**External Program Review of the Computer Science Department**

**Sonoma State University**

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**Introduction**

The Computer Science Department at Sonoma State University offers a B.S. in Computer Science degree and a Minor in Computer Science. The department is staffed by 5 tenured faculty members (all with doctorates) and 5 adjunct lecturers. In addition, the department is supported by one half-time administrative support coordinator and one department technician.

In Fall 2022, the department had 270 majors, 25 minors and 2 post-baccalaureate (second Bachelor’s) students each semester. While enrollments in the CS department have been declining at a similar rate to the university since 2018, it appears that the CS enrollment may be starting to stabilize.

The department supports three laboratories with a total of 72 workstations and a server facility to support the labs in the basement of Darwin Hall. An additional lab in Stevenson Hall is expected to have workstations installed in the near future. All laboratories are open whenever the buildings are open, and the servers that support instruction mustbe available 24/7.

The student population is about 50% white, and about 27% Hispanic, and about 15% female. The department is actively working to attract and retain students from traditionally underrepresented populations. The department benefits from work with national organizations that support efforts to bring traditionally underrepresented students into CS, such as: the National Center for Women & Information Technology (NCWIT), the Computing Alliance of Hispanic Serving Institutions (CAHSI), LSAMP, and the Mathematics Engineering and Science Achievement (MESA) program.

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

**The Review Process**

Prior to the visit, the university and the department provided the reviewer with the university Guidelines for External Reviewers, a self-study document, and supporting material for the self-study.

The campus visit and subsequent Zoom meetings provided the reviewer with access to the Department Chair, to all the tenured members of the department faculty, to adjunct faculty, to the staff members of the department, to the Dean of the School of Science and Technology, and to the Associate Vice President of Academic Affairs & Dean of Undergraduate and Graduate Studies.

The reviewer also had an opportunity to visit the laboratories and view the servers that support the students’ learning environment in Darwin Hall and to see the location of the new laboratory in Stevenson Hall.

Near the end of the on-site portion of the visit, the reviewer had an opportunity to meet with the faculty, lecturers, and staff on Zoom to discuss findings.

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

**Initial Observations**

The past 2 years have been very challenging for the faculty, due to resignations of 4 junior faculty members, in addition to leaves and retirements of some senior faculty members. The faculty must be commended for all their work above and beyond to keep the department running. The first priority should be to stabilize the faculty to keep workloads reasonable and prevent burnout.

Some additional issues raised during the visit were DFW rates in certain courses (115, 215, 315), lack of staff support, lack of space for students to interact with each other and with faculty, course schedule conflicts, lack of electives to enable seniors to graduate, lack of courses for transfer students, and need for curricular review.

**Faculty**

The loss of faculty over the last two years has had negative effects on morale and workload. It is hoped that the university will take further steps to investigate the reasons behind the loss of faculty and whether there can be lessons learned and improvements made to the university environment.

The tenured faculty have pulled together to manage the department and continue their excellent teaching. I commend Dr. Gondree on his 2022-2023 Excellence in Teaching Award from SSU. I also commend Drs. Gill and Gondree for their work on justice and inclusion. Overall, the faculty are very impressive for their dedication to teaching, supporting, and including students, as well as their dedication to the department, excellence and professionalism.

Also, to be commended are the adjunct lectures. In particular, Dave Shreiner, who is bringing his industry experience to expand timely elective offerings to students, and Dr. Henry Walker, who bring a wealth of experience and passion to his teaching and a seasoned perspective to the department.

A careful eye needs to be kept on faculty workload and to make sure faculty are supported to avoid burnout.

In particular, as the changing of Department Chair occurs this summer, it is important to have mentoring and support for the new Chair. I recommend that Academic Affairs provides mentoring opportunities to new department chairs, in addition to the usual workshops offered.

It is important that university procedures be followed when potential conflicts arise, particularly between students and faculty. It is important that anyone in the position to advise students is trained to advise that the student contact the instructor first, then the Department Chair, before taking issues to a higher level. At the same time, faculty and the Department Chair need to be reasonably available to students to discuss issues that arise.

The current physical layout of the cs department offices coupled with lack of staff presence does not facilitate student-faculty interaction. I recommend that the Dean work with other administrators to make sure that staff advising students are properly trained (for example, MESA staff).

I further recommend that the department consider ways to facilitate student access to faculty outside of class. Some possibilities might include finding safe ways to keep the Department Office outside door unlocked during regular hours, securing additional office staff, and holding office hours in the Stevenson Hall Lab or other publicly accessible space.

**Facilities**

The current laboratory and server room facilities while adequate for run-of the-mill teaching purposes, are not sufficient to support courses, such as advanced computer graphics and computer vision, which are CPU- and GPU-intensive. These courses are important for preparing students for competitive industry jobs. In addition, the current laboratories do not facilitate out of class interaction between faculty and students or between students. As noted previously, the current physical layout of the cs department offices coupled with lack of staff presence does not facilitate student-faculty interaction.

I recommend that the Stevenson Lab be opened, even without workstations, and that faculty work toward making it a gathering place for students. Promoting student interaction and encouraging student clubs to meet there, possibly having tutors/mentors available, and having some faculty office hours there. I believe facilitating increased interaction would improve faculty and student morale and increase students’ sense of belonging to the department and the university.

The institutional facilities including the library, other electronic information retrieval systems, computer networks, classrooms, and offices are adequate to support the program.

**Courses and Curriculum**

Given the current lack of faculty, I recommend that the faculty look for courses in other departments that could reasonably be taken by students for CS elective credit. Looking for courses in Philosophy on AI and Ethics, in Art supporting game design, in Electrical Engineering, in Physics supporting quantum computing. I want to commend the faculty for their flexibility in accepting appropriate courses from other departments to provide electives when there is insufficient CS faculty to offer the needed CS elective courses. However, it is important to note that, absent a critical lack of CS faculty, CS students are better served by CS electives in faculty areas of expertise. For example, computer graphics, AI, iOS programming, and Web Frameworks, all introduce students to a broader range of computer science areas that play an important role in computer science education and often translate in to success for students on the job market.

As noted in the Reflection and Plan of Action in the Self-Study document a serious exploration and redesign of the CS BS curriculum is overdue. The last redesign was in 2007. My main concern is that this project cannot be taken on until the faculty and their workloads have stabilized. However, I do recommend asking the Dean for funds to have a faculty retreat late-summer to begin preliminary discussions and make a plan to the review and redesign. The bullet points in the Self-Study document are a good place to start.

Note that with the introduction of ChatGPT last Fall make this a particularly good time to be reconsidering CS curriculum.

The redesign process should take into consideration and address the concerns that have been raised about the DFW rates in CS 115, CS 215, and CS 315. It should also address providing pathways for students from varied backgrounds. In the interest of being more inclusive and diversifying our student body, we need to recognize that some students are entering with a fair amount of programming experience and need to be challenged, but other students enter with no programming experience and need a learning environment where they will not be intimidated. Similar issues arise in how to best integrate transfer students into our curriculum.

One approach that is worth considering would be to start with expected outcomes at graduation and work backwards to determine the necessary milestones and then in which course those should be met. Once these milestones and where they need to occur is determined, transparency is key. If all instructors and all students know what needs to be mastered and in what course, this will make courses more consistent from instructor to instructor and year to year.

This approach, starting with outcomes, also has the potential to simplify the process of determining effective assessments.

In addition, to standards for material covered in courses, the department should continue developing and expanding the use of Software Development Standards. These standards can be used to teach necessary workplace and graduate school skills, such as software version control systems and standardized coding in different programming languages, as appropriate to each course curriculum. I would like to commend the work that has been done so far by the faculty, including Dr. Walker and Dr. Watts, to develop these standards.

This approach can also help determine what topics should be taught and prioritized in CS 242 Discrete Structures for Computer Science to make sure that it is properly supporting upper division CS courses.

Once the curriculum revision is complete, making sure that courses are taught on a rotation that allows students to finish their degree on a timely basis with minimal roadblocks is strongly encouraged.

**Conclusion**

The dedication and preparation of the SSU CS department faculty and staff to providing a diverse student body with a high-quality education are outstanding. In the current understaffed environment, there is a real risk of burnout. The department needs university support to stabilize and move forward. They have put together an excellent self-study and plan of action. I hope that the university will consider some of my recommendations to support them.