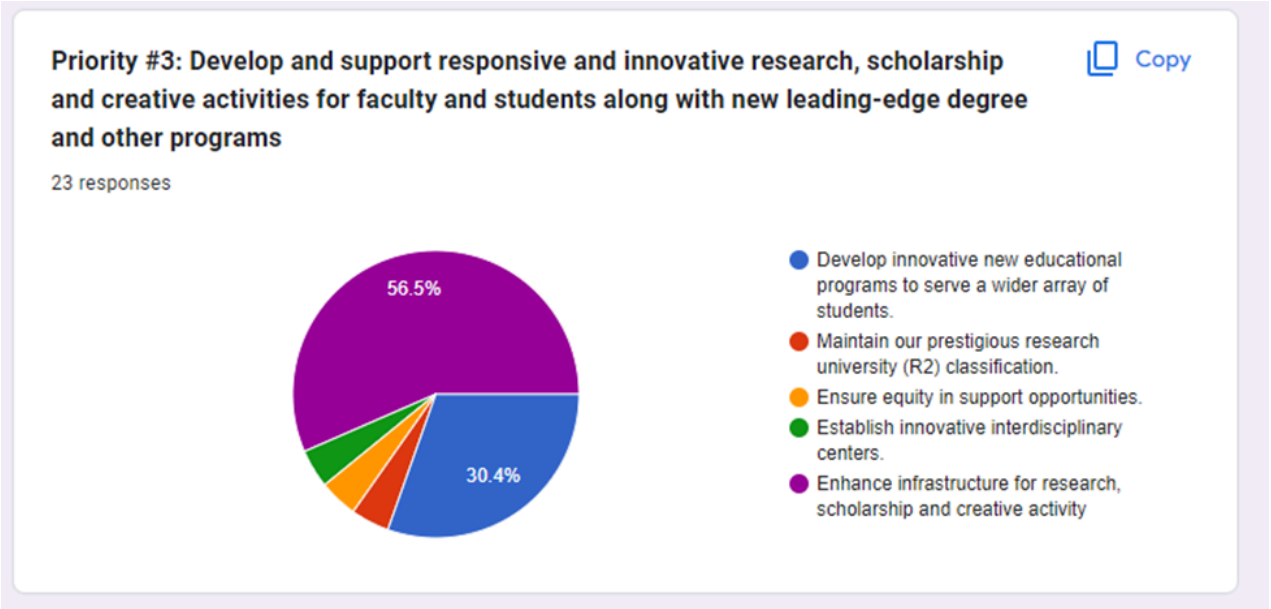


Actions for Priority 2.

1. Maintain a list of online teaching/training workshops available for faculty and record which faculty members have completed which training, e.g., COS JEDI training programs.

2. Organize related workshops or discussions every year, e.g., organize an open house for CS faculty and students. This will be combined with the alumni or industrial board meetings when we invite alumni, industry guest speakers and students to participate.

Priority #3: Enhance infrastructure for research, scholarship and creative activity.



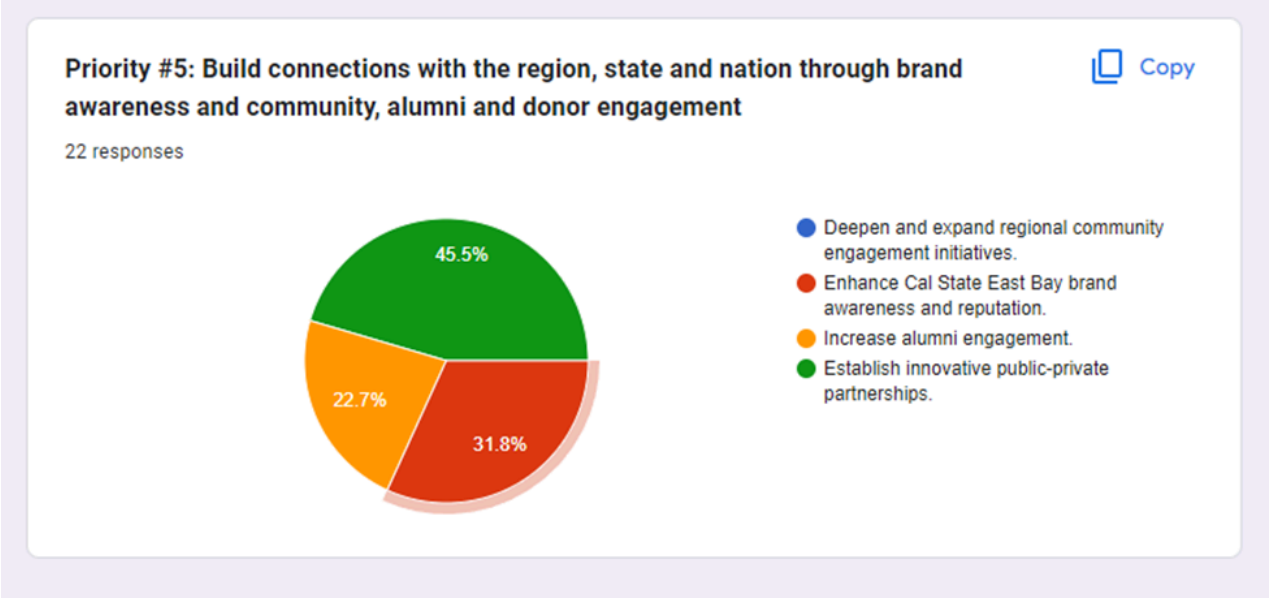
Actions for Priority 3

1. Create a list of our research labs and equipment, e.g., the new security lab, XR lab, drone lab, AI/ML lab, etc. Possibly record the newly purchased equipment each year. In addition, we can send out surveys to faculty and students to see what they want for their research projects and then make plans for the next year.

2. Record a list of faculty/student collaborative research projects and outcomes. Host several open lab events. Facilitate hackathon events.

3. Track professional activities.

Priority #5: Establish innovative public-private partnerships.



Actions for Priority 5

1. Organize industrial board and advisory board meetings
2. Organize on campus CS alumni events
3. Organize small group site visits to local companies
4. Reach out to local companies to create partnerships

In the coming years, the CSUEB CS Department will implement the above action plans for its priorities.

II. SUMMARY OF ASSESSMENT *(suggested length of 1-2 pages)*

A. Program Learning Outcomes (PLO)

List all your PLO in this box. Indicate for each PLO its alignment with one or more institutional learning outcomes (ILO). For example: "PLO 1. Apply advanced computer science theory to computation problems (ILO 2 & 6)." Program Learning Outcome(S) Assessed. *List the PLO(s) assessed. Provide a brief background on your program's history of assessing the PLO(s) (e.g., annually, first time, part of other assessments, etc.)*

PLO1 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.

ILO1: Quantitative Reasoning

ILO2: Communication

Class Assessed: CS 611 Theory of Computation – 2023-2024

PLO2 Design, develop, and evaluate a computer-based system, process, component, or program to meet desired needs.
ILO1: Quantitative Reasoning; ILO4: Collaboration
Class Assessed: CS 651 Web Development 2024-2025

PLO3 Classify and explain the mechanisms, components
and architecture of computing systems.
ILO1: Quantitative Reasoning
Class Assessed: CS 621 Operating System – 2025-2026

PLO4 Employ current techniques, skills, and tools
necessary for computing practice and justify the need for continuing professional development.
ILO1: Quantitative Reasoning
Class Assessed: CS 601 Advanced Algorithms - 2026-2027

PLO5 Discuss professional, ethical, legal, and security
issues and responsibilities, and the impact of computing on individuals, organizations, and society.
ILO1: Quantitative Reasoning
ILO2: Communication
Class Assessed: CS 601 Advanced Algorithms - 2027-2028

PLO6 Function successfully on teams to accomplish a
common goal and explain computer science concepts effectively in written and oral form.
ILO1: Quantitative Reasoning
ILO2: Written Communication
Class Assessed: CS 671 Cybersecurity 2028-2029

B. Summary of Assessment Process

Summarize your assessment process briefly using the following sub-headings

Instrument(s):

We assess the Computer Science program in five courses that are required for all students.

These include CS 601 Advanced Algorithms, CS 611 Theory of Computation, CS 621 Operating Systems Design, CS 651 Web Systems, and CS 671 Cybersecurity. We have tried to assess these courses each semester and have a 5-year plan for assessing the ILOs that are associated with a particular course each year as shown above. Summative assessments include multiple-choice questions that students complete at the end of the course. Most assessments were deployed through Blackboard and we are migrating to Google forms. A score of 60% proficiency was chosen to indicate that a student has met expectations for a particular PLO. Elective courses are not assessed.

Sampling Procedure:
Each assessment has 10 questions. Scores range from 0 – 100. Each professor is responsible for gathering the assessment results and uploading the results to a shared department Google assessment drive. Faculty have had some issues with the process which is why we are moving to Google forms. In the past year we were to assess PLO6: Function successfully on teams to accomplish a common goal and explain computer science concepts effectively in written and oral form which maps to the ILOs of Quantitative Reasoning and Written Communication. Due to a miscommunication, data was not collected in the 2022-23 academic year.

Sample Characteristics:

MS Computer Science Assessment 2020-2021	PLO 1	PLO 2	PLO3	PLO 4	PLO 5	PLO 6
Cs 601 Advanced Algorithms				85%		
CS 611 Theory of Computation	88%					
CS 621 Advanced Operating Systems			87%			96%

Data Collection: *(include when, who, and how collected)*

Instructors collected the results of the assessments through their Blackboard's for each class and provided averaged scores for each assessment.

Data Analysis:

Assessment results are excellent with all scores being in the 85th percentile and above which well above our goal of 60th percentile.

C. Summary of Assessment Results
Summarize your assessment results briefly using the following sub-headings.

Main Findings:

The assessment scores are in the 85th percentile and above which is well above the 60th percentile chosen for proficiency. We are happy to see our students are mastering the concepts aligned with our program learning outcomes in these important required courses.

Recommendations for Program Improvement: *(changes in course content, course sequence, student advising)*

Currently, we do not see a need to change course content, sequence or advising. However, a more convenient and consistent method of deploying the assessments and gathering data is needed.

Next Step(s) for Closing the Loop: *(recommendations to address findings, how & when)*

Our results were positive and show that students are learning content aligned with our PLOs in the classes assessed. Findings will be disseminated to the department graduate committee and then to the department at large.

Other Reflections:

We are investigating more convenient and automatic way of deploying and collecting assessment results. We also would like to compare the effectiveness of in-person, online, and hybrid instructions.

D. Assessment Plans for Next Year

Summarize your assessment plans for the next year, including the PLO(s) you plan to assess, any revisions to the program assessment plan presented in your last five-year plan self-study, and any other relevant information.

In the next academic year, we will assess **PLO1** "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." This PLO maps with the ILOs of Quantitative Reasoning and Communication. The class assessed will be CS 611 Theory of Computation.

III. DISCUSSION OF PROGRAM DATA & RESOURCE REQUESTS *(suggested length of 2 pages)*

Each program should provide a one-page discussion of the program data available through University Dashboard. This discussion should include an analysis of trends and areas of concern. Programs should also include in this discussion requests for additional resources including space and tenure- track hires. Resource requests must be supported by reference to University Dashboard data.

Requests for tenure-track hires should indicate the area and rank that the program is requesting to hire. If a program is not requesting resources in that year, indicate that no resources are requested.
Enrollment Trends

A. Discussion of Trends & Reflections Notable Trends;

Summarize and discuss any notable trends occurring in your program over the past 3-5 years based on program statistics (1-2 paragraphs). You may include 1-2 pages of supplemental information as appendices to this report (e.g., graphs and tables).

Enrollment has increased in the MS Computer Science program from 2017-2022. Numbers have grown from 153 in 2017 to 246 in 2022 (Table 1). As graduate courses require PhD instructors and with three faculty retiring, we are facing a faculty shortage and will need to shrink the program. The computer Science concentration is favored by the majority of the students (Table 2 and Table 3). We are seeing an increase of male students and a decrease in female students (Table 4). As has long been the trend, 95% of our graduate students identify as International with 4% Asian, 1% Latinx, and 1% White (Table 5). International students require more resources for advising due to immigration policies and procedures. First generation graduate students are few at 5% (Table 6). We would like to see this number increase through recruitment from our undergraduate program and through our presence at other graduate student informational events.

Reflections on Trends and Program Statistics:

Provide your reflections on the trends discussed above and statistics and supplemental information presented in this report.

With both BS and MS programs growing, 28% in the last five years, and three faculty retiring, our department is in dire need of new hires. The CS department faculty has one of the highest Student Faculty Ratio in the College of Science. The department plans to continue to request new positions in the department and carry out searches to secure new faculty members for the department. However, hiring new faculty became a bit challenging because of the low salary offers.

The department will continue to do extensive outreach to local universities and universities that serve under-represented groups, and recruit at conferences and other events where possible. The department is currently conducting a search for one tenure track faculty member during the 2023-24 academic year. In every university survey, local or system wide, it has been shown that faculty salaries and workload issues are the top two issues faced when trying to hire new faculty. That is why we request at least a 20% increase in our compensation for TT faculty candidates compared to last year's accepted offer. In the last five years we were never able to hire any CS TT candidate who were in top 2-3 in the offer eligible candidates list.

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 space 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 advice.

The Computer Science Department is one of the largest departments in the College of Science. Within the last couple years, it is the only department with enrollment growth in the College of Science. It also has the largest master’s program with the highest number of international students. Despite the fact that it is the largest department in many ways within the college of science, it suffers from a lack of sufficient teaching and research lab space, regardless of location. We currently have only three, shared, computer classrooms available to support our program: SCN 336, SCN 104 and a classroom in AE 0393. Through the generosity of the College of Science, the department was able to create an open Computer Science

Lab for students to use outside of the classroom in SC N337. As our external reviewer mentioned, when we seek accreditation our relative lack of teaching and experimental lab space would be a major concern to the accrediting board.

When it comes to research labs, the department needs more physical lab space, since we don't have any CS dedicated lab spaces but only shared spaces with other departments. Currently we have seven labs, include the Computer Networks and Network Security lab, XR lab, AI and Deep Learning lab, Parallel Computing lab, Drone lab, IoT lab and iLAB. We have more than 50 types of lab equipment including routers, sensors, GPU servers, XR headsets, drones, 3D printers, robotic arm, etc. We need more lab space to store the equipment and to allow faculty and students to work on their research projects.

The department is currently involved in discussions with the Dean of the College of Science in order to address the lack of teaching lab space. It seems that CS will have yet another shared lab space in this new science building. This could be enough for some research activities but it is not definitely enough to teach XR and Drone classes for example. We need permanent, Computer Science only, teaching labs.

In addition to the lack of space, the Computer Science Department is the only department in the College of Science and in all of the CSU and UC CS departments that does not have its own technician. The technician that IT has designated to the CS department is shared by all of the departments within the College of Science, and that technician is leaving this semester.

Since we have the labs mentioned above, the department needs physical teaching and research space for faculty and students as well as a dedicated technician who will support teaching and research activities for CS students and faculty.

We 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 than the originals. For instance, BayCloud virtual images has been suggested as a temporary solution, but it does not provide the functionality needed in the long term. The department is having discussions with ITS to attempt to find solutions to this problem.

Table 1 – Enrollment Computer Science Fall 2018-2022

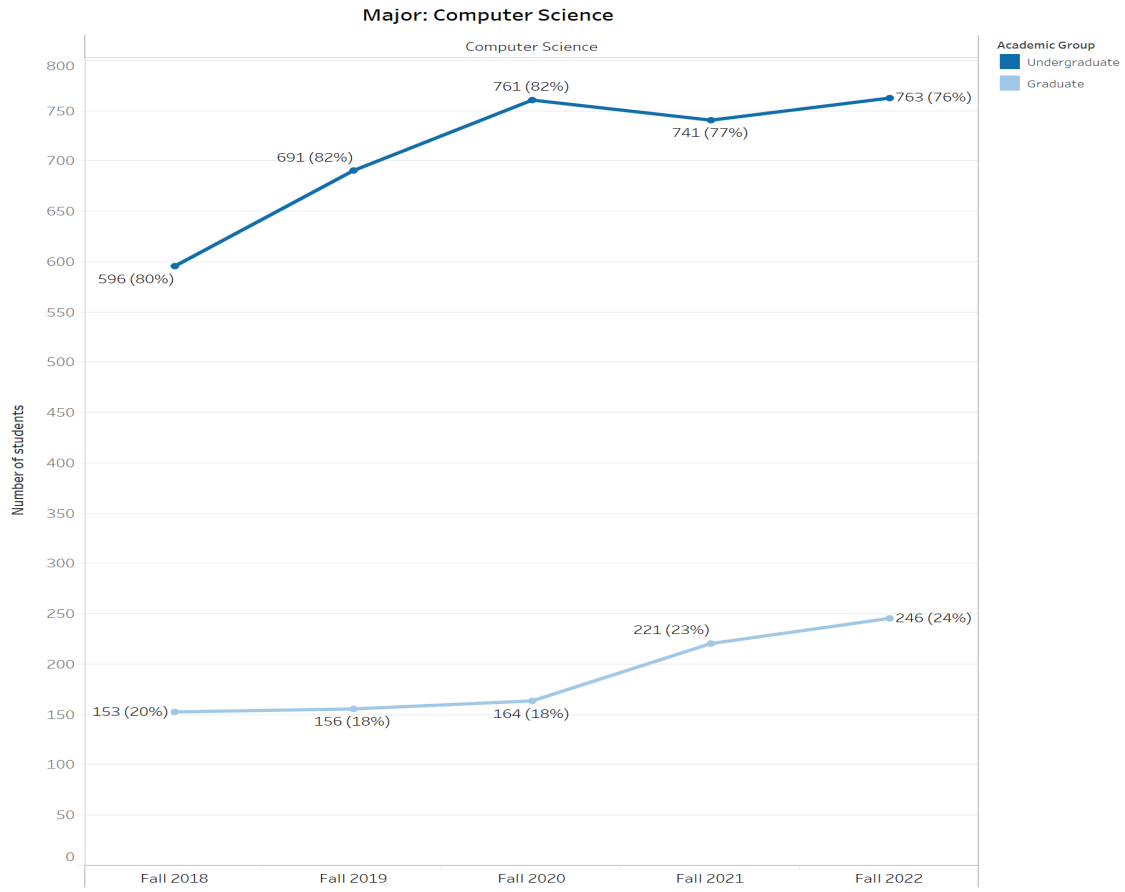
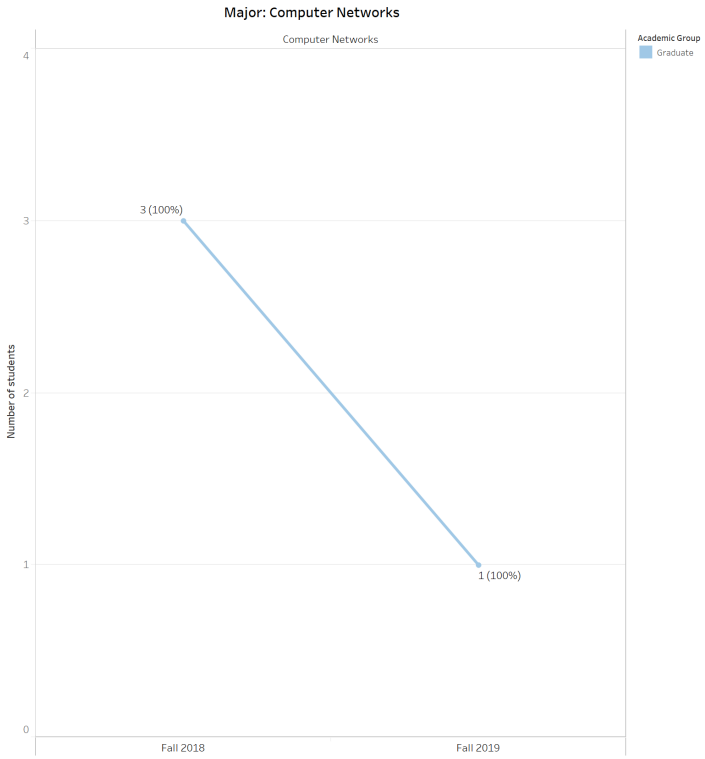


Table 2 Fall 2023 Enrollments MS Computer Science – Computer Science concentration

Computer Science: Concentration

		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate		561	94%	675	98%	755	99%	739	100%	763	100%
	Computer Engineering	7	1%	2	0%						
	Networking & Data Communic	4	1%	3	0%	2	0%				
	Software Engineering	24	4%	11	2%	4	1%	2	0%		
	Total	**596**	**100%**	**691**	**100%**	**761**	**100%**	**741**	**100%**	**763**	**100%**
Graduate		117	76%	73	47%	41	25%	33	15%	1	0%
	Computer Networks	4	3%	3	2%	1	1%	2	1%	1	0%
	Computer Science	32	21%	80	51%	122	74%	186	84%	244	99%
	Total	**153**	**100%**	**156**	**100%**	**164**	**100%**	**221**	**100%**	**246**	**100%**
Postbaccalaureate										2	100%
	Total									**2**	**100%**
Grand Total		**749**	**100%**	**847**	**100%**	**925**	**100%**	**962**	**100%**	**1,011**	**100%**

Table 3 MS Computer Science - Network Concentration 2018-2019



Computer Networks: Admit Type

		Fall 2018		Fall 2019	
		n	%	n	%
Graduate	First-time Graduate	3	100%	1	100%
	Total	3	100%	1	100%
Grand Total		3	100%	1	100%

Graduation/Degree Data

Time to Degree Years (and Headcount)

Table 4 MS Computer Science Students by Sex Fall 2018 – 2022

Computer Science: Sex											
		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	Female	103	17%	121	18%	140	18%	135	18%	146	19%
	Male	493	83%	570	82%	621	82%	606	82%	616	81%
	Nonbinary									1	0%
	Total	**596**	**100%**	**691**	**100%**	**761**	**100%**	**741**	**100%**	**763**	**100%**
Graduate	Female	74	48%	80	51%	100	61%	103	47%	98	40%
	Male	79	52%	76	49%	64	39%	118	53%	148	60%
	Total	**153**	**100%**	**156**	**100%**	**164**	**100%**	**221**	**100%**	**246**	**100%**
Postbaccalaureate	Female									2	100%
	Total									**2**	**100%**
Grand Total		**749**	**100%**	**847**	**100%**	**925**	**100%**	**962**	**100%**	**1,011**	**100%**

Table 5 MS Computer Science Students by Race/Ethnicity Fall 2018 - 2023

Computer Science: Race/Etnicity											
		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	Asian	215	36%	264	38%	300	39%	309	42%	302	40%
	Black	31	5%	30	4%	46	6%	41	6%	40	5%
	International	84	14%	81	12%	83	11%	71	10%	67	9%
	Latinx	116	19%	143	21%	150	20%	160	22%	186	24%
	Multirace	23	4%	25	4%	26	3%	29	4%	33	4%
	Native American	1	0%	1	0%	1	0%				
	NHPI	8	1%	4	1%	7	1%	6	1%	9	1%
	Unknown	26	4%	32	5%	36	5%	30	4%	32	4%
	White	92	15%	111	16%	112	15%	95	13%	94	12%
	Total	**596**	**100%**	**691**	**100%**	**761**	**100%**	**741**	**100%**	**763**	**100%**
Graduate	Asian	17	11%	15	10%	22	13%	19	9%	9	4%
	International	127	83%	129	83%	131	80%	190	86%	229	93%
	Latinx	1	1%	1	1%	3	2%	3	1%	3	1%
	Multirace	1	1%	1	1%	1	1%				
	NHPI	1	1%	1	1%	1	1%	1	0%	1	0%
	Unknown	2	1%	1	1%			1	0%	1	0%
	White	4	3%	8	5%	6	4%	7	3%	3	1%
	Total	**153**	**100%**	**156**	**100%**	**164**	**100%**	**221**	**100%**	**246**	**100%**
Postbaccalaureate	Asian									1	50%
	Latinx									1	50%
	Total									**2**	**100%**
Grand Total		**749**	**100%**	**847**	**100%**	**925**	**100%**	**962**	**100%**	**1,011**	**100%**

Table 6 – computer Science First Generation

Computer Science: First Generation

		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	FG	286	48%	349	51%	388	51%	403	54%	420	55%
	Non-FG	310	52%	342	49%	373	49%	338	46%	343	45%
	Total	**596**	**100%**	**691**	**100%**	**761**	**100%**	**741**	**100%**	**763**	**100%**
Graduate	FG	55	36%	49	31%	39	24%	23	10%	12	5%
	Non-FG	98	64%	107	69%	125	76%	198	90%	234	95%
	Total	**153**	**100%**	**156**	**100%**	**164**	**100%**	**221**	**100%**	**246**	**100%**
Postbaccalaureate	FG									2	100%
	Total									**2**	**100%**
Grand Total		**749**	**100%**	**847**	**100%**	**925**	**100%**	**962**	**100%**	**1,011**	**100%**

Table 7 Computer Science Admit Type

Computer Science: Admit Type

		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	First-time Fr..	286	48%	319	46%	315	41%	306	41%	330	43%
	Transfer	310	52%	372	54%	446	59%	435	59%	433	57%
	Total	596	100%	691	100%	761	100%	741	100%	763	100%
Graduate	First-time Gr..	152	99%	155	99%	163	99%	220	100%	246	100%
	Transfer	1	1%	1	1%	1	1%	1	0%		
	Total	153	100%	156	100%	164	100%	221	100%	246	100%
Grand Total		749	100%	847	100%	925	100%	962	100%	1,009	100%

Table 8 – Computer Science Class Level

Computer Science: Class Level

		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	Frosh	93	16%	139	20%	118	16%	117	16%	113	15%
	Sophomore	76	13%	56	8%	74	10%	72	10%	89	12%
	Junior	198	33%	180	26%	198	26%	188	25%	185	24%
	Senior	229	38%	316	46%	371	49%	364	49%	376	49%
	Total	596	100%	691	100%	761	100%	741	100%	763	100%
Graduate	Postbacc	153	100%	156	100%	164	100%	221	100%	246	100%
	Total	153	100%	156	100%	164	100%	221	100%	246	100%
Postbaccalaureate	Postbacc									2	100%
	Total									2	100%
Grand Total		749	100%	847	100%	925	100%	962	100%	1,011	100%

Table 9 Computer Science – Time to degree

Time to Degree Years (and Headcount)

		Transfer	Masters & Ed.D	First-time Freshmen
Overall		2.2 (138)	2.2 (67)	4.7 (40)
CSCI	Computer Science	2.2 (138)	2.2 (67)	4.7 (40)

Table 10 APR Coursework Data Summary at census – BS degree only

APR Coursework Data: Summary: Fall Term as of Census

FTES, FTEF (instruction), and SFR of all state-side coursework

		Term & Year														
		Fall 2018			Fall 2019			Fall 2020			Fall 2021			Fall 2022		
College	Department	FTES	FTEF	SFR	FTES	FTEF	SFR	FTES	FTEF	SFR	FTES	FTEF	SFR	FTES	FTEF	SFR
CSCI	CS	361.5	13.6	26.6	426.9	14.5	29.4	502.0	17.2	29.2	506.6	17.9	28.4	536.3	18.1	29.6
	Total	361.5	13.6	26.6	426.9	14.5	29.4	502.0	17.2	29.2	506.6	17.9	28.4	536.3	18.1	29.6
Grand Total		361.5	13.6	26.6	426.9	14.5	29.4	502.0	17.2	29.2	506.6	17.9	28.4	536.3	18.1	29.6