**Department of Computer Science**

**California State University, Los Angeles**

 **Bachelor of Science in Computer Science Program Program Review**

**Modified Self-Study Report (MSSR)**

## Summary:

## The Bachelor of Science in Computer Science curriculum is accredited by the Computing Accreditation Commission (CAC) of Accreditation Board for Engineering and Technology (ABET). Our most recent accreditation is valid from October 1st 2019 through September 30th 2025. This maximum six year accreditation is the third such consecutive six year accreditation awarded to our program.

## Attachments:

## [ABET Self Study Report](https://csns.calstatela.edu/download?fileId=6174462)(https://csns.calstatela.edu/download?fileId=6174462)

## [ABET Final Statement of Accreditation](https://csns.calstatela.edu/download?fileId=7277464) (https://csns.calstatela.edu/download?fileId=7277464)

**Accreditation and MSSR Matrix**

|  |  |  |
| --- | --- | --- |
|  **PROGRAM REVIEW SELF-STUDY SECTIONS** | **ACCREDITATION CSBS SELF-STUDY SECTIONS (pg #)** | **Additional Comments**  |
| **1.0 History, Mission, Goals, and Objectives** | BACKGROUND INFORMATION (pp 5-8) |  |
| 1.1 Overview and Dept. history |  |
| 1.2 Mission | Creiterion 2 (pp 27-31) |  |
| 1.3 Goals and PLOs |  |
| 1.4 Changes in goals and PLOs |  |
| 1.5 Recommendations from last program review and Accrediting body recommendations |  | See 2019 ABET review report |
| **2.0 Program Data** | Appendix D (pp 267 – 294) | See CSMS Program Review Self Study Report |
| 2.1 Student Data in the Program |
| 2.2 Impact of enrollment trends |
| **3.0 Curriculum and Instruction** | Criterion 5 (pp 96-112) |  |
| 3.1 Curriculum |  |
| 3.2 Compliance with EO 1071 | Yes |  |
| 3.3 Comparison with peer institutions |  | All comparative institutions are ABET accredited. |
| 3.4 GE courses | N/A |  |
| 3.5 Service courses | N/A |  |
| 3.6 Minors, Credential or certificate programs |  | See CSMS Program Review Self Study Report |
| 3.7 Opportunities for student RSCA  |  |
| 3.8 Academic advising | Criterion 1 (pp 9-25) |  |
| 3.9 Masters theses, projects and dissertations | N/A |  |
| 3.10 Innovations in the Curriculum | Criterion 4 (pp 86-93) |  |
| **4.0 Assessment of PLOs** | Criterion 3 (pp 36-48)Criterion 4 (pp 49-95) |  |
| 4.1 Program learning outcomes and curriculum map  |  |
| 4.2 Comprehensive Assessment Plan |  |
| 4.3 PLO Assessment  |  |
| 4.4 Faculty involvement in assessment |  |
| 4.5 Further education of alumni |  |
| 4.6 Student and alumni awards/achievements |  |
| 4.7 Assessment of GE courses offered by Program | N/A |  |
| **5.0 Department Faculty** | Criterion 6 (pp 113-124) | See CSMS Program Review Self Study Report |
| 5.1 Student feedback on instruction |
| 5.2 Trends in percent of courses taught by faculty rank |
| 5.3 Faculty scholarly activities faculty research |
| 5.4 Faculty service to the University |
| **6.0 Student Engagement, Outreach and Recruitment** | Criterion 1 (pp 9-23) | See CSMS Program Review Self Study Report |
| 6.1 Description of activities |
| 6.2 Effectiveness of activities |
| **7.0 Program Recommendations** |  | See CSMS Program Review Self Study Report |
| **Five Year Plan**  | Criterion 8 (pp 131-135) |
| Appendix A: Report from Previous Program Review | BACKGROUND INFORMATION (pp 8) |  |
| Appendix B: Students in the Major | Appendix D (pp.290) | See CSMS Program Review Self Study Report |
| Appendix C: Graduation and Persistence Rates |
| Appendix D: Faculty Utilization | Appendix D (pp.294) |
| Appendix E: Catalog Description of Each Program | Criterion 5 (pp96-104) |  |
| Appendix F: GE Assessment | N/A |  |
| Appendix G: Masters Theses, Projects and Dissertations | N/A |  |
| Appendix H: Curriculum Map for Each Academic Degree Program | Criterion 4 (pp 51) |  |
| Appendix I: Assessment plan(s) | Criterion 4 (pp. 49-93) |  |
| Appendix J: Faculty Composition | Appendix D (pp.294) | See CSMS Program Review Self Study Report |
| Appendix K: Faculty Summary Vitae | Appendix B (pp 223-261) |
| Appendix L: Instructional faculty types in the Programs’ courses | N/A |
| Appendix M: Recommendations for External Reviewers | N/A |

**VERIFICATION OF FACULTY REVIEW**

Each full-time faculty member on duty in the Department of Computer Science has been asked to sign the following statement:

By my signature below, I am verifying that I have had the opportunity to see and read the department’s Self-Study Report that is being submitted to the University Program Review Subcommittee.

|  |  |
| --- | --- |
| **Signature** | **Date** |
| Eun-Young “Elaine” Kang |  |
| Russell J. Abbott |  |
| Vladimir Akis |  |
| Navid Amini |  |
| Huiping Guo |  |
| Jiang Guo |  |
| Raj S Pamula |  |
| Behzad Parviz |  |
| Mohammad Pourhomayoun |  |
| Chengyu Sun |  |
| Zilong Ye |  |
| Yuqing Zhu |  |

**ECST Graduation Initiative Progress**

The overall goal of our College GI 2025 is to accelerate student graduation while fully developing them to be successful professionals in engineering, computer science or technological fields. The rigorous pre-requisite structure of engineering and computer science undergraduate curriculum makes it clear that only the students who are able to complete their first year calculus and basic science courses successfully can potentially graduate in four years. However, most of our students struggle in foundational math and basic science, and many of them take three years or more to complete the Calculus and Physics sequence (with multiple repeats). Hence, a primary focus of our GI2025 initiative is to increase student success during the first year. The following sections describe the foundational efforts of ECST GI2025 initiative: 1) FYRE program; 2) Advising and Student Support; 3) Engaged Teaching and Learning, which involves all engineering and computer science programs.

1. **First Year Experience in ECST (FYrE) Program:**

Established in Fall 15, FYrE is a major component of the ECST GI2025 initiative that aims at accelerating student progress and success by offering comprehensive (Academic, Social and Professional) support during the first year. FYrE integrates a number of evidence-based student support and intervention services including learning communities, block scheduling, Supplementary Instruction (SI), individual and group mentoring, peer cohorts, project-based learning, etc. to mitigate the barriers faced by first generation college students. The implementation of the FYrE program has yielded very positive impact on student progress during the 1st year and their performance beyond the first year. The most recent data from the FYrE program shows that, among the Fall 19 freshman cohorts, 69% of FYrE students were able to complete the major-specific criteria (MSC) during their first year, while only 21% of non-FYrE students completed the MSC in the same period.

1. **Advising and Student Support:**

Establishing an effective structure that provides holistic student advising and support is one of our core commitments in the ECST 2015-2020 strategic plan, as well as an important component in our GI2025 initiative. The progress in this area during the last several years is summarized below:

* **Enhanced Structure -** In Fall 2016, ECST established the Advising Council that consists of all professional advisors from Student Success Center, principal faculty advisors for all departments, and the department chairs. The Advising Council has played an essential role to support the collaborative advising model in the College. It offers an open-channel for communication, a platform to share ideas and best practice, and opportunities for advisor training and professional development. It also provides a venue for sharing campus advising initiatives and training of new advising tools.
* **Closer Collaboration -** Collaborative efforts of both faculty and professional advisors has helped to provide more coherent advising and help students to grow academically, professionally and socially. The collaborative advising model also facilitates proactive planning for advising campaigns to accelerate graduation. Since Fall 17, the ECST Student Success Center (ESSC) has helped the major departments perform “junior advising campaigns” using EAB to help junior –level students better understand major requirements and to avoid unnecessary delay to their senior design project.
* **Cultural Change -** As more advisors embraced the idea that advising is an essential educational practice, we started to integrate advising in various milestone courses to help students to gain knowledge of their own degree requirements, develop academic planning skills, create proactive attitude and enhance the sense of responsibilities. These soft skills are critical to their success not only in academic study but also in their professional careers. Currently, ESSC advisors introduce “basic academic planning, degree planner, and GET” in ENGR1500 and CS1010 (IHE) courses, and provide a section to discuss “career planning” in ENGR3010 courses.
* **Enhanced Procedure -** The Advising Council proposed progress to degree policy for ECST majors to enable early detection of students who need additional support; provide early intervention and help students to major in an area that they can be successful. With the guidance of UGS, we are revising the policy for advising guidelines to help pre-major students achieve milestones in a timely fashion.
1. **Engaged Teaching and Learning**:

Teaching and learning is the centerpiece of student success. A key strategic area in ECST is to nurture a community of deeply engaged faculty and staff committed to enable student success through quality curriculum, responsive teaching and active learning, and this is also a focus in our GI2025 initiative to address high DFW rates in some major courses.

In 2015, the College of ECST launched the Teaching and Learning Academy (T&L) to bring faculty across disciplines together (including both T/TT faculty and lecturers) to exchange ideas and share best practices in teaching and learning. Currently, the T&L Academy consists of a summer workshop and a series of short, informal faculty learning community meetings called Teacher-Scholar Forums throughout the academic year. To provide inclusive and equitable learning experiences for our students, many T&L Academy workshops and meetings were designed to increase the awareness of implicit bias, improve the understanding of the first-generation students, and inclusive teaching strategies. Table 1 lists the T&L academy summer workshops topics and some representative discussion topics in the year-around meetings.

Table 1. Representative ECST Teaching and Learning Summer Workshop and Teacher-Scholar Forum Topics.

|  |  |
| --- | --- |
| T&L Academy Summer Workshop | Teacher-Scholar Forum  |
| 2015: Active Learning Strategies to enhance student success in ECST 2016: Create an inclusive and Engaging learning experience2017: Strategies for effective mentoring the first generation college students2018: Rewarding teaching and learning experiences2019: Equity mindedness to meet the students where they are | * Who are our students: sharing ideas/practice to address our students’ learning needs
* Effective Learning Assessment in large engineering lectures
* Engineering Education Grant ABC
* Roles of a Professor: a progressive view of a faculty with 30+ years in classroom
* Five effective strategies of teaching
* Flipped ME2040: course structure and student performance
* Simple techniques to enhance classroom dynamics
 |

In addition, the College has emphasized professional development for faculty. The faculty review process has been strengthened to encourage reflective teaching with continuous assessment and improvement. Departments strongly encourage faculty to participate in CETL workshops, and the College has supported faculty (new & experienced) to participate in the NETL (National Effective Teaching & Learning) conference and the American Society of Civil Engineer’s ExCEEd Teaching workshop. As a result, more faculty have applied evidence-based teaching strategies in their classes. In addition, both engineering and CS departments have been engaged in course redesign initiatives to enhance student learning experiences and performance in bottleneck courses with high DFW rate. Such initiatives were led by faculty teams (including both T/TT and adjunct professors) that teach the same courses to discuss the learning outcomes, discuss teaching strategies, and identify ways to offer consistent and engaged student learning experiences.

**College and Program Outreach and Recruitment**

This section describes the ECST undergraduate student outreach and recruitment activities that engage all degree programs. The information presented here augments the description of student engagement activities in the ABET accreditation self-study report (discussed in Section 6 of that report) as indicated in MSSR matrix.

Currently, the College of ECST has two primary pre-college outreach programs, MESA and LaunchPad, as described below:

**MESA Schools Program** offers pre-college students college and career exploration in the STEM fields. The MESA University Center housed in our College worked closely with about 30 middle school and high schools in our local communities and sponsored multiple events that featured activities and workshops to increase the awareness of engineering, computer science and technological careers and to prepare high school students for college. Signature MESA events that we sponsored include *preliminary MESA Day* and the Regional Science Bowl Competition sponsored by the US department of Energy, where middle and high school students compete in design challenges or math/science knowledge contests. ECST students in Civil, Electrical and Mechanical engineering and Computer Science majors have been deeply engaged in MESA activities, serving as volunteers, peer-mentors, event moderators and judges in the competition.

**LaunchPad Program** was established in 2017 to broaden the participation of women who choose engineering and computer science as a major among females in our local high schools. It is also an ECST initiative to increase the number of incoming Cal State LA female students who choose engineering and computer science as a major. LaunchPad is a two week summer program where high school female students are introduced to a few of the exciting ways that engineers and computer scientists can make the world a better place. The students learn about computing and data science, how to make a cell phone control a robot, and propose ideas to enhance the environment.

In addition to the activities described above, ECST regularly hosts community outreach events that engage students, faculty, advisors, industrial representatives and community partners year around, as summarized below:

* ECST Annual Open House (Boeing Day): Each October, the College of ECST hosts an Open House in partnership with Boeing to introduce engineering and computer science majors and careers to middle and high school students, teachers, and parents. Activities include lab tours, student organizations projects, workshops and hands-on projects hosted by Boeing engineers.
* National Engineering Week: Each February, the College celebrates the National Engineering Week with fun events, including workshops, hands-on activities, student club activities and project demonstrations, to increase the awareness of the engineering and computer science careers among students and communities. Many of the events also focus on career preparation for our students and helping them to network with potential employers.
* ECST Student Organization Outreach: Our College provides many opportunities for students to engage in student clubs and organizations. The following list shows our current active student organizations that are part of national professional societies:
	+ - * Association of Computing Machinery (ACM) Student Chapter
			* American Society of Civil Engineers (ASCE) Student Chapter
			* American Society of Mechanical Engineers (ASME) Student Chapter
			* Biomedical Engineering Society Student Chapter
			* Engineers without Borders
			* Institute of Electrical and Electronics Engineers Student Chapter
			* Society of Automotive Engineers (SAE)
			* Mini-Baja Club
			* Structural Engineers Association
			* MakerClub
			* National Society of Black Engineers (NSBE)
			* Society for Women Engineers (SWE) Student Chapter
			* Society of Hispanic Engineering and Science (SHESS)
			* Robosub

Many of these student organizations and clubs not only provide rich extracurricular activities for professional development, but also provide outreach and community service. Members from student organizations served as mentors to kids in local communities and ambassadors to introduce careers in engineering and computer science.

Aside from LaunchPad, the goals of our College and department level outreach activities were designed to increase the awareness of engineering and computer science among the local communities rather than recruitment. The outreach efforts have built a strong relationship with MESA middle school and high schools, the local communities, and potential employers. These activities also created valuable learning experiences for our own students, strengthening their communication and leadership skills and deepening their understanding of their professional responsibilities.

LaunchPad, with the goal of increasing women students in engineering and computer science majors, has proved to be very effective. LaunchPad students reported very positive experiences with the program, and usually more than 70% of the participants decided to apply at Cal State LA. The women students from the previous years’ program also served as peer mentors to inspire their peers from their high school to consider majors in STEM areas.

**Department 5-Year Strategic Plan Summary: 2020-2025**

Since Fall 2019, each department of the ECST college has worked on strategic planning for the next five years. The Computer Science department has conducted numerous meetings at the entire department level and various committee levels. The following summarizes strategic plans that the department aims to focus on. It is assumed that the department chair will oversee all the initiatives very closely.

1. **Curriculum**

Traditional Computer Science courses and programs dealt with a core tradition of writing software. In addition, Computer Science adds new fields and areas quite often. Computer Science is growing and changing rapidly as technology continues to advance. Computers now interact strongly with the physical and human world leading to new areas such as: machine learning, Internet of Things (IoT), robotics, cloud computing, and others.

* + The CS MS graduate program is to be modified to incorporate the newer areas while streamlining the existing areas. This is a challenge as there is no easy solution. The faculty are currently in discussion to revise the curriculum. This revision will also be in compliant with the EO1071. We plan to submit this modification by Spring 2020 and make the new program effective in Fall 2021. The whole department is involved in this but the department IAC (Instructional Affair Committee) and the Graduate Studies Committee are leading the initiative.
	+ Based on the new ABET guidelines, the CS BS program has to be realigned. Program modification is currently in discussion and will be implemented next year. This process also requires adding new courses to the core requirements and aligning the four year road maps accordingly. We plan to submit this modification by Spring 2020 and make the new program effective in Fall 2021. The whole department is involved in this but the department IAC (Instructional Affair Committee) is leading the initiative.
	+ We expect to implement new courses in cloud computing, AWS, security, IoT, visualization, and other areas in the next few years (2019-2021). Individual faculty (course creator) and the IAC lead this initiative.
	+ We expect to implement new Certificate Programs to be offered through PAGE. We submitted three proposed certificate programs: in Data Science, Cyber Security, Computer Science Supplementary Authorization for K-12 teachers. The whole department is involved in this but the department IAC (Instructional Affair Committee) and the Graduate Studies Committee are leading the initiative.
	+ We plan to offer some courses in hybrid/online format. Currently, several courses utilize online lecture format in part. The department will seek a viable option to create hybrid/online for these courses without sacrificing teaching and learning quality. ). Individual faculty (course creator) and the IAC lead this initiative

1. **Students**

We plan to implement the following initiatives.

* + Enhance recruitment activities to the CS MS program to increase both resident students and international students for the next five years.
	+ Improve student retention after the first year in both CS MS and CS BS programs.
	+ Further improve undergraduate graduation rates in the next five years.
	+ Meet the Graduation Initiative 2025. It is an ambitious plan to increase the first-time freshmen 6-year graduation rate from 50% (currently) to 62%. On the same token, we need to improve the transfer graduation rate from 40% (currently) to 77%. (Our graduate student graduation rate is already as high as 90% in 3 years or less.)
	+ The department aims to achieve several initiatives mentioned above by more proactive advisement, course redesign for introductory levels, and promoting welcoming instruction environment. These initiatives are on-going efforts and the whole department leads them.
	+ Help students with their job search and PhD applications. This will be led by the graduate studies committee.
	+ Gathering advice from recent graduates who succeeded in landing their first job. This will be led by the graduate studies committee.
	+ Gather input from students regularly and reflect their needs into the curriculum.  Starting from Fall 2020, this will be led by the department Student Affairs Committee.
1. **Faculty**

Our initial plan had us searching for two tenure-track faculty searches in 2019-2020. This initiative was successfully completed and we were able to hire three tenure-track faculty. This initiative was successfully led by the Search Committee.

We plan to implement the following faculty initiatives:

* + Request additional tenure-track faculty—five for the next three years. This will offset the potential retirement of four faculty in the next several years (2021-2025). This is led by the Search Committee.
	+ Increase the part-time faculty pool for the next five years (2021-2025). This is led by the Department Chair.
	+ Improve the faculty research environment by re-evaluating term workload, faculty supervision and encouraging MS Students’ participating in thesis option. This is led by the Department chair and the graduate studies committee. Starting from Fall 2019, this will be an on-going effort.
	+ Increase faculty support for professional development (learn new technologies, create new courses, write grant proposals etc) . Starting from Fall 2019, this will be an on-going effort. This is led by the research committee.
	+ Promote faculty research activities for securing external grants. . Starting from Fall 2019, this will be an on-going effort. This is led by the research committee.
1. **Department/Resources**

We plan to implement the following initiatives.

* + Complete the development of a CS Strategic Plan (2019-2020).
	+ Increase Industry Advisory Board partnerships. Starting from Fall 2019, this will be an on-going effort. This is led by the IAB.
	+ Establish an active alumni network. Starting from Fall 2019, this will be an on-going effort. This is led by the IAB.
	+ Enhance Senior Design Projects sustainability through revamping section format of the senior design courses and seeking external funding more actively for the next five years. This is led by the Senior Design Committee and the IAB.
	+ Find extra funding resources through new Certificate Programs, online courses, and faculty grants in the next five years. The department plans to offer certificate programs from 2021. This is led by the IAC and the research committee.
	+ Increase department visibility in the next five years. Increased visibility would help increase the yield rates among the admitted students. Starting from Fall 2020, the department will start more active advertisements to local community and beyond (e.g. visiting campuses and redesigning web pages).