

**ACADEMIC SENATE
Of
CALIFORNIA POLYTECHNIC STATE UNIVERSITY
San Luis Obispo, CA**

AS-1019-26

**RESOLUTION ON PROPOSED NEW DEGREE PROGRAM: MASTER OF SCIENCE IN
COMPUTER ENGINEERING**

Impact on Existing Policy: None

- 1 WHEREAS, The Computer Engineering Department has a strong history of educating
2 students in the design and development of computing systems and
3 technologies; and
- 4 WHEREAS, Computer Engineering is a field that plays a central role in modern society
5 through its contributions to computing systems, embedded systems, and
6 emerging technologies such as artificial intelligence; and
- 7 WHEREAS, Computer Engineering education at Cal Poly emphasizes Learn by Doing
8 through applied, practice-based learning experiences; and
- 9 WHEREAS, The proposed Master of Science in Computer Engineering provides
10 advanced study in the design, analysis, and implementation of computer
11 hardware and software systems; and
- 12 WHEREAS, The proposed program prepares graduates for advanced careers and
13 leadership roles in high-demand industries; and
- 14 WHEREAS, The proposed Master of Science in Computer Engineering builds upon
15 existing faculty expertise, facilities, and interdisciplinary collaboration
16 within the College of Engineering; and
- 17 WHEREAS, The proposed Master of Science in Computer Engineering has been
18 approved by the Computer Engineering Department curriculum committee,
19 the College of Engineering curriculum committee, and the Academic Senate
20 Curriculum Committee; therefore be it

21 RESOLVED: That the Academic Senate of Cal Poly approves the new degree program
22 for the Master of Science in Computer Engineering for final review by the
23 Chancellor's Office.

Proposed by: Computer Engineering Department

Date: May 19, 2026

Academic Programs, Innovations and Faculty Development
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**California State University
Degree Program Proposal Template
Revised April 2022**

Please note:

- Campuses may mention proposed degree programs in recruitment material if it is specified that enrollment in the proposed program is contingent on final program authorization from the CSU Chancellor's Office.
- Approved degree programs will be subject to campus program review within five years after implementation. Program review should follow system and Board of Trustee guidelines (including engaging outside evaluators) and should not rely solely on accreditation review.
- ***Please refer to the document "Tips for Completing a Successful Program Proposal" before completing the Program Proposal Template.***

Cal Poly Instructions:

- **Do not remove** the prompts from the template.
- Respond to each prompt directly under the item.
- Self-Support programs must also complete a budget. Ask APP for the template if you have not received it.
- Update the Index upon completion of the template so the page numbers will update. Click in the index, select update table, and then select update entire table.
- Using the Review tab in Word, insert comments where you have questions for APP.
- APP will do a preliminary review of the proposal before it is circulated to curriculum committees and after any changes are made as a result of campus reviews. Once the preliminary review is completed, make all subsequent changes with Word Track Changes turned on and save updated versions with v1, v2, v3, etc. appended to the document name.
- Complete the faculty checklist. It will be appended to the beginning of this document before submittal to the CO.
- Once all approvals on campus have taken place, APP will remove this cover page and replace it with a Cal Poly cover page.



Degree Designation (e.g., BA, MS, etc.)	MS
Campus Specific Degree Title	Computer Engineering
CSU Degree Title	Computer Engineering
CIP Code	14.0901
CIP Code Degree Title	Computer Engineering
Requested Start Term	Fall 2027
College	College of Engineering
Department	Computer Engineering
Proposer Contact Name(s), Position(s), and Email(s)	Andrew Danowitz, Associate Professor, adanowit@calpoly.edu

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1. **Program Type (Select all that apply)**

- a. New Program (previously authorized as a projection by the BOT)
- b. Fast Track (bachelor's or master's only; not already on Campus Academic Plan)
- c. State-Support
- d. [Self-Support](#)
- e. Delivery Format:
 - Fully face to face
 - Hybrid
 - Fully online

Note: For new Pilots and Pilot Conversions use:

- [Pilot Proposal template](#)
- [Pilot Conversion template](#)

2. **Program Identification**

- a. Campus

California Polytechnic State University, San Luis Obispo

- b. Full and exact degree designation and title (e.g., Master of Science in Genetic Counseling, Bachelor of Arts in History).

Master of Science in Computer Engineering

- c. Date the Board of Trustees approved adding this program projection to the Campus Academic Plan.

9/18/2023

- d. Term and academic year of intended implementation (e.g., fall 2024).

Fall 2026

- e. Total number of units required for graduation. This will include all requirements (General Education and campus-specific graduation requirements), not just major requirements.

30 Semester Units

- f. Name of the department(s), division, or other unit of the campus that would offer the proposed degree program. Please identify the unit that will have primary responsibility.

Department of Computer Engineering

- g. Name, title, and rank of the individual(s) primarily responsible for drafting the proposed degree program.

Andrew Danowitz, Associate Professor of Computer Engineering

- h. Statement from the appropriate campus administrative authority that the addition of this program supports the campus mission and will not impede the successful operation and growth of existing academic programs.

See Attachment 1: Letter of Support from Robert Crocket, Interim Dean, College of Engineering, April 29, 2025.

- i. Any other campus approval documents that may apply (e.g., curriculum committee approvals).

Letter of curriculum committee approval will be provided after required edits/changes from APP.

See Attachment 2 [pending]

- (a) Computer Engineering Department Curriculum Committee approval, date
- (b) College of Engineering Curriculum Committee approval, date
- (c) Ad Hoc Graduate Curriculum Committee approval, date
- (d) Academic Senate Curriculum Committee approval, date
- (e) Academic Senate Resolution, date
- (f) Presidential approval, date

- j. Substantive Change Screening Form:

- i. The [WASC Senior College and University Commission \(WSCUC\)](#) requires that the campus Accreditation Liaison Officer submit a Substantive Change Screening Form via the Accreditation Management portal for any proposed degree program. If it is determined that no substantive change review is required, please attach a separate document containing the email response from WSCUC.

See Attachment 3: November 30, 2023 notification from WSCUC that substantive change review is not required for this new degree program.

- ii. If the proposed program is subject to WSCUC substantive change review, the campus shall submit a copy of the WSCUC Substantive Change proposal in lieu of this CSU proposal format. If campuses choose to submit the WSCUC Substantive Change Proposal, they will also be required to submit a program assessment plan using the format found in the CSU program proposal template.

Not applicable

- k. Proposed Classification of Instructional Programs (CIP) and CSU Degree Program Code.

Using a master list of degree programs and reporting codes, campuses report data to the Chancellor's Office on applications, enrollments, and degrees granted. To ensure consistent record keeping, campuses use the same pairings of generic systemwide degree program titles and corresponding reporting codes. The required curriculum for each CSU degree program title (and level) is roughly comparable across the system and reflects the Classification of Instructional Programs ([CIP](#)) program definition for each CIP

code. Campuses are allowed to use a slightly different campus-specific title, as long as it is reasonably similar to the official title. The program codes, however, remain the same across the system. The CSU Degrees Database has fields for the official “generic” CSU title and a campus-specific title.

Campuses should suggest one CSU degree program code and one corresponding CIP code. The official list of approved systemwide degree titles and their assigned CSU and CIP reporting codes may be found in the [CSU Program Codes and Corresponding CIP Codes](#). If an appropriate CSU code does not appear on the system-wide list, you can search CIP 2020 <https://nces.ed.gov/ipeds/cipcode/default.aspx?y=56> to identify the code that best matches the proposed degree program. The CSU degree program code and CIP code will be assigned when the program is approved by the Chancellor.

CSU code: 09094, CIP code: 14.0901

A program that generally prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of computer hardware and software systems and related equipment and facilities; and the analysis of specific problems of computer applications to various tasks. Examples: [Computer Systems Engineering]

3. Program Overview and Rationale

- a. Provide a brief descriptive overview of the program citing its 1) purpose and strengths, 2) fit with the institutional mission or institutional learning outcomes and 3) the compelling reasons for offering the program at this time.

The M.S. Computer Engineering program will equip students with advanced knowledge and skills at the intersection of Electrical Engineering and Computer Science. It allows students to explore advanced topics and techniques in areas such as embedded systems, digital systems design, computer architecture, and high-performance software design. In the spirit of Cal Poly’s Learn By Doing philosophy, the program emphasizes practical applications, preparing graduates for advanced careers in various industries including technology, telecommunications, automotive, aerospace, and beyond. In line with Cal Poly’s Ready Day One philosophy, graduates will choose one of two culminating experiences: an extensive hands-on research through the form of a graduate thesis or an industry-sponsored project experience that will allow them to directly transition into their career roles.

One major strength of our program is our interdisciplinary faculty. Several members of the department have joint appointments or active research collaborations with departments throughout the College of Engineering. These existing relationships will provide our students with opportunities to tackle challenging, meritorious computing projects across the wide range of disciplines where advanced computer hardware and computing techniques are required.

Although Cal Poly already offers an undergraduate degree in Computer Engineering, there is significant industry demand for graduates with advanced training in this field. The U.S. Bureau of Labor Statistics projects the labor market for Computer Hardware Engineers to grow at a rate of 7% per year for the decade of 2023-2033.¹ While entry level jobs in this field typically only require a bachelor’s degree, as the U.S. Bureau of Labor Statistics points out, “Some large firms or specialized jobs may require a

¹ <https://www.bls.gov/ooh/architecture-and-engineering/computer-hardware-engineers.htm>

master's degree in computer engineering."² Additionally, a Master's is typically required for the job of Computer and Information Research Science which is projected to grow at 26% per year from 2023–2033. As the same agency states, "Computer and information research scientists typically need a master's or higher degree in computer science or a related field."³ This demand, coupled with Cal Poly Computer Engineering's ranking as the #1 Computer Engineering program at a non-doctoral level institution (*U.S. News & World Report*, "Best Colleges Rankings," 2025)⁴ makes Cal Poly well positioned to be a leader in the provision of a top-quality Computer Engineering master's degree.

The rapid advancement and widespread adoption of artificial intelligence (AI) further strengthens the long-term demand for graduate-level education in Computer Engineering. AI systems depend fundamentally on advances in computing hardware, embedded systems, high-performance architectures, networking, and hardware–software co-design—core areas of Computer Engineering expertise. While AI tools may automate certain routine tasks, they simultaneously increase demand for engineers capable of designing the underlying computational infrastructure that enables AI at scale. Analysis from the Center for Strategic and International Studies⁵ highlights that meeting the expanding AI infrastructure build-out will require a workforce with specialized technical capabilities beyond basic coding skills.

Federal employment projections continue to show strong structural demand in computing-related occupations. Overall, Computer and Information Technology occupations are projected to grow much faster than the average for all occupations from 2024 to 2034, with roughly 317,700 openings per year due to growth and replacement needs.⁶

Industry demand for AI-capable systems, data centers, and high-performance infrastructure further underscores this trend. The AI computing and data center build-out is expected to surge as organizations expand capacity to host advanced AI workloads, placing sustained pressure on engineering talent to design, optimize, and maintain these systems.⁷ Reports also note a growing shortage of engineers and technicians capable of supporting the rapid expansion of AI infrastructure, particularly for data center design, power systems, and high-density computing environments.⁸

These developments suggest that AI is not reducing long-term demand for computer engineers, but rather raising the bar on specialization and technical expertise, making graduate-level preparation increasingly valuable. A Master of Science in Computer Engineering positions Cal Poly graduates to move beyond routine implementation roles and into advanced systems design, research and development, and leadership in AI-enabled technologies.

² <https://www.bls.gov/ooh/architecture-and-engineering/computer-hardware-engineers.htm#tab-4>

³ <https://www.bls.gov/ooh/computer-and-information-technology/computer-and-information-research-scientists.htm>

⁴ <https://www.usnews.com/best-colleges/rankings/engineering-computer>

⁵ <https://www.csis.org/analysis/genais-human-infrastructure-challenge-can-united-states-meet-skilled-trade-labor-demand?>

⁶ <https://www.bls.gov/ooh/Computer-and-Information-Technology>

⁷ <https://www.deloitte.com/us/en/insights/topics/emerging-technologies/growing-demand-ai-computing.html?>

⁸ <https://spectrum.ieee.org/ai-data-centers-engineers-jobs?>

The M.S. Computer Engineering program will provide a path for students to continue their Computer Engineering education beyond the B.S. Computer Engineering curriculum. It will also enable the Computer Engineering Department to recruit and retain top faculty candidates by providing Computer Engineering faculty with professional development opportunities through engaging in graduate-level student research.

Although this program is being presented as “new,” it effectively already exists in practice. Currently, Computer Engineering undergraduate students who wish to pursue graduate study must enroll in either the M.S. in Electrical Engineering or the M.S. in Computer Science due to the absence of a dedicated M.S. in Computer Engineering. As a result, Computer Engineering faculty are already advising, teaching, and supervising graduate students whose academic focus is distinctly Computer Engineering. This proposal formalizes an existing academic pathway and provides appropriate disciplinary alignment and degree designation for work that is already occurring within the university. The establishment of a state-supported M.S. in Computer Engineering reflects the maturation of the department and aligns graduate education with the structure of the undergraduate program.

This program is proposed as state-supported because it serves the core academic and workforce mission of the California State University system. Computer Engineering is central to California’s economy, which leads the nation in semiconductor design, embedded systems, aerospace, telecommunications, cybersecurity, and AI-enabled technologies. The proposed program supports the preparation of highly skilled engineers for these strategically important industries and provides an accessible, affordable pathway for California residents to obtain advanced technical training.

Unlike self-support programs, which are typically designed for specialized professional markets or mid-career working professionals at premium tuition rates, the proposed M.S. in Computer Engineering is intended to serve:

- Continuing Cal Poly undergraduates seeking advanced preparation
- California residents preparing for high-demand technical roles
- Students pursuing research and innovation aligned with public-sector and regional workforce needs

Because this program builds upon existing faculty expertise, infrastructure, and instructional capacity, and because graduate students are already being supported in closely related degree programs, the transition to a state-supported M.S. in Computer Engineering represents an academic realignment rather than the creation of a new revenue-generating enterprise, where it is expected that M.S. students in EE and CS who would work with a Computer Engineering advisor will enroll in the Computer Engineering M.S. program. Indeed, even after the establishment of an independent M.S. in Computer Engineering degree program, it is anticipated that all 4000 and 5000 level classes with the exception of the culminating experience will be open for enrollment for students from EE, CS, and CPE M.S. students and advanced CPE undergraduates. The Ethics course proposed for this degree program will additionally be cross-listed with the philosophy department and open to advanced Philosophy undergraduates as well. Likewise, we envision CPE Master’s students enrolling in 4000 and 5000 level coursework offered by other departments. This sort of interdisciplinary, inter-degree program enrollment would be made significantly more difficult to maintain if the CPE M.S. program were transformed into the lone extended education degree program within the Noyce School of Applied Computing. Establishing the program under state support ensures equitable access to courses for all Noyce-affiliated Master’s students and advanced undergrads, strengthens the Teacher-Scholar model, and reinforces Cal Poly’s public mission.

Keeping the program as public support will also enable smoother transition pathways when we expand the computer engineering M.S. program to feature a blended B.S. M.S. option for degree enrollment.

Understanding the need for a Computer Engineering master's program starts with recognizing the history of Computer Engineering at Cal Poly and its relation to the rapid development in computer-related technology. The Computer Engineering baccalaureate program turned out its first graduate in 1990, which was a time when electrical engineering and computer science were both well-established fields. Being that computer engineering was a relatively new field, creating a computer engineering program at that time rather than a computer engineering department made the most sense as a viable major could be created by drawing from existing computer science and electrical engineering curricula.

The rate of change in computer technology and the overall availability of computers and computer-based applications in the last 36 years has changed many aspects of the engineering landscape. Computers and computer-controlled devices have become ubiquitous. During this time, the notion of computer engineering as a cross between computer science and electrical engineering became outdated and limiting. In essence, the field of computer engineering has distanced itself from computer science and electrical engineering and evolved into its own distinct and widely recognized discipline.

The relatively recent creation of the Computer Engineering Department represented the first step in acknowledging the unique needs of Computer Engineering education at Cal Poly. The next step in this process was the complete retooling of the Computer Engineering curricula, a process that was initiated by Cal Poly's switch from the quarter system to semesters. Creating a Computer Engineering master's program represents the final step in this process as it will provide a path for both Computer Engineering students to be maximally prepared for advanced technical employment and/or continued graduate education and removes current limits/barriers faced by Computer Engineering faculty members in the area of professional development and their support of Cal Poly's Teacher-Scholar Model. The newly created Noyce School of Applied Computing currently provides funding for both research and instructional-based initiatives for Computer Engineering, Electrical Engineering, and Computer Science departments. Additionally, the Computer Engineering Industrial Advisory Board has been expressing the need for a Computer Engineering master's program since the Board's inception in 2005.

- b. Provide the proposed catalog description. The description should include:
 - i. a narrative description of the program

The Master of Science in Computer Engineering (MS CPE) enables students to build on the foundation they gained from their undergraduate education and/or related work experience. The MS CPE program design is similar to other engineering-based master's programs in that it initially provides students with core knowledge associated with computer engineering related topics, then allows students to use an independent thesis or supervised project to extend that basic knowledge by focusing their studies on specific topics. The field of computer engineering encompasses a vast array of topics and applications. The overall goal of the program is to provide students with an advanced understanding of the theory, design, and application of computer systems with a strong emphasis on the interaction between the underlying hardware and software of such systems.

Examples of specialties associated with computer engineering include the design and implementation of embedded systems, computer architectures, cyber security, computer networks, operating systems, etc., as well as the integration of artificial intelligence in these areas.

The MS CPE program is primarily intended for students with an undergraduate degree in Computer Engineering, but also supports students with degrees and/or experience in Computer Science or Electrical Engineering. The program requires completion of a core curriculum, directed electives, and either an independent thesis or supervised project for a total of 30 semester units.

ii. admission requirements

Students admitted to the Computer Engineering Master's Program must have completed undergraduate studies with a GPA of 3.0 or higher with a major or minor in Computer Engineering, Electrical Engineering, Computer Science, Software Engineering, or a related field. Applicants should also have taken the equivalent of:

- CSC 2050 System Software Mechanics
- CPE 3160 Microcontrollers and Embedded Applications
- CPE 3201 Introduction to Computer Security
- CPE 3300 Computer Architecture

Students without these courses may be admitted conditionally, taking up to 8 units (not applicable to the degree) in these areas to make up for any deficiencies.

- iii. a list of all required courses for graduation including electives, specifying course numbers, course titles, prerequisites or co-requisites (ensuring there are no "hidden prerequisites" that would drive the total units required to graduate beyond the total reported in 2e above), course unit requirements, and any units associated with demonstration of proficiency beyond what is included in university admission criteria.

Required courses:

- **Core Courses (9 units):**
 - CPE 5505: Ethics for Computer Engineering (3 units)
Prerequisites: Graduate standing or consent of the instructor
 - CPE 5300: Computer Microarchitecture (3 units)
Prerequisites: Graduate standing, CPE 3300 Computer Architecture, or consent of instructor
 - CPE 5590: Graduate Research Methods (3 units)
Prerequisites.: Graduate standing or consent of the instructor
- **Culminating Experience (6 units):**
 - CPE 5598: Master's Project (6 units)
Prerequisites: Graduate standing, consent of advising instructor, may not be taken if student has credit in Thesis (CPE 5599 Master's Thesis).
 - OR**
 - CPE 5599: Master's Thesis (6 units)
Prerequisites: Graduate standing, consent of advising instructor, may not be taken if student has credit in Project (CPE 5598 Master's Project).

- **5000-level CPE, CSSE, or EE Electives (3-4 units)*:**
 - CPE 5350 Digital Systems Design (3 units)
Prerequisites: Graduate standing, and CPE 3160 Microcontrollers and Embedded Applications, or CPE 3300 Computer Architecture, or EE3329 Cyber-Physical Systems
 - CPE 5420: Advanced High Performance Embedded Systems (3 units)
Prerequisites: Graduate standing, and CPE 4420 High-Performance Embedded Systems or consent of instructor
 - CPE 5564: Research Topics in Computer Networks (3 units)
Prerequisites: Graduate standing, and CPE 4464 Introduction to Computer Networks or CPE 4220 Network Security or consent of instructor
 - CPE 5500 Directed Study (1-4 units)
Prerequisites: Graduate standing and consent of instructor
 - CPE 5660: Computer Systems (3 units)
Prerequisites: Graduate standing, CPE 3300 Computer Architecture
 - CSC 5100 Modern Software Engineering (3 units)
Prerequisites: Senior standing and CSC 307 Software Engineering I, CSC 308 Software Engineering II or CSC 3100 Software Engineering III; or graduate standing
 - CSC 5113 Computing Education Research and Practice (3 units)
Prerequisites: Senior standing or graduate standing
 - CSC 5170 Special Advanced Topics in Software Engineering (1-4 units)
Prerequisites: Graduate standing, CSC 307 Software Engineering I, CSC 308 Software Engineering II, or CSC 3100 Software Engineering III; and consent of instructor
 - CSC 5201 Computer Security and Privacy (3 units)
Prerequisites: Senior standing and CPE/CSC 321 Computer Security or CPE/CSC 3201 Introduction to Computer Security; or graduate standing and consent of instructor
 - CSC 5210 Software Security (3 units)
Prerequisites: CSC 307 Software Engineering I or CSC 308 Software Engineering II or CSC 3100 Software Engineering III and CPE/CSC 321 Computer Security or CPE/CSC 3201 Introduction to Computer Security; or graduate standing and consent of instructor
 - CSC 5220 Advanced Network Security and Privacy (3 units)
Prerequisites: CPE/CSC 321 Computer Security or CPE/CSC 3201 Introduction to Computer Security and CPE 464 Computer Networks or CPE 4464 Advanced Computer Networks; or graduate standing
 - CSC 5270 Special Advanced Topics in Computer Security (1-4 units)
Prerequisites: Graduate standing, CPE/CSC 321 Computer Security, or CPE/CSC 3201 Introduction to Computer Security; and consent of instructor
 - CSC 5281 System Security (3 units)
Prerequisites: CSC 364 Introduction to Database Systems or CSC 3001 Data Structures and Algorithms and CPE/CSC 321 Computer Security or CPE/CSC 3201 Introduction to Computer Security; or graduate standing
 - CSC 5370 Special Advanced Topics in Programming Languages (1-4 units)
Prerequisites: Graduate standing, CSC 430 Programming Languages or CSC 3300 Programming Languages, and consent of instructor

- CSC 5445 Advanced Theory of Decidability and Reducibility (2 units)
Prerequisites: CSC 445 Theory of Computation, CSC 3445 Theory of Computation, or graduate standing
- CSC 5447 Advanced Algorithmic Graph Theory (2 units)
Prerequisites: CSC 349 Design and Analysis of Algorithms or CSC 3449 Design and Analysis of Algorithms, or graduate standing
- CSC 5449 Advanced Algorithm Design and Analysis (4 units)
Prerequisites: CSC 349 Design and Analysis of Algorithms or CSC 3449 Design and Analysis of Algorithms; or graduate standing and consent of instructor
- CSC 5550 Research in Operating Systems (3 units)
Prerequisites: CPE/CSC 453 Operating Systems or CPE/CSC 4553 Introduction to Operating Systems; or graduate standing and consent of instructor
- CSC 5570 Special Advanced Topics (1-4 units)
Prerequisites: Graduate standing, satisfactory preparation in computer science, and consent of instructor
- CSC 5571 Special Advanced Laboratory (1-2 units)
Prerequisites: Graduate standing and consent of instructor
- CSC 5660 Advanced Database Management Systems (4 units)
Prerequisites: Graduate standing, CSC 365 Introduction to Database Systems, or CSC 3665 Database Systems
- CSC 5669 Distributed Computing (4 units)
Prerequisites: CPE/CSC 357 Systems Programming or CPE/CSC 2050 System Software Mechanics; or graduate standing and consent of instructor
- CSC 5670 Special Advanced Topics in Computer Systems (1-4 units)
Prerequisites: Graduate standing, CPE/CSC 453 Operating Systems or CPE/CSC 4553 Introduction to Operating Systems, and consent of instructor
- CSC 5710 Computer Graphics (3 units)
Prerequisites: CPE/CSC 471 Introduction to Computer Graphics or CSC 4710 Introduction to Computer Graphics; or graduate standing and consent of instructor
- CSC 5740 Advanced Compute Shaders in Computer Graphics (3 units)
Prerequisites: CPE/CSC 471 Introduction to Computer Graphics, CSC 4710 Introduction to Computer Graphics, or graduate standing
- CSC 5770 Special Advanced Topics in Computer Graphics (1-4 units)
Prerequisites: Graduate standing, CPE/CSC 471 Introduction to Computer Graphics or CSC 4710 Introduction to Computer Graphics, and consent of instructor
- CSC 5870 Special Advanced Topics in Artificial Intelligence (1-4 units)
Prerequisites: Graduate standing, CSC 480 Artificial Intelligence or CSC 4880 Artificial Intelligence, and consent of instructor
- CSC 5880 Artificial Intelligence (4 units)
Prerequisites: Senior standing and CSC 480 Artificial Intelligence or CSC 4880 Artificial Intelligence; or graduate standing and consent of instructor

- CSC 5887 Advanced Deep Learning (4 units)
Prerequisites: One of the following: CSC 487 Deep Learning, CSC 4667 Deep Learning, DATA/CSC 4610 Fundamentals of Machine Learning, or graduate standing
- EE 5424 Principles of Remote Sensing and Radar (3 units)
Prerequisites: EE 2328 Signals and Systems or graduate standing
- EE 5428 Computer Vision (4 units)
Prerequisites: EE 2328 Signals and Systems or graduate standing
- EE 5504 Software Defined Radio (4 units)
Prerequisites: EE 314 Communication Systems, EE 4314 Communication Systems, or graduate standing
- EE 5509 Computational Intelligence (4 units)
Prerequisites: EE 2328 Signals and Systems or graduate standing
- EE 5513 Modern Control Systems (4 units)
Prerequisites: EE 302 Linear Systems and Signals, EE 3302 Linear Systems and Signals, or graduate standing
- EE 5514 Advanced Modern Control Systems (4 units)
Prerequisites: EE 302 Linear Systems and Signals, EE 3302 Linear Systems and Signals, or graduate standing
- EE 5515 Advanced Digital Signal Processing (3 units)
Prerequisites: EE 314 Communication Systems, EE 2328 Signals and Systems, or graduate standing
- EE 5517 Data Analytics for Cyber-Physical Systems (3 units)
Prerequisites: EE 2328 Signals and Systems, EE 3329 Cyber-Physical Systems, or graduate standing
- EE 5525 Stochastic Processes (3 units)
Prerequisites: STAT 350 Statistics for Engineers or STAT 3310 Statistics for Engineers or graduate standing
- EE 5526 Advanced Digital Communications (4 units)
Prerequisites: EE 416 Digital Communication Systems, EE 4416 Digital Communication Systems, or graduate standing
- EE 5531 Advanced VLSI Design and Validation (3 units)
Prerequisites: EE 431 Computer-Aided Design of VLSI Devices, EE 4431 Computer-Aided Design of VLSI Devices, or graduate standing
- EE 5532 VLSI Test Laboratory (1 unit)
Prerequisites: EE 307 Electronics Laboratory, EE 3306 Electronics, or graduate standing
- EE 5570 Special Advanced Topics (1-4 units)
Prerequisites: Graduate standing and consent of instructor
- EE 5571 Special Advanced Laboratory (1-2 units)
Prerequisites: Graduate standing and consent of instructor
- STAT 5210 Introduction to Engineering Statistics for Graduate Students (3 units)
Prerequisite: Graduate standing; and univariate calculus or equivalent.

- **4000/5000-level CPE or CSSE Electives (11 or 12 units)***
 - Any Advanced Elective Course listed above beyond 3 units
 - CPE 4140: Robotics System Integration (3 units)
Prerequisites: CPE 3160 Microcontrollers and Embedded Applications or EE 3329 Cyber-Physical Systems or graduate standing
 - CPE 4160: Autonomous Mobile Robotics (3 units)
Prerequisites: CPE 3160 Microcontrollers and Embedded Applications
 - CPE 4180: Advanced Microcontrollers and Embedded Applications (3 units)
Prerequisites: CPE 3160 Microcontrollers and Embedded Applications or EE 3329
 - CPE 4220: Network Security (3 units)
Prerequisites: CPE4464 Introduction to Computer Networks or CSC 3001 Modern Application Development
 - CPE 4250: Wireless Security (3 units)
Prerequisites: CSC 3201 Introduction to Computer Security
Corequisite: Phil 3323 Ethics, Science, and Technology
 - CPE 4280: Introduction to Hardware Security (3 units)
Prerequisite: CSC 3201 Introduction to Computer Security, CPE 3300 Computer Architecture
 - CPE 4300: Advanced Computer Architecture (3 units)
Prerequisite: CPE 3300 Computer Architecture
 - CPE 4390: Introduction to Real-Time Operating Systems (3 units)
Prerequisite: CPE 3160 Microcontrollers and Embedded Applications or EE 3329 Cyber-Physical Systems
 - CPE 4420: High-Performance Embedded Systems (3 units)
Prerequisite: CPE 3160 Microcontrollers and Embedded Applications or EE 3329 Cyber-Physical Systems
 - CPE 4455: Design of Fault Tolerant Systems (3 units)
Prerequisite: CPE 3160 Microcontrollers and Embedded Applications or EE 3329 Cyber-Physical Systems
 - CPE 4464: Introduction to Computer Networks (3 units)
Prerequisite: CSC 2050 System Software Mechanics
 - CPE 4465: Advanced Computer Networks (3 units)
Prerequisite: CPE 4464 Introduction to Computer Networks or CSC 3001 Modern Application Development
 - CPE 4650: Scalable Server Implementation and Testing (3 units)
Prerequisite: CPE 4420 High-Performance Embedded Systems or CSC 4553 Introduction to Operating Systems, and CPE4464 Introduction to Computer Networks or CSC 3001 Modern Application Development
 - CPE 4669: Distributed Systems (3 units)
Prerequisite: CSC 2050 System Software Mechanics
 - CPE 5595: Internship/co-op (1-2 units)
Prerequisite: Graduate standing
 - CSC 4230 Web and Cloud Security (3 units)
Prerequisites: CPE/CSC 321 Computer Security or CPE/CSC 3201 Introduction to Computer Security
 - CSC 4270 Special Advanced Topics in Computer Security (1-4 units)
Prerequisites: CPE/CSC 321 Computer Security or CPE/CSC 3201 Introduction to Computer Security, and consent of instructor

- CSC 4570 Special Advanced Topics in Computer Systems (1-4 units)
Prerequisites: CPE/CSC 357 Systems Programming or CPE/CSC 2050 System Software Mechanics, and consent of instructor
- CSC 4669 Distributed Systems (4 units)
Prerequisites: CPE/CSC 357 Systems Programming or CPE/CSC 2050 System Software Mechanics
- CSC 4710 Introduction to Computer Graphics (3 units)
Prerequisites: CPE/CSC 357 Systems Programming or CPE/CSC 2050 System Software Mechanics
- STAT 5210 Introduction to Engineering Statistics for Graduate Students (3 units)
Prerequisite: Graduate standing; and univariate calculus or equivalent.

* Students may petition the program for course substitutions if they identify appropriate courses not listed here that are relevant to their educational goals.

iv. total units required to complete the degree

30 units required to complete the degree

v. if a master's degree, catalog copy describing the culminating experience requirement(s)

Students advance to candidacy after successfully completing 9 units of coursework towards their graduate degree with a 3.0 GPA, including CPE 5590 Research Methods. Once they advance to candidacy, students are offered two choices of culminating experience, CPE 5598 Master's Project and CPE 5599 Master's Thesis. During their second year in the program, students may choose to work in a small group on a large open-ended industry sponsored culminating project under the direction of an external sponsor and faculty supervisor (CPE 5598), or under the direct supervision of a faculty adviser on a master's thesis (CPE 5599). Both options require a final culminating document. Findings of a master's thesis will be of a quality commensurate with a peer-reviewed research article. Findings of the project should be commensurate with industry published white papers. Students will present and defend their work and culminating document before a committee of no fewer than three faculty to achieve approval for graduation. Sponsors for industry projects will be sought from our traditional undergraduate capstone partners, including Cisco, Western Digital, and ROHM Semiconductor, and companies represented on the Computer Engineering Industrial Advisory Board. There are ongoing discussions with Lawrence Livermore National Laboratories, which is looking to expand its existing Master's advisory partnerships with Cal Poly. Details of available projects will be published early in the fall semester. Students wishing to pursue an industry sponsored project will be asked to submit a brief application including their transcript, CV, and a ranked choice of projects to work on. Faculty will review anonymized applications to determine best matches. While all efforts will be made to solicit enough projects for the number of students interested, if there is a shortage of projects students will first be asked for volunteers to pursue a thesis project instead, and students will be asked to apply for projects and selected based on fit and expertise.

Students with existing relationships to companies through previous or concurrent employment may also work with their companies to bring sponsored projects to Cal Poly. Subject to project review and approval by a faculty advisor and the graduate coordinate, and assuming the project can be structured

to meet all Cal Poly sponsored project requirements, students will be allowed to work on these projects as their culminating experience.

Catalog Copy for 5598 and 5599:

CPE 5598 Master's Project: Culminating experience focusing on an applied design or testing project typical of Computer Engineering applied research. Project management skills including budgeting, timelines, resource management, and professional communication will be developed. Total credit limited to 6 units. Graduate standing.

CPE 5599 Master's Thesis: Selection by individual with faculty approval of topic for individual research or investigation resulting in a thesis as the culminating experience for a Master's degree. Total credit limited to 6 units. Graduate standing and consent of the instructor.

4. Curriculum

(These requirements conform to the WSCUC 2013 Handbook of Accreditation)

a. These program proposal elements are required:

- Institutional learning outcomes (ILOs)
- Program learning outcomes (PLOs)
- Student learning outcomes (SLOs)

Describe outcomes for the 1) institution, 2) program and for 3) student learning. Institutional learning outcomes (ILOs) typically highlight the general knowledge, skills, and dispositions all students are expected to have upon graduating from an institution of higher learning. Program learning outcomes (PLOs) highlight the knowledge, skills, and dispositions students are expected to know as graduates from a specific program. PLOs are more narrowly focused than ILOs. Student learning outcomes (SLOs) clearly convey the specific and measurable knowledge, skills, and/or behaviors expected and guide the type of assessments to be used to determine if the desired the level of learning has been achieved. (WASC 2013 CFR: 1.1, 1.2, 2.3)

Cal Poly's University Learning Objectives (ULOs):

All students who complete an undergraduate or graduate program at Cal Poly should be able to:

1. Think critically and creatively
2. Communicate effectively
3. Demonstrate expertise in a scholarly discipline and understand that discipline in relation to the larger world of the arts, sciences, and technology
4. Work productively as individuals and in groups
5. Use their knowledge and skills to make a positive contribution to society
6. Make reasoned decisions based on an understanding of ethics, a respect for diversity, and an awareness of issues related to sustainability
7. Engage in lifelong learning

M.S. Computer Engineering Program Learning Objectives (PLOs):

All graduates of the M.S. Computer Engineering will:

1. Demonstrate technical expertise in computer engineering and apply that expertise in leadership roles such as project direction, team coordination, or technical decision-making;

2. Apply a broad range of computer engineering solutions to solve hardware and software engineering problems;
3. Formulate research questions, evaluate prior work, and design and execute rigorous methods to generate and interpret evidence in computer engineering contexts;
4. Communicate complex technical ideas in written and oral formats to technical and professional audiences;
5. Apply ethical reasoning and evaluate the societal impacts of computer engineering solutions;
6. Integrate diverse perspectives and stakeholder considerations in the development of effective engineering solutions; and
7. Be prepared for professional development through independent learning, training, and continued graduate education.

PLO 6 was specifically developed to address University Diversity Learning Outcomes 1 and 5:

1. Recognize and understand the contributions to knowledge and civilization that have been made by members of diverse cultural and gender groups and other historically marginalized people in the United States and across the world;
5. Define and describe the various issues related to diversity, equity, and inclusion in their respective disciplines.

Student Learning Objectives (SLOs):

All M.S. Computer Engineering students will:

1. Communicate technical concepts effectively by delivering clear and coherent oral presentations and written reports in relation to their graduate thesis or graduate culminating project (5598 or 5599).
2. Design and implement hardware and software systems by completing either a culminating project or thesis, meeting specified design requirements or research goals (5598 or 5599).
3. Demonstrate adherence to ethical standards in computer engineering practice by completing coursework (5505) on professional ethics and integrity, and by applying ethical considerations in design projects and research activities (5598 or 5599).
4. Collaborate productively in multidisciplinary teams and contribute effectively to team projects in Research Methods (5590), Computer Microarchitecture (5300), Master’s project (if applicable), and technical elective.
5. Construct an argument for how a computing solution could be improved through the integration of diverse perspectives by completing coursework (5505) in ethical considerations for computing and Research Methods (5590).

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7
SLO 1				X			
SLO 2	X	X	X				X
SLO 3					X		
SLO 4	X		X			X	
SLO 5						X	

b. These program proposal elements are required:

- Comprehensive Assessment Plan addressing all assessment elements

- Matrix showing where student learning outcomes are introduced (I), developed (D), and mastered (M)

Key to program planning is creating a comprehensive assessment plan addressing multiple elements, including a strategy and tool to assess each student learning outcome. SLOs operationalize the PLOs and serve as the basis for assessing student learning in the major. Constructing an assessment matrix, showing the relationship between all assessment elements, is an efficient and clear method of displaying all assessment plan components.

Creating a curriculum map matrix, identifying the student learning outcomes, the courses where they are found, and where content is “introduced,” “developed,” and “mastered” ensures that all student learning outcomes are directly related to overall program goals and represented across the curriculum at the appropriate times. Assessment of outcomes is expected to be carried out systematically according to an established schedule, generally every five years.

See the Curriculum Map Matrix (Attachment 4) and the Comprehensive Assessment Plan (Attachment 5).

The CPE department will create a Master’s Assessment committee that will be responsible for evaluating program assessment elements and make recommendations for improving the program. The program assessment committee will review the results of each SLO once per five-year evaluation cycle, which works out to examining a different SLO each year. The assessment committee will report its findings and recommendations to the full department faculty at the end of each year. The department will decide on the recommendations and how to implement the suggested improvements, which may involve consultation with outside bodies.

Direct Assessment:

A detailed assessment plan, including mapping of ULOs/PLOs/SLOs, assessment timing, assessment evaluation, and rubrics is included in the attached Comprehensive Assessment Plan.

The CPE department will use the following as direct assessment of the master’s program:

- Embedded questions in exams linked to specific PLOs/SLOs
- Homework assignments, projects, oral presentations, and written reports. We will use rubrics developed around certain criteria for specific learning outcome to be assessed. Each required course will have artifacts linked to SLOs and PLOs.

The MS CPE PLOs were designed after a series of department-wide consultations and were inspired by existing PLOs from other existing MS programs at Cal Poly as well as from Computer Engineering Master's programs offered by other institutions.

As described in the attached plan, the outcomes of these assessments will be summarized and presented to the entire graduate program faculty. We will analyze both attainment of mastery in SLOs based rubric-based direct assessments, including the percentage of students achieving high levels of performance, and progress between the courses where each SLO/PLO is introduced and where expect mastery to be achieved. Based on results, graduate faculty will suggest and pilot changes to curriculum to improve student attainment of SLOs and PLOs. Focus groups and post-graduation surveys of students may also be used to inform program improvements.

Culminating Experience: Thesis or Project:

Progress through the MS degree culminates in the completion of either a research-based thesis or completion of a comprehensive industry sponsored project. Both require a formal written report of a quality commensurate with a peer-reviewed research article or an industry published white paper. Written reports will be evaluated using an appropriate rubric to assess many of the PLOs. The comprehensive assessment plan provides a structure to evaluate achievement of PLOs. The assessment plan aligns the Institutional Learning Outcomes, and the Program Learning Outcomes with the assessment activities, tools, schedule, reports, program findings and closing the loop strategies for program assessment and improvement.

Indirect Assessment:

The following methods will be used to collect data that reflects indirect assessment:

- Surveys/Interviews: The MS degree program will survey graduating students and alumni to gather data and feedback for assessment of program objectives.
- Postgraduate employer/advisory survey: External indicators can serve as excellent feedback that the MS degree is meeting its program goals. The postgraduate employer/advisory survey will help determine the success of graduates in securing positions in academia, private sector, governmental agencies, and non-profits.

c. Indicate total number of units required for graduation.

30 Semester Units

- d. Include a justification for any baccalaureate program that requires more than 120-semester units or 180-quarter units. Programs proposed at more than 120 semester units will have to provide either a Title 5 justification for the higher units or a campus-approved request for an exception to the Title 5 unit limit for this kind of baccalaureate program.

Not applicable

- e. If any formal options, emphases or concentrations are planned under the proposed major, identify and list the required courses. Optional: You may propose a CSU degree program code and CIP code for each concentration that you would like to report separately from the major program.

None planned at this time.

- f. List any new courses that are: (1) needed to initiate the program or (2) needed during the first two years after implementation. Include proposed catalog descriptions for new courses. For graduate program proposals, identify whether each new course would be at the graduate- or undergraduate-level.

(1) New courses needed to initiate the program:

CPE 5500 – Directed Study (1-4)

Individual directed study of advanced concepts. Repeatable up to 4 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

CPE 5505 – Ethics for Computer Engineering (3 units, New graduate course)

Examination of ethical impacts of computer engineering. Ethical reasoning, scouting for and identifying ethical impacts, implementing mitigations. Philosophical examination of topics raised by computer engineering, including consent, privacy, transparency, and potential harms. 3 lectures.

CPE 5590 – Graduate Research Methods (3 units)

Prepares students with skills and techniques to successfully complete project- or thesis- based culminating experience. Topics include engaging with peer-reviewed literature, basic statistical analysis techniques, scientific writing, plagiarism and Intellectual Property issues, and experimental design.

CPE 5595 – Internship or Co-Op (1-2 units)

Advanced study analysis and full-time work experience in student's career field; innovations, practices, and problems in computing. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Repeatable up to 2 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

CPE 5598 – Master's Project (3 units)

Culminating experience focusing on an applied design or testing project typical of Computer Engineering applied research. Project management skills including budgeting, timelines, resource management, and professional communication will be developed. Total credit limited to 6 units. Graduate standing.

CPE 5599 – Master's Thesis (1-6 units)

Selection by individual with faculty approval of topic for individual research or investigation resulting in a thesis as the culminating experience for a Master's degree. Total credit limited to 6 units. Graduate standing and consent of the instructor.

The CPE department currently offers a wide selection of 400- and 500-level courses that will be continued to be offered as 4000- and 5000-level courses in the semester curriculum beginning in Fall 2026. Five of these courses will be available as 5000-level graduate electives for master's students to use towards degree completion. Additionally, fourteen 4000-level courses will be available to master's students to choose as electives as listed in response to question 3biii. These 19 courses will be converted to semesters and in the catalog before the master's program start date, and all will be accessible and open to master's students who meet the program's admission criteria.

(2) New courses needed during the first two years after implementation:

None

- g. Attach a proposed course-offering plan for the first three years of program implementation, indicating likely faculty teaching assignments. (WASC 2013 CFR: 2.2b)

Please see the Course Offerings List, Years 1-3 (Attachment 6).

- h. For master's degree proposals, include evidence that program requirements conform to the minimum requirements for the culminating experience, as specified in Section 40510 of Title 5 of the California Code of Regulations.

This program matches the criteria as follows:

(1) The completion of a specified pattern of study approved by the appropriate campus authority.

The degree proposal was approved at several campus levels: department (including curriculum committee and chair), college (curriculum committee and dean), Academic Innovations and Programs, Graduate Education, Academic Plan Consultative Committee, Academic Senate Curriculum Committee, Academic Senate, Office of the Provost and Executive Vice President, and Office of the President.

(2) A minimum of thirty semester units of approved graduate work completed within a maximum time to be established by each campus.

The MS degree requires completion of 30 semester units.

(A) Not less than 21 semester units (32 quarter units) shall be completed in residence.

The MS degree requires at least 21 semester units be completed in residence.

(B) Not less than one-half of the units required for the degree shall be in courses organized primarily for graduate students.

The MS degree requires a minimum of 18 semester units of 500 level courses (This accounts for 60% of total required units).

(C) Not more than six semester units shall be allowed for a thesis or project.

The MS degree allows a maximum of 6 semester units for a thesis or project.

(3) Satisfactory completion of a thesis, project, or comprehensive examination.

The MS degree requires completion of a thesis or project (6 semester units) and defense of outcome in front of a panel of faculty.

(4) A grade point average of 3.0 (grade of B) or better in all courses taken to satisfy the requirements for the degree, except that a course in which no letter grade is assigned shall not be used in computing the grade point average.

The MS degree requires a grade point average of 3.0 or better in all degree courses is required for graduation.

- i. For graduate degree proposals, cite the corresponding bachelor's program and specify whether it is (a) subject to accreditation and (b) currently accredited. (WASC 2013 CFR: 2.2b)

The primary bachelor's degree program corresponding to the proposed MS is the BS Computer Engineering.

- a) The Computer Engineering Bachelor's Degree program is subject to ABET accreditation.
- b) The bachelor's degree program is currently accredited (last accredited in 2020).

- j. For graduate degree programs, specify admission criteria, including any prerequisite coursework. (WASC 2013 CFR: 2.2b)

Minimum requirements for applicants to be considered are:

- Filing of an application for Graduate Admission via Cal State Apply by the deadlines specified at Cal Poly's [Graduate Admissions: Dates and Deadlines](#) webpage.
- Submission of three letters of recommendation from a source that can attest to the academic capabilities of the applicant. All letters of recommendation must be uploaded through Cal State Apply.
- Statement of purpose describing the student's background and future goals in Computer Engineering.
- Completion of a bachelor's degree in Computer Engineering, Computer Science, Electrical Engineering, or a related field from an accredited college/university with a minimum grade point average of 3.0.

Beyond the minimum requirements, the following considerations are relevant:

As specified in response to question 3.b.ii above on admission requirements, applications must show that they have completed undergraduate coursework in systems programming (CSC 2050), principles of computer security (CPE 3201), computer architecture (CPE 3300 or equivalent), and microcontroller-based systems (CPE 3160 or equivalent). An applicant who lacks prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies (8 unit limit) before moving to classified graduate standing.

All applicants who do not speak and write English as their primary language are required to complete the Test of English as a Foreign Language (TOEFL), taken within the last 2 years with a minimum score of 550 (paper version), 213 (computerized version), or 80 (internet based). Submit scores electronically to Institution Code: 4038. This requirement does not apply if country of citizenship is listed on the Automatic Waiver list [here](#).

- k. For graduate degree programs, specify criteria for student continuation in the program.

Each semester students are enrolled, satisfactory progress toward the master's degree is expected to be made. Satisfactory academic progress is defined as maintaining a 3.0 GPA on all courses used to satisfy the degree requirements listed in Section 3.b.iii above. In addition, per University requirement, "graduate students are required to maintain continuous enrollment from the time of first enrollment in a graduate program until completion of the degree (AS-692-09)."⁹

- l. For undergraduate programs, specify planned provisions for articulation of the proposed major with community college programs.

Not applicable

⁹ <https://grad.calpoly.edu/policies/continuous-enrollment.html>

- m. Roadmaps. Provide a 4-year major and subprogram roadmap and a 2-year transfer roadmap for bachelor's degree programs or an appropriate year major roadmap for master's degree programs that outlines the suggested coursework students should complete each semester.

See the MS CPE Curriculum 2-Year Roadmap provided in Attachment 7.

- n. Describe how accreditation requirements will be met, if applicable, and anticipated date of accreditation request (including the WASC Substantive Change process). (WASC 2013 CFR: 1.8)

Accreditation Note:

Master's degree program proposals

If subject to accreditation, establishment of a master's degree program should be preceded by national professional accreditation of the corresponding bachelor's degree program.

Fast-track proposals

Fast-track proposals cannot be subject to specialized accreditation by an agency that is a member of the Association of Specialized and Professional Accreditors unless the proposed program is already offered as an authorized option, emphasis or concentration that is accredited by an appropriate specialized accrediting agency.

As is standard practice for M.S. degrees in Computer Engineering, other than the university accreditation by WSCUC, the program will not be accredited by another agency. Substantive change screening with WSCUC has been completed. No review is required.

5. Societal and Public Need for the Proposed Degree Program

- a. List other California State University campuses currently offering or projecting the proposed degree program; list neighboring institutions, public and private, currently offering the proposed degree program.

The following CSU campuses currently offer a Master's in Computer Engineering:

- CSU Fullerton: MS Computer Engineering
- CSU Northridge: MS Computer Engineering
- San Jose State University: MS Computer Engineering

Other institutions in California offering a Master's in Computer Engineering:

- University of Southern California: MS Computer Engineering
- UC Santa Barbara: MS Electrical and Computer Engineering
- UC Davis: MS Electrical and Computer Engineering

- b. Describe differences between the proposed program and programs listed in Section 5a above.

	Proposed Program, Cal Poly	CSUF ¹⁰	CSUN ¹¹	SJSU ¹²	USC ¹³	UCSB ¹⁴	UCD ¹⁵
Culminating Experience							
Thesis	Year	Year	Year	Year	N/A	Year	Year
Project	Year	Semester	Semester	Year	N/A	N/A	N/A
Exam	N/A	Available	N/A	N/A	N/A	Available	Available
Course-work	N/A	N/A	N/A	N/A	Only option	N/A	N/A
Required Core Courses (Excluding Thesis/Culminating Option)							
Required	CPE 5505 Ethics for Computer Engineers CPE 5590 Research Methods CPE 5300 Computer Microarchitecture	EGEC 447 Introduction to Cyber-Physical Systems Security EGEC 463 Current Topics in Computer Engineering EGEC 520 Advanced Computer Architecture EGEC 540 Computer Arithmetic Structures	N/A	CMPE 200 Computer Architecture CMPE 220 System Software CPE 240 Advanced Computer Design	N/A	N/A	EEC290 Seminar in Electrical and Computer Engineering
Enrollment							
	20 (est)	75 (F2024 BS+MS and MS) ¹⁶ 79 (F2025, BS+MS and MS)	31 (F2024) ¹⁷ 16 (F2025)	94 (F2024) ¹⁸ 108 (F2025)	N/A	101 (ECE MS F2024) ¹⁹ 99 (ECE MS F2025)	121 (ECE MS F2024) ²⁰ 144 (ECE MS F2025)

There are several differences between our proposed program and other available Master's programs in Computer Engineering in California:

Culminating experience: Only one other program, San Jose State, offers a full-year project as an option. We believe that our focus on allowing students to complete a one-year project in close alignment with an industry sponsor will enable deeper learning and more meaningful industry-related skill development as highlighted by the CSU's burgeoning "Beyond Completion" initiative.

Emphasis on research opportunities: As a non-Ph.D. granting institution, our program also centers master's students as key researchers in the topics of their choice. Rather than assisting more senior doctoral students on small components of projects, our program will have master's students working directly with faculty advisors to push the bounds of the field.

Required coursework in research methods: The Cal Poly proposed master's program is also the only program to require all students to take a research methods class, ensuring that all students regardless of culminating experience are equipped with a full set of research skills.

Required coursework in socio-technical dimensions of computer engineering: This will be the only program in this field that requires students to take an ethics course, helping to ensure that our graduates are uniquely qualified to understand the societal consequences and social context of their work after graduation.

The Noyce School's unique structure: The Noyce School of Applied Computing, which brings together the computing-related disciplines of Electrical Engineering, Computer Science, and Software Engineering under one interdisciplinary umbrella, will provide enhanced interdisciplinary opportunities for our master's students to take coursework, and conduct research in all areas of computing. The Noyce School through existing donations and future work will also provide our students with access to cutting-edge industry tools like the Cadence Design suite used extensively for custom digital circuit design and architecture.

- c. List other curricula currently offered by the campus that are closely related to the proposed program.

¹⁰ https://www.fullerton.edu/ecs/ece/degrees/cpe_grad/index.php

¹¹ <https://w2.csun.edu/engineering-computer-science/electrical-computer-engineering/programs/graduate-programs/ms-computer-engineering>

¹² https://catalog.sjsu.edu/preview_program.php?catoid=15&poid=9495&returnto=5383

¹³ <https://viterbigradadmission.usc.edu/programs/masters/msprograms/electrical-computer-engineering/ms-computer-engineering/>

¹⁴ <https://www.ece.ucsb.edu/grad/ms>

¹⁵ <https://ece.ucdavis.edu/graduate>

¹⁶ <https://www.fullerton.edu/data/institutionalresearch/student/enrollments/headcountsftesbycollegeandstudentlevel.php>

¹⁷ https://www.csun.edu/counts/apps_admits_and_enrolls.php

¹⁸ https://prd-analytics.sjsu.edu/t/IRPublic/views/Student_Enrollment_Dashboard/StudentEnrollment?%3Aorigin=card_share_link&%3Aembed=y

¹⁹ <https://bap.ucsb.edu/institutional-research/ucsb-information-center/enrollment-dashboard>

²⁰ <https://aggiedata.ucdavis.edu>

Cal Poly currently offers M.S. Electrical Engineering and M.S. Computer Science programs that allow Cal Poly students to take 400-level (senior-level technical electives) and 500-level (master's) courses that are somewhat related to computer engineering. These courses are primarily designed to support students with knowledge and skills specific to those majors.

- d. Describe community participation, if any, in the planning process. This may include prospective employers of graduates.

The Computer Engineering Department's Industrial Advisory Board (IAB) and students have long advocated for the creation of a CPE master's degree. Feedback has been positive about computer engineering's existing 500-level courses, which are offered for master's students in the electrical engineering and computer science master's programs. IAB members would like to see the creation of a Master's in Computer Engineering program that centers the student learning experience around our existing 5000-level courses so that students gain more breadth and depth in Computer Engineering as the primary focus of study.

- e. Provide applicable workforce demand projections and other relevant data.

Note: *Data Sources for Demonstrating Evidence of Need*
[US Department of Labor, Bureau of Labor Statistics](#)
[California Labor Market Information](#)

U.S. Bureau of Labor Statistics (BLS) projects demand for computer hardware engineers to increase 7% from 2023-2033.²¹ Similarly, the BLS projects a 21% growth rate in the number of jobs for Computer and Information Research Scientists from 2023-2033 and states that the typical entry level education for these jobs is a master's degree.²² According to the California state Employment Development Department, there will be over 17,000 job openings for Computer Hardware Engineers in the state in the next decade, and according to some sources 34% of these openings require a master's degree²³.

Industry demand for AI-capable systems, data centers, and high-performance infrastructure is expected to further increase demand for graduates with advanced degrees in Computer Engineering. The AI computing and data center build-out is expected to surge as organizations expand capacity to host advanced AI workloads, placing sustained pressure on engineering talent to design, optimize, and maintain these systems.²⁴ Reports also note a growing shortage of engineers and technicians capable of supporting the rapid expansion of AI infrastructure, particularly for data center design, power systems, and high-density computing environments.²⁵

²¹ <https://www.bls.gov/ooh/architecture-and-engineering/computer-hardware-engineers.htm>

²² <https://www.bls.gov/ooh/computer-and-information-technology/computer-and-information-research-scientists.htm>

²³ <https://www.onetonline.org/link/summary/17-2061.00>

²⁴ <https://www.deloitte.com/us/en/insights/topics/emerging-technologies/growing-demand-ai-computing.html?>

²⁵ <https://spectrum.ieee.org/ai-data-centers-engineers-jobs?>

6. Student Demand

- a. Provide compelling evidence of student interest in enrolling in the proposed program. Types of evidence vary and may include national, statewide, and professional employment forecasts and surveys; petitions; lists of related associate degree programs at feeder community colleges; reports from community college transfer centers; and enrollments from feeder baccalaureate programs.

As noted above in Section 3.a, U.S. Bureau of Labor Statistics data show that the profession of Computer and Information Research Science, which typically requires a master's degree, is projected to grow at 26% per year from 2023–2033.

An analysis of enrollment data from the last five years shows that annually, roughly 20 CPE undergraduate students enroll in a Cal Poly master's program in the related fields of Electrical Engineering or Computer Science. A strong indicator of student interest in a Computer Engineering master's program is the fact that many of these students subsequently enroll in master's level coursework offered by the Electrical Engineering and Computer Science Departments that include computer engineering topics and then go on to choose computer engineering faculty members as their thesis advisors. The creation of technical electives and graduate-level courses specific to computer engineering topics would serve to enhance student interest in computer engineering in general.

In a 2023 survey of Cal Poly Computer Engineering undergraduate students, 88% of respondents indicated that they would be interested in a Cal Poly master's program in Computer Engineering, and 77% responded that they would be more interested in applying to a Cal Poly master's program in Computer Engineering than to a master's program at Cal Poly in a related field such as Electrical Engineering or Computer Science. Ultimately, this demand would indicate a rebalancing of enrollment among EE, CS, and CPE master's programs as EE and CS Master's students who would otherwise work with an out-of-department CPE advisor instead enroll directly in the CPE MS program.

Therefore, we estimate a program size as described below:

	At Initiation	After 3 Years	After 5 Years
Number of Majors (Annual)	10	15	20
Number of Graduates (Cumulative)		17	45

Currently, most Computer Engineering students wishing to earn a master's degree at Cal Poly transition into the Electrical Engineering or Computer Science blended programs. According to Cal Poly's Institutional Research Office, between 2018 and 2023, 57 CPE students did so, with enrollments approaching 20 per year in the last two years of that period. We believe that most of these students will apply to a CPE master's program if given the opportunity. While some CPE students might still choose an Electrical Engineering or Computer Science master's degree, we assume that some Electrical Engineering or Computer Science undergrads would also apply to the CPE master's program. CENG will work with the Electrical Engineering and Computer Science Departments to ensure that they similarly reduce

admissions by this number of students, so that overall MS enrollment in the three majors remains constant.

The enrollment numbers will be strictly enforced as a mechanism to keep overall WTUs constant and to maintain the current availability of graduate coursework without the requirement of new faculty. Additional enrollment of external applicants will be considered as resources and advising capacity allow.

- b. Identify how issues of diversity and access to the university were considered when planning this program. Describe what steps the program will take to ensure all prospective candidates have equitable access to the program. This description may include recruitment strategies and any other techniques to ensure a diverse and qualified candidate pool.

Due to staffing limitations and current internal demand and in recognition of the broader budgetary considerations facing the CSU and Cal Poly, it is anticipated that this program will initially attract students enrolled in the BS CPE program who will apply for admission to the MS program. To maximize access within this context, we plan to partner with engineering clubs and affinity groups on campus, including the Computer Engineering Society (CPES), Color Coded, Women Involved in Software and Hardware (WISH), National Society for Black Engineers (NSBE), Society for Women Engineers (SWE), Society for Hispanic Professional Engineers (SHPE), and the American Indian Science and Engineering Society (AISES) to offer special information sessions about the master's program each Fall before graduate school applications are due and to encourage students from all backgrounds to apply.

For off-campus recruitment, which is also essential for a healthy program, we plan to reach out to regional and national chapters of engineering affinity groups (NSBE, SWE, SHPE, and AISES), and will send advertisements to appropriate engineering departments at California MSIs and HSIs, as well as HBCUs and MSIs nationally to ensure the recruitment of a diverse student body. We will also distribute recruitment flyers to other CSU campuses through the CSU engineering deans listserv, and will provide recruitment flyers and QR codes for faculty to distribute at engineering conferences and meetings they attend as part of university business.

To ensure sufficient support for our future master students, the department will commit to expanding its inclusive and equitable teaching practices. The department has already partnered with Cal Poly's Center for Teaching and Learning Technology to offer our faculty a CPE specific "Intro to Equitable and Inclusive Teaching" workshop as designed by the nationally recognized Inclusive STEM Teaching Project. The department also commits to dedicating department meeting sessions to this and other professional development opportunities for CPE's faculty in the area of Justice, Equity, Diversity, and Inclusion (JEDI).

All future department hiring will also follow institutional guidelines and requirements on ensuring a diverse candidate pool and engaging in equitable hiring practices to increase diversity and fairness in our hiring practices. The department has already instituted a process for de-identifying all faculty candidate applications to minimize the introduction of implicit bias to the candidate selection phase. The department also has a long history of promoting engineering education-based research and rewarding faculty through the retention-promotion-and tenure process for conducting research and professional development in areas related to JEDI and evidence-based teaching practices; this will continue as we staff up to meet the demands of our master's program.

As noted above, our ideals of inclusion and equity have been integrated into the program with the inclusion of the brand-new CPE 5505 Ethics for Computer Engineering course that all CPE Master’s students will take in their first semester of the program. Among other topics, this class will explore issues related to bias in AI and computing systems.

At a college level, Engineering has implemented policies to drastically increase the number of gender-neutral bathrooms to create a more welcoming and equitable environment for trans- and non-binary faculty, staff, and students.

Outside of the classroom, the department will rely on existing student organizations, and college- and university-based resources to provide a welcoming and supportive social environment for our diverse student population. These resources include Cal Poly’s Multicultural Engineering Program; funding, research opportunities, and programming facilitated by Cal Poly’s Office of University Diversity and Inclusion; Cal Poly’s student-focused Gender and Sexuality Centers and Race and Ethnicity Centers; and affinity groups within engineering (including but not limited to WISH, SWE, NESBE, SHPE, AISES, and Color Coded), and at the university level (including but not limited to Black Student Union, Cal Poly SWANA, Hillel, and the Latinx Cultural Association).

- c. For master’s degree proposals, cite the number of declared undergraduate majors and the degree production over the preceding three years for the corresponding baccalaureate program, if there is one.

BS Computer Engineering	2020-2021	2021-2022	2022-2023
Majors as of Fall	400	398	422
Degrees Awarded	92	104	92

- d. Describe professional uses of the proposed degree program.

This degree program prepares students for a wide range of industry jobs. Many R&D jobs and digital design jobs at top companies like Nvidia, Intel, AMD, and Apple require a Master’s degree or higher. Indeed, many cutting-edge jobs in computer hardware require engineers to be able to interface with peer reviewed literature to adopt the latest techniques; while skills like these are often not emphasized at the Bachelor’s level, engaging with peer-reviewed research is a key component of our program’s Research Methods course and is required for successful completion of the Master’s culminating experience. As noted in the response to 5e, engineers possessing a Master’s degree in computing fields earn a significant wage premium over those with Bachelor’s degrees, indicating that those holding Master’s degrees in computing fields are able to secure jobs with more responsibilities and have more room for promotion and career advancement than their peers.

- e. Specify the expected number of majors in the initial year, and three years and five years thereafter. Specify the expected number of graduates in the initial year, and three years and five years thereafter.

Based on the current number of computer engineering undergraduates currently enrolling in master’s programs in related fields at Cal Poly, and based on strict teaching and budget limitations imposed by

the College of Engineering, we estimate a steady state program size of roughly 20 new Master’s students per year. Of these, we believe that up to half will choose the project option. Computer Engineering faculty will likely advise up to three master’s students per year based on current advisory loads. All Tenured/Tenure-track Computer Engineering faculty are eligible to advise master’s students and all have required advisory units as part of their teaching load.

	At Initiation	After 3 Years	After 5 Years
Number of Majors (Annual)	10	15	20
Number of Graduates (Cumulative)		17	45

Note: Sections 7 and 8 should be prepared in consultation with the campus administrators responsible for faculty staffing and instructional facilities allocation and planning. A statement from the responsible administrator(s) should be attached to the proposal assuring that such consultation has taken place.

7. Existing Support Resources for the Proposed Degree Program

a. List faculty who would teach in the program, indicating rank, appointment status, highest degree earned, date and field of highest degree, professional experience, and affiliations with other campus programs. **Note:** For all proposed graduate degree programs, there must be a minimum of five full-time faculty members with the appropriate terminal degree. (Coded Memo EP&R 85-20)

- Andrew Danowitz, Associate Professor, Tenured, PhD 2014 in Electrical Engineering. Cal Poly faculty, associated with Department of Computer Engineering.
- Lynne Slivovsky, Professor, Tenured, PhD 2001 in Electrical and Computer Engineering. Cal Poly faculty, associated with Department of Computer Engineering.
- John Oliver, Professor, Tenured, PhD 2007 in Computer Engineering. Cal Poly faculty, associated with Department of Computer Engineering.
- John Bellardo, Professor, Tenured, PhD 2006 in Computer Science and Engineering. Cal Poly faculty, associated with Department of Computer Engineering.
- James Mealy, Professor, Tenured, PhD 2002 in Computer Engineering. Cal Poly faculty, associated with Department of Computer Engineering.
- John Clements, Professor, Tenured, PhD 2005. Cal Poly faculty, associated with Department of Computer Engineering and Computer Science and Software Engineering Department.
- Foad Khosmood, Professor, Tenured, PhD 2011 in Computer Science. Cal Poly faculty, associated with Department of Computer Engineering and Computer Science and Software Engineering Department.
- John Seng, Professor, Tenured, PhD 2003 in Computer Engineering. Cal Poly faculty, associated with Department of Computer Engineering and Computer Science and Software Engineering Department.
- Hugh Smith, Professor, Tenured, PhD 1999 in Computer Science. Cal Poly faculty, associated with Department of Computer Engineering.
- Bruce DeBruhl, Associate Professor, Tenured, PhD 2015 in Electrical and Electronics Engineering. Cal Poly faculty, associated with Department of Computer Engineering and Computer Science and Software Engineering Department.

- Stephen Beard, Assistant Professor, PhD 2019 in Computer Science. Cal Poly faculty, associated with Department of Computer Engineering and Computer Science and Software Engineering Department.
- Dongfeng (Phoenix) Fang, Assistant Professor, PhD 2019 in Computer Engineering. Cal Poly faculty, associated with Department of Computer Engineering and Computer Science and Software Engineering Department.
- Ria Kanjilal, Assistant Professor, PhD 2022 in Electrical Engineering. Cal Poly faculty, associated with Department of Computer Engineering.
- Carlos Alvarenga, Assistant Professor, PhD 2024 in Electrical Engineering and Computer Science. Cal Poly faculty, associated with Department of Computer Engineering.

b. Describe facilities that would be used in support of the proposed program.

Existing buildings and room assignments are already used to support 400- and 500-level CPE curriculum and these same classrooms will be used to offer their semester conversion equivalents (CPE 4140, CPE 4160, CPE 4180, CPE 4300, CPE 4390, CPE 4420, CPE 4455, CPE 5300, CPE 5350, CPE 5420, and CPE 5660) once per year. The courses will be offered in labs in Engineering East (Bldg. 20) and the Frank E. Pilling Computer Science Building (Bldg. 14), and in university-maintained lecture halls. All classrooms and facilities are entirely ADA accessible and are designed to handle roughly 36 people. Our program specific rooms each feature desktop computers with software pre-installed to support undergraduate and graduate course work. Rooms 20-100 and 20-132 are equipped with electronic test and measurement equipment including logic analyzers and benchtop power supplies for advanced hardware prototyping and debugging work. Room 20-100 is accessible to students 24 hours a day when no class is occurring through use of a door code.

For new group courses like CPE 5505 and 5590, which will be offered once per year, our existing CPE Capstone Room (20-145) will be used. This room is well-equipped with computers and electronic test and measurement equipment including logic analyzers and benchtop power supplies. All furniture and chairs are on wheels so that the room can be reconfigured to suit group work, lecture, seminar, project work, or other needs. Advisory courses like CPE 5598 and 5599 will not require fixed classroom space. Existing facilities include Rooms 20-100, 20-132, 20-145, and 14-303. All buildings within the College of Engineering are equipped with both gender-neutral and gender-specific restrooms to support students of all genders.

Please see Attachment 9: physical space assessment by Joe Borzellino, Associate Vice President for Strategic Enrollment Management, April 25, 2025.

c. Provide evidence that the institution offers adequate access to both electronic and physical library and learning resources.

Please see Attachment 8: statement on Kennedy Library resources by College of Engineering Librarian Sarah Lester, April 29, 2025.

d. Describe available academic technology, equipment, and other specialized materials.

Through generous donations from industry partners, and through our existing classroom technology, all students will have access to:

- Licenses for Synopsys digital chip design suite

- High-end Xilinx Ultrascale FPGA cluster
- High-performance computing lab
- Networking laboratory
- Cyber security laboratory

Through pre-existing resources, all students will have access to:

- Laboratory-based computer workstations.
- University-wide Information Technology
- Canvas Portal
- Office 365 email and calendar service
- Office 365 suite of productivity applications
- EduRoam Wi-Fi access
- Office 365: One Drive (1 TB backup drive)
- Over 300 computers throughout library
- Equipment loans through the university: laptops, iPads, Kindles, and associated peripherals (e.g. headphones, etc.), projectors, cameras, etc.

Existing equipment is already integrated in the coursework for our wide selection of 400- and 500-level courses which will form the basis of the technical electives and technical coursework for a standalone CPE Master's degree. Recent additions such as the donated licenses for the Synopsys digital chip design suite and Xilinx Ultrascale cluster will enable a new range of high-impact research projects and industry sponsored thesis projects in the realm of digital chip design, computer micro-architecture, hardware accelerated machine learning, and related fields. Our existing computer security laboratory and strong core of faculty with expertise in cyber security will enable us to offer cutting edge cyber-security related thesis projects to students as well.

8. **Additional Support Resources Required**

Note: *If additional support resources will be needed to implement and maintain the program, a statement by the responsible administrator(s) should be attached to the proposal assuring that such resources will be provided.*

- a. Describe additional faculty or staff support positions needed to implement the proposed program.

Computer engineering faculty already teach a wide variety of 400- and 500-level master's and technical elective courses. Faculty already advise or co-advise a large number of master's students; this means that aside from staffing the new CPE 5505 and 5590 courses, creating this program should not make a major difference to the department teaching and advisory loads.

As part of Cal Poly's semester conversion process, individual advisory senior projects for undergraduate Computer Engineering students are being eliminated in favor of capstone-based culminating experiences, freeing up many advisory WTUs from existing faculty starting in the 2026-2027 academic year (4 semester supervisory WTUs per tenured/tenure-track faculty member per year, or roughly 60

advisory WTUs).²⁶ As each graduate level research or project-based culminating experience currently awards 1 WTUs of advisory workload per faculty member (2 terms x 0.5 WTU/term), the department would be able to advise up to 60 master's students through their culminating experience without an increase in base faculty workload. Therefore, we do not anticipate advisory loads being a major driver of staffing needs as the program scales up. If needed and in accordance with CBA requirements, our full and part time lecturers with sufficient educational and industry background can be offered supervisory WTU opportunities as well, significantly increasing the pool of advisory units available. CPE will also require an additional 2 WTUs per semester to be allocated to a faculty member as graduate program coordinator in line with College of Engineering policy. These units are already being allocated to the faculty member in charge of proposing this program in recognition of the added work required for degree program design; therefore these WTUs are already accounted for in college budgeting and long-term planning.

As staffing allows, and anticipating that wider adoption of AI tools through industry will lead to increased demand from students and industry for Master's Level coursework and specialization, we hope to expand the size of our M.S. in Computer Engineering program to accommodate more students and grow the program in size. We recognize, however, that staffing needs for undergraduate education and the upcoming adoption of year-round operations takes precedence over expanding opportunities for graduate education in the short term, and are therefore focused on establishing a strong program within the constraints of our existing resources with hopes of expanding scope if and when resources become available. We will use strict limits on admissions to ensure that we stay within our means.

- b. Describe the amount of additional lecture and/or laboratory space required to initiate and to sustain the program over the next five years. Indicate any additional special facilities that will be required. If the space is under construction, what is the projected occupancy date? If the space is planned, indicate campus-wide priority of the facility, capital outlay program priority, and projected date of occupancy. Major capital outlay construction projects are those projects whose total cost is \$610,000 or more (as adjusted pursuant to Cal. Pub. Cont. Code §§ 10705(a); 10105 and 10108).

None projected, the program is designed to use existing facilities and subscriptions. The primary publications in this fields are indexed in the IEEE Explore Library and ACM Digital Library, both of which are already available and are also required for the MS in Electrical Engineering and MS in Computer Science degrees offered by the College of Engineering.

- c. Include a report written in consultation with the campus librarian which indicates any necessary library resources not available through the CSU library system. Indicate the commitment of the campus to purchase these additional resources.

All relevant databases are already available directly, through open access, or through interlibrary loan. Please see Attachment 8: statement on Kennedy Library resources by College of Engineering Librarian Sarah Lester, April 29, 2025.

²⁶ This exact number is subject to change, as some tenured faculty hold joint appointments with other departments and can choose how to distribute their advisory load. Additionally, some faculty are in the process of retiring, and the department is actively hiring tenure-track faculty as of the completion of this proposal.

- d. Indicate additional academic technology, equipment, or specialized materials that will be (1) needed to implement the program, and (2) needed during the first two years after initiation. Indicate the source of funds and priority to secure these resource needs.

None needed. As noted in 7d, significant resources already exist.

9. Self-Support Programs

Not applicable to this program

Submit completed proposal packages to:

degrees@calstate.edu

Academic Programs, Innovation and Faculty Development
CSU Office of the Chancellor
401 Golden Shore, 6th Floor
Long Beach, CA 90802-4210

Contact Us

Academic Programs, Innovation and Faculty Development

Brent M. Foster, Ph.D.

Assistant Vice Chancellor and State University Dean, Academic Programs

Phone (562) 951-4149

bfoster@calstate.edu

Academic Programs, Innovation and Faculty Development is on the Web: <http://www.calstate.edu/APP/>

Extended Education (Professional and International Education)

Mr. Leo Van Cleve

Assistant Vice Chancellor, Professional and International Education

Phone (562) 951-4790

lvancleve@calstate.edu



April 29, 2025

Re: New Program Proposal for the Master of Science in Computer Engineering

Dear Program Proposal Reviewers,

I am pleased to offer my enthusiastic support for the College of Engineering's proposal for a new Master of Science in Computer Engineering degree program.

Building upon the college's nationally recognized program in computer engineering, the proposed two-year, 30-unit MS in Computer Engineering will provide an advanced education that integrates hardware and software development and emerging computing technologies. Students will gain deep technical knowledge alongside practical experience, preparing them for leadership roles in industry, research, and innovation.

Graduates of the program will be well-prepared to pursue advanced careers in sectors such as artificial intelligence, embedded systems design, IoT technologies, cybersecurity, and systems architecture, or to pursue doctoral studies in computer engineering and related fields.

Importantly, the program has been designed to leverage existing courses, laboratories, and faculty expertise, ensuring efficient use of university resources. A faculty program director will be appointed with assigned time support similar to that provided to graduate program directors in other departments.

The addition of this Master of Science in Computer Engineering program will significantly strengthen the College of Engineering's academic offerings and will further position the university as a leader in preparing graduate students to tackle the technological challenges of tomorrow.

I strongly support this exciting new program and the opportunities it will provide for our students, faculty, and industry partners.

Sincerely,

Robert Crockett
Interim Dean, College of Engineering

preparing graduates to contribute to rapidly evolving technological fields. Its emphasis on both applied learning and research is especially consistent with Cal Poly's "learn by doing" philosophy.

For these reasons, the CPE curriculum committee strongly support the creation of the Master of Science in Computer Engineering program at Cal Poly. I am confident that it will provide significant value to students, the university, and the broader engineering community.



MEMORANDUM

May 13, 2026

TO: College of Engineering
FROM: College of Engineering Curriculum Committee
SUBJECT: M.S. Computer Engineering Statement of Support

The CENG Curriculum Committee supports the proposed Master of Science in Computer Engineering. The program and its curricular pathways have been reviewed by the committee. This degree provides students with a strong foundation in advanced computer engineering with a culminating thesis or project experience.

The program's emphasis on applied learning, ethics, and collaboration supports the college's Learn by Doing mission, and its values of excellence, collaboration, and preparing students to make a positive societal impact.

Bruce DeBruhl

Subject: ASCC Approval of the Master of Science in Computer Engineering Program (CPE-MS)
Date: Thursday, May 14, 2026 at 1:52:43 AM Pacific Daylight Time
From: John H. Walker
To: Jerusha Greenwood, Andrew Robert Danowitz
CC: Shannon Sullivan-Danser

Hi, all,

The Academic Senate Curriculum Committee has reviewed the Master of Science in Computer Engineering program proposal and is approving it to go to the Senate Executive Committee. Please include this e-mail in the appropriate section of the proposal as evidence of the committee's approval.

Thank you for an excellent proposal!
John

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John H. Walker, Ph.D.
Professor, Statistics Department
Chair, Academic Senate Curriculum Committee
California Polytechnic State University
San Luis Obispo, CA, USA
Pronouns: he/him/his

From: John Hausaman <jhausaman@wscuc.org>

Date: Thursday, November 30, 2023 at 7:06 AM

To: Andrew D. Morris <admorris@calpoly.edu>

Subject: Substantive Change Screening Determination: No further review of program needed



Dear ALO:

Thank you for submitting the Substantive Change Screening form. Following a review of the information submitted, it has been determined that no substantive change review will be necessary for the proposed program.

Program Implementation Notification Required

You are required to confirm implementation of the program in order for the program or location to be listed on the WSCUC website for purposes of financial aid eligibility verification by the U.S. Department of Education.

Login to the [Accreditation Management Portal](#) and the Computer Engineering as Active within 30 days of implementation. Failure to report implementation may result in the suspension of financial aid eligibility for enrolled students.

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University Commission immediately and delete the material.



	<i>CPE 4140: Rob Sys Integ</i>	<i>CPE 4160: Aut Mob Robotics</i>	<i>CPE 4180: Adv uC and Emb Apps</i>	<i>CPE 4190 Appl Par Comp</i>	<i>CPE 4220: Net Sec</i>	<i>CPE 4250: Wi Sec</i>
<i>SLO 1: Communicat e technical concepts clearly, effectively, and concisely</i>	<i>D</i>	<i>D</i>	<i>D</i>			
<i>SLO 2: Design and implement hardware and software systems, meeting specified design requirement s or research goals</i>	<i>I/D</i>	<i>D</i>	<i>D</i>	<i>I/D</i>	<i>I/D</i>	<i>I/D</i>
<i>SLO 3: Demonstrate adherence to ethical standards in computer engineering practice</i>	<i>D</i>	<i>I</i>				

<i>SLO 4: Collaborate productively in multidisciplinary teams</i>	<i>D</i>	<i>D</i>				
<i>SLO 5: Construct an argument for how a computing solution could be improved through the integration of diverse perspectives</i>	<i>D</i>	<i>D</i>				

MS Computer Engineering Master's Degree Progr

<i>CPE 4280: Intro to HW Sec</i>	<i>CPE 4300: Adv Comp Arch</i>	<i>CPE 4390: Intro to RTOS</i>	<i>CPE 4420: HP Embed Sys</i>	<i>CPE 4455: Des of Fault Tol Sys</i>	<i>CPE 4464: Intro to Net</i>	<i>CPE 4465: Adv Net</i>
<i>D</i>	<i>D</i>	<i>D</i>		<i>I/D</i>		<i>I/D</i>
<i>D</i>	<i>D</i>	<i>D</i>	<i>D</i>	<i>I/D</i>	<i>I/D</i>	<i>D</i>
<i>I/D</i>	<i>D</i>					

D	D		D			
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am Student Learning Outcome Evaluation Matrix

<i>CPE 4650: Scal Serv Impl</i>	<i>CPE 4669: Dist Sys</i>	<i>CSC 4230: Web and Cloud Sec</i>	<i>CSC 4270: Special Adv Topics in Comp Sec</i>	<i>CSC 4570: Special Adv Topics in Comp Sys</i>	<i>CSC 4669: Dist Sys</i>	<i>CSC 4710: Introduction to Computer Graphics</i>
<i>D</i>						
<i>D</i>	<i>D</i>	<i>D</i>	<i>D</i>	<i>D</i>	<i>D</i>	<i>D</i>

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<i>CPE 5300: Computer uArch</i>	<i>CPE 5350: Digital System Design</i>	<i>CPE 5420: Adv HP Embed Syst</i>	<i>CPE 5500: Int/Co-op</i>	<i>CPE 5505: Ethics in Comp Eng</i>	<i>CPE 5564: Res Topics in Comp Nets</i>	<i>CPE 5590: Res and Sci Meth</i>
<i>D</i>		<i>M</i>			<i>D</i>	<i>I/D</i>
<i>D</i>	<i>D</i>	<i>D</i>	<i>D</i>	<i>D</i>	<i>D</i>	<i>I/D</i>
			<i>D</i>	<i>D</i>	<i>D</i>	<i>I</i>

<i>M</i>	<i>D</i>	<i>D</i>				<i>I/D</i>
<i>D</i>	<i>D</i>	<i>D</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>I</i>

<i>CPE 5598: Culm Proj</i>	<i>CPE 5599: Culm Thesis</i>	<i>CPE 5660: Comp Sys</i>	<i>CSC 5100: Mod Sof Eng (3 units)</i>	<i>CSC 5113: Comp Ed Res and Practice</i>	<i>CSC 5170: Spec Adv Topics in Soft Eng</i>	<i>CSC 5201: Comp Sec and Priv</i>
<i>M</i>	<i>M</i>	<i>M</i>				
<i>M</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>
<i>M</i>	<i>M</i>					

<i>M</i>		<i>D</i>				
<i>M</i>		<i>D</i>				

<i>CSC 5210: Soft Sec</i>	<i>CSC 5220: Adv Net Sec and Priv</i>	<i>CSC 5270: Spec Adv Topics in Comp Sec</i>	<i>CSC 5281: Sys Sec</i>	<i>CSC 5370: Spec Adv Topics in PLs</i>	<i>CSC 5445: Adv Theory of Decid and Reduc</i>	<i>CSC 5447 Adv Alg Graph Theory</i>
<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>

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<i>CSC 5449 Adv Alg Design and Analysis</i>	<i>CSC 5550: Res in Op Sys</i>	<i>CSC 5570: Spec Adv Topics</i>	<i>CSC 5571: Sec Adv Lab</i>	<i>CSC 5595: Coop Edu Exp</i>	<i>CSC 5660: Adv DB Man Syss</i>	<i>CSC 5669: Dist Comp</i>
<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>

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<i>CSC 5670: Spec Adv Topics in Comp Sys</i>	<i>CSC 5710: Comp Graph</i>	<i>CSC 5740: Adv Comp Shad in Comp Graph</i>	<i>CSC 5770: Spec Adv Topics in Comp Graph</i>	<i>CSC 5870: Spec Adv Topics in AI</i>	<i>CSC 5880: AI</i>	<i>CSC 5887: Adv Deep Learning</i>
<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>

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<i>EE 5424: Princ of Rem Sens and Rad</i>	<i>EE 5428: Comp Vis</i>	<i>EE 5504: SDR</i>	<i>EE5509: Comp Intel</i>	<i>EE 5513: Mod Con Sys</i>	<i>EE 5514: Adv Mod Con Sys</i>	<i>EE 515: Adv Dig Sig Proc</i>
<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>

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<i>EE 5517: Data An for Cyber-Phys Sys</i>	<i>EE 5525 Stochastic Processes</i>	<i>EE 5526: Adv Dig Comms</i>	<i>EE 5531: Adv VLSI Des and Verif</i>	<i>EE 5532: VLSI Test Lab</i>	<i>EE 5570: Spec Adv Topics</i>	<i>EE 5571: Spec Adv Lab</i>
<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>

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MS Computer Engineering: Comprehensive Assessment Plan

<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>	<i>k</i>
<i>ILOs</i>	<i>PLOs</i>	<i>SLOs</i>	<i>Course where each SLO is assessed</i>	<i>Assessment activity/ assignment used to measure each SLO</i>	<i>Assessment tool used to measure outcome success</i>	<i>Assessment schedule – how often SLOs will be assessed</i>	<i>How data/ findings will be quantitatively or qualitatively reported</i>	<i>Designated personnel to collect, analyze, and interpret student learning outcome data</i>	<i>Program data/ findings dissemination schedule</i>	<i>Closing the loop strategies</i>
<i>ILO 2: Communicate effectively</i>	<i>PLO 4: Communicate complex technical ideas in written and oral formats to technical and professional audiences</i>	<i>SLO 1 Communicate technical concepts effectively</i>	<i>5590 Research and Scientific Method</i>	<i>Research topic presentation</i>	<i>Rubric: Student presentation will be evaluated for technical content, content clarity, and other considerations on 5 point scales where a 4.0 is determined to meet standards. This will exist as a dedicated rubric item on Canvas.</i>	<i>First year, then every five years (once per evaluation cycle)</i>	<i>Report on percentage of students that score 80% (4/5) or higher on rubric or scale.</i>	<i>Course instructor will assign and grade assessment, grad coordinator and assessment committee will analyze and interpret results and curriculum committee and faculty committee will evaluate recommendations to either improve student outcome or collect more specific data for targeted interventions.</i>	<i>Assessment data will be reviewed by the assessment committee during the first half of the semester following data collection. The assessment committee in conjunction with faculty offering assessed grad courses will develop recommendations based on “closing the loop strategies” to be presented to the department curriculum committee and department faculty in the second half of the semester following data collection. Results will be formalized and compiled in regular reports for academic planning and programs in accordance with and at intervals determined by university policy.</i>	<i>The grad coordinator, instructor, and assessment committee (which will include at least one master’s student) will meet to review assessment data. Findings will then be shared with the entire master’s program faculty, who will identify where improvements are needed, including but not limited to revising course content, revising the rubric, and revising PLOs. IAB input will be sought as needed to ensure course outcomes remain consistent with industry needs.</i>
<i>ILO 1: Think critically and creatively</i> <i>ILO 7: Engage in lifelong learning</i>	<i>PLO 1: Demonstrate technical expertise in computer engineering and apply that expertise in leadership roles such as project direction, team coordination, or</i>	<i>SLO 2 Design and implement hardware and software systems, meeting specified design requirements or research goals</i>	<i>5598 Culminating project</i> <i>Or*</i> <i>5599 Culminating thesis</i> <i>*Students have the option of</i>	<i>Oral defense of culminating work</i>	<i>Rubric: Student work will be evaluated for technical content, novelty, validation/verification of work, and other consideration</i>	<i>Second year, then every five years (once per evaluation cycle)</i>	<i>Report on percentage of students that score 80% (4/5) or higher on rubric or scale.</i>	<i>Defense committee will fill rubric, grad coordinator and assessment committee will analyze and interpret results and curriculum committee and faculty committee will evaluate recommendations to either improve student outcome or</i>	<i>Assessment data will be reviewed by the assessment committee during the first half of the semester following data collection. The assessment committee in conjunction with faculty offering assessed grad courses will develop</i>	<i>The grad coordinator, instructor, and assessment committee (which will include at least one master’s student) will meet to review assessment data. Findings will</i>

	<p>technical decision-making</p> <p>PLO 2: Apply a broad range of computer engineering solutions to solve hardware and software engineering problems</p> <p>PLO 3: Formulate research questions, evaluate prior work, and design and execute rigorous methods to generate and interpret evidence in computer engineering contexts</p> <p>PLO 7: Be prepared for professional development through independent learning, training, and continued graduate education</p>		<p>completing an individual thesis OR engage in an industry-sponsored project experience for their MS culminating experience</p>		<p>s on a 5 point scale where a 4.0 is determined to meet standards. Defense committee will fill separate form</p>			<p>collect more specific data for targeted interventions.</p>	<p>recommendations based on "closing the loop strategies" to be presented to the department curriculum committee and department faculty in the second half of the semester following data collection. Results will be formalized and compiled in regular reports for academic planning and programs in accordance with and at intervals determined by university policy..</p>	<p>then be shared with the entire master's program faculty, who will identify where improvements are needed, including but not limited to revising course content, revising the rubric, and revising PLOs. IAB input will be sought as needed to ensure course outcomes remain consistent with industry needs.</p>
<p>ILO 6: Make reasoned decisions based on an understanding of ethics, a respect for diversity, and an awareness of issues related to sustainability</p>	<p>PLO 5: Apply ethical reasoning and evaluate the societal impacts of computer engineering solutions</p>	<p>SLO 3: Demonstrate adherence to ethical standards in computer engineering practice</p>	<p>5505 Ethics in Computer Engineering</p>	<p>Final Exam</p>	<p>Rubric: Subsections of the culminating assignment (final exam) will be evaluated on a 5 point scale where a 4.0 is determined to meet standards. Subsections will cover different topic areas and ethical frameworks.</p>	<p>Third year, then every five years (once per evaluation cycle)</p>	<p>Report on percentage of students that score 80% (4/5) or higher on each subsection of the scale.</p>	<p>Course instructor will assign and grade assessment, grad coordinator and assessment committee will analyze and interpret results, and curriculum committee and faculty committee will evaluate recommendations to either improve student outcome or collect more specific data for targeted interventions.</p>	<p>Assessment data will be reviewed by the assessment committee during the first half of the semester following data collection. The assessment committee in conjunction with faculty offering assessed grad courses will develop recommendations based on "closing the loop strategies" to be presented to the department curriculum committee and department faculty in the second</p>	<p>The grad coordinator, instructor, and assessment committee (which will include at least one master's student) will meet to review assessment data. Findings will then be shared with the entire master's program faculty, who will identify where improvements are needed, including but not limited to</p>

					<i>These scales for each subsection will exist as dedicated rubric items on Canvas.</i>				<i>half of the semester following data collection. Results will be formalized and compiled in regular reports for academic planning and programs in accordance with and at intervals determined by university policy.</i>	<i>revising course content, revising the rubric, and revising PLOs. IAB input will be sought as needed to ensure course outcomes remain consistent with industry needs.</i>
<i>ILO 4: Work productively as individuals and in groups</i>	<i>PLO 1: Demonstrate technical expertise in computer engineering and apply that expertise in leadership roles such as project direction, team coordination, or technical decision-making</i> <i>PLO 3: Formulate research questions, evaluate prior work, and design and execute rigorous methods to generate and interpret evidence in computer engineering contexts</i> <i>PLO 6: Integrate diverse perspectives and stakeholder considerations in the development of effective engineering solutions</i>	<i>SLO 4: Collaborate productively in multidisciplinary teams by earning positive peer evaluations and contributing effectively to team projects</i>	<i>5590 Research and Scientific Method</i>	<i>Research topic presentation</i>	<i>Rubric: Student peer evaluation, self-evaluation, and faculty evaluation results will be evaluated on a 5 point scale where a 4.0 is determined to meet standards. This will exist as a dedicated rubric item on Canvas.</i>	<i>Fourth year, then every five years (once per evaluation cycle)</i>	<i>Report on percentage of students that score 80% (4/5) or higher on rubric or scale.</i>	<i>Course instructor will assign and grade assessment, grad coordinator and assessment committee will analyze and interpret results and curriculum committee and faculty committee will evaluate recommendations to either improve student outcome or collect more specific data for targeted interventions.</i>	<i>Assessment data will be reviewed by the assessment committee during the first half of the semester following data collection. The assessment committee in conjunction with faculty offering assessed grad courses will develop recommendations based on "closing the loop strategies" to be presented to the department curriculum committee and department faculty in the second half of the semester following data collection. Results will be formalized and compiled in regular reports for academic planning and programs in accordance with and at intervals determined by university policy.</i>	<i>The grad coordinator, instructor, and assessment committee (which will include at least one master's student) will meet to review assessment data. Findings will then be shared with the entire master's program faculty, who will identify where improvements are needed, including but not limited to revising course content, revising the rubric, and revising PLOs. IAB input will be sought as needed to ensure course outcomes remain consistent with industry needs.</i>
<i>ILO 3: Demonstrate expertise in a scholarly discipline and understand that discipline in</i>	<i>PLO 6: Integrate diverse perspectives and stakeholder considerations in the development of effective</i>	<i>SLO 5: Construct an argument for how a computing solution could be</i>	<i>5505 Ethics in Computer Engineering</i>	<i>Final paper</i>	<i>Rubric: Culminating assignment (final paper) will be evaluated on a 5 point</i>	<i>Fifth year, then every five years (once per evaluation cycle)</i>	<i>Report on percentage of students that score 80% (4/5) or higher on rubric or scale.</i>	<i>Course instructor will assign and grade assessments, grad coordinator and assessment committee will analyze and interpret results and</i>	<i>Assessment data will be reviewed by the assessment committee during the first half of the semester following data collection. The</i>	<i>The grad coordinator, instructor, and assessment committee (which will include at least one</i>

<p><i>relation to the larger world of the arts, sciences, and technology</i></p> <p><i>ILO 6: Make reasoned decisions based on an understanding of ethics, a respect for diversity, and an awareness of issues related to sustainability</i></p> <p><i>DLO 5: Define and describe the various issues related to diversity, equity, and inclusion in their respective disciplines</i></p>	<p><i>engineering solutions</i></p>	<p><i>improved through the integration of diverse perspectives</i></p>			<p><i>scale where a 4.0 is determined to meet standards. This will exist as a dedicated rubric item on Canvas. Assignment will be evaluated for understanding of topics of diversity and the importance of diverse viewpoints in the engineering design process..</i></p>		<p><i>curriculum committee and faculty committee will evaluate recommendations to either improve student outcome or collect more specific data for targeted interventions.</i></p>	<p><i>assessment committee will develop recommendations based on "closing the loop strategies" to be presented to the department curriculum committee and department faculty in the second half of the semester following data collection. Results will be formalized and compiled in regular reports for academic planning and programs in accordance with and at intervals determined by university policy.</i></p>	<p><i>master's student) will meet to review assessment data. Findings will then be shared with the entire master's program faculty, who will identify where improvements are needed, including but not limited to revising course content, revising the rubric, and revising PLOs. IAB input will be sought as needed to ensure course outcomes remain consistent with industry needs.</i></p>
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Examples of assessment activities: final exam, presentation, project, performance, observations, classroom response systems, computer simulated tasks, analytical paper, case study, portfolio, critique, policy paper, comparative analysis project, qualifying or comprehensive examination, project, thesis, dissertation, and many others.

Examples of Assessment Tools (an instrument used to score or evaluate an assessment activity/assignment): Rubrics (that produce scores based on established criteria – can be used with most activities listed above), observational checklists, etc.

Examples of ways to report assessment data: number/percentage of those scoring at or above 4.0 on a 5.0 point scale on the assessment used to measure mastery of a specific SLO; number/percentage of students scoring at the highly proficient level; instructor observational narrative that includes analysis and findings to qualitatively show trends and patterns; mean scores of all who exhibited desired traits or behaviors on an observational checklist. Other examples?

MS Computer Engineering: Course Offerings List, Years 1-3

Year 1		Year 2
Fall Semester	Winter Semester	Fall Semester
CPE 4160: Autonomous Mobile Robotics. Instructor: John Seng	CPE 4140: Robotics System Integration. Instructor: Carlos Diaz	CPE 4160: Autonomous Mobile Robotics. Instructor: John Seng
CPE 4180: Advanced Microcontrollers and Embedded Applications. Instructor: Ria Kanjilal, James Mealy	CPE 4190: Applied Parallel Computing. Instructor: Maria Pantoja	CPE 4180: Advanced Microcontrollers and Embedded Applications. Instructor: Ria Kanjilal, James Mealy
CPE 4220: Network Security. Instructor: Bret Hartman	CPE 4250: Wireless Security. Instructor: Phoenix (Dongfeng) Fang	CPE 4220: Network Security. Instructor: Bret Hartman
CPE 4400: Special Problems for Undergraduates. Instructor: Advisory-All CPE Faculty	CPE 4280: Intro to Hardware Security. Instructor: Stephen Beard	CPE 4400: Special Problems for Undergraduates. Instructor: Advisory-All CPE Faculty
CPE 4420: High-Performance Embedded Systems. Instructor: Andrew Danowitz	CPE 4300: Advanced Computer Architecture. Instructor: Maria Pantoja	CPE 4420: High-Performance Embedded Systems. Instructor: Andrew Danowitz
CPE 4464: Introduction to Computer Networks. Instructor: Hugh Smith or John Bellardo	CPE 4390: Introduction to Real Time Operating Systems. Instructor: James Mealy	CPE 4464: Introduction to Computer Networks. Instructor: Hugh Smith or John Bellardo
CPE 4650: Scalable Server Implementation and Testing. Instructor: John Bellardo	CPE 4455: Design of Fault Tolerant Systems. Instructor: Staff	CPE 4650: Scalable Server Implementation and Testing. Instructor: John Bellardo
CPE 4669: Distributed Systems. Instructor: Maria Pantoja	CPE 4465: Advanced Computer Networks. Instructor: John Bellardo	CPE 4669: Distributed Systems. Instructor: Maria Pantoja
CPE 5505: Ethics for Computer Engineers. Instructor: John Oliver	CPE 5300: Computer Microarchitecture. Instructor: John Seng	CPE 5505: Ethics for Computer Engineers. Instructor: John Oliver
CPE 5350: Digital Systems Design. Instructor Andrew Danowitz	CPE 5420: Advanced High-Performance Embedded Systems. Instructor: Andrew Danowitz	CPE 5350: Digital Systems Design. Instructor Andrew Danowitz
CPE 5564: Research Topics in Computer Networks. Instructor: Hugh Smith	CPE 5660: Computer Systems. Instructor: Andrew Danowitz	CPE 5564: Research Topics in Computer Networks. Instructor: Hugh Smith
CPE 5590: Engineering Research Methods. Instructor: Lynne Slivovsky	CPE 5598: Master's Project. Instructor: Advisory- All CPE Faculty	CPE 5590: Engineering Research Methods. Instructor: Lynne Slivovsky

CPE 5598: Master's Project. Instructor: Advisory- All CPE Faculty	CPE 5599: Master's Thesis. Instructor: Advisory- All CPE Faculty	CPE 5598: Master's Project. Instructor: Advisory- All CPE Faculty
CPE 5599: Master's Thesis. Instructor: Advisory- All CPE Faculty		CPE 5599: Master's Thesis. Instructor: Advisory- All CPE Faculty

Year 2	Year 3	
Winter Semester	Fall Semester	Winter Semester
CPE 4140: Robotics System Integration. Instructor: Carlos Diaz	CPE 4160: Autonomous Mobile Robotics. Instructor: John Seng	CPE 4140: Robotics System Integration. Instructor: Carlos Diaz
CPE 4190: Applied Parallel Computing. Instructor: Maria Pantoja	CPE 4180: Advanced Microcontrollers and Embedded Applications. Instructor: Ria Kanjilal, James Mealy	CPE 4190: Applied Parallel Computing. Instructor: Maria Pantoja
CPE 4250: Wireless Security. Instructor: Phoenix (Dongfeng) Fang	CPE 4220: Network Security. Instructor: Bret Hartman	CPE 4250: Wireless Security. Instructor: Phoenix (Dongfeng) Fang
CPE 4280: Intro to Hardware Security. Instructor: Stephen Beard	CPE 4400: Special Problems for Undergraduates. Instructor: Advisory-All CPE Faculty	CPE 4280: Intro to Hardware Security. Instructor: Stephen Beard
CPE 4300:Advanced Computer Architecture. Instructor: Maria Pantoja	CPE 4420: High-Performance Embedded Systems. Instructor: Andrew Danowitz	CPE 4300:Advanced Computer Architecture. Instructor: Maria Pantoja
CPE 4390: Introduction to Real Time Operating Systems. Instructor: James Mealy	CPE 4464: Introduction to Computer Networks. Instructor: Hugh Smith or John Bellardo	CPE 4390: Introduction to Real Time Operating Systems. Instructor: James Mealy
CPE 4455: Design of Fault Tolerant Systems. Instructor: Staff	CPE 4650: Scalable Server Implementation and Testing. Instructor: John Bellardo	CPE 4455: Design of Fault Tolerant Systems. Instructor: Staff
CPE 4465: Advanced Computer Networks. Instructor: John Bellardo	CPE 4669: Distributed Systems. Instructor: Maria Pantoja	CPE 4465: Advanced Computer Networks. Instructor: John Bellardo
CPE 5300: Computer Microarchitecture. Instructor: John Seng	CPE 5505: Ethics for Computer Engineers. Instructor: John Oliver	CPE 5300: Computer Microarchitecture. Instructor: John Seng
CPE 5420: Advanced High-Performance Embedded Systems. Instructor: Andrew Danowitz	CPE 5350: Digital Systems Design. Instructor Andrew Danowitz	CPE 5420: Advanced High-Performance Embedded Systems. Instructor: Andrew Danowitz
CPE 5660: Computer Systems. Instructor: Andrew Danowitz	CPE 5564: Research Topics in Computer Networks. Instructor: John Bellardo	CPE 5660: Computer Systems. Instructor: Andrew Danowitz
CPE 5598: Master's Project. Instructor: Advisory- All CPE Faculty	CPE 5590: Engineering Research Methods. Instructor: Lynne Slivovsky	CPE 5598: Master's Project. Instructor: Advisory- All CPE Faculty

CPE 5599: Master's Thesis. Instructor: Advisory- All CPE Faculty	CPE 5598: Master's Project. Instructor: Advisory- All CPE Faculty	CPE 5599: Master's Thesis. Instructor: Advisory- All CPE Faculty
	CPE 5599: Master's Thesis. Instructor: Advisory- All CPE Faculty	

MS CPE Curriculum Roadmap

Traditional Academic Year (Semesters)

Fall Y1	Spring Y1	Fall Y2	Spring Y2
Research Methods CPE 5590 3 units	Computer Engineering Ethics CPE 5505 3 Units	Culminating Experience (Thesis or Project) CPE 5598 or CPE 5599 3 Units	Culminating Experience (Thesis or Project) CPE 5598 or CPE 5599 3 Units
Technical Elective 4000 or 5000 Level 3 Units	Computer Microarchitecture CPE 5300 3 units	Technical Elective 4000 or 5000 Level 3 Units	Technical Elective 4000 or 5000 Level 3 Units
Technical Elective 5000 Level 3 Units	Technical Elective 4000 or 5000 Level 3 Units		
9 Units Total	9 Units Total	6 Units Total	6 Units Total
30 Units Total			

Core	15 Units
Advanced Elective	3 Units
Technical Elective	12 Units



MEMORANDUM

4/29/2025

TO: Andrew Danowitz, Associate Professor Electrical Engineering
FROM: Sarah Lester, College of Engineering Librarian
COPIES: Nikki DeMoville, Senior Manager of Collections Strategy & Discovery
Katherine O'Clair, Associate Dean for Academic Services
Adriana Popescu, Dean, Library Services

SUBJECT: Library resources in support of proposed M.S. Computer Engineering Program

Kennedy Library's current collection can fully support the proposed MS in Computer Engineering. As there is much overlap with existing courses, the library already provides access to content that supports Computer Engineering instruction and research. Detailed below is a selection of the relevant resources.

Description of Collections Supporting MS Computer Engineering Degree

Books and Journals

Kennedy Library has long preferred online books and journals for engineering. The libraries online collection includes access to journals from top publishers of engineering information including IEEE, ACM, Elsevier, Springer Nature, and numerous others. These online resources include highly ranked journals as well as access to books and technical handbooks.

Online journal and ebook collections include:

ACM Digital Library

ACM Digital Library covers the fields of computing and information technology. The full-text database includes the complete collection of ACM's publications, including journals, conference proceedings, magazines, newsletters, and multimedia titles.

IEEE Xplore (IEEE/IET Electronic Library)

The IEEE/IET Electronic Library provides access to full-text documents from publications in electrical engineering, computer science, telecommunications, electronics and related disciplines, including journals, ebooks, standards, and conference proceedings from the Institute of Electrical and Electronics Engineers (IEEE), the Institution of Engineering and Technology (IET), John Wiley & Sons, and MIT Press.

SpringerLink

SpringerLink hosts thousands of high quality peer-reviewed journals and e-books in the natural sciences, medicine, engineering, business & economics, social sciences, architecture, food & nutrition, and environmental sciences.



ScienceDirect

ScienceDirect is Elsevier's platform for ebooks and peer-reviewed journals in the areas of physical sciences and engineering, life sciences, health sciences, and social sciences and humanities.

Synthesis Digital Library of Engineering and Computer Science

Synthesis features 50- to 100-page e-books that synthesize important research or development topics across a broad range of engineering and computer science areas. More modular and dynamic than traditional print or digital handbooks, they are ideal entry points to new areas for researchers, advanced developers, and students.

O'Reilly Online Learning

O'Reilly Online Learning provides access to professional books on topics including UX design, leadership, project management, teams, agile development, analytics, and core programming. In addition to ebooks, learning paths, case studies, and video courses are available.

Research Databases

Compendex (Engineering Village)

Compendex is a comprehensive bibliographic database of scientific and technical engineering research, covering all engineering disciplines. It includes millions of bibliographic citations and abstracts from thousands of engineering journals and conference proceedings.

Inspec (Engineering Village)

Inspec is a comprehensive index to global literature in electronics, computer science, physics, electrical, control, production and mechanical engineering. Includes INSPEC Thesaurus, Classification Codes and other specialized search aids.

Dissertations & Theses Global: The Sciences and Engineering Collection

A comprehensive collection of dissertations and theses in the fields of science and engineering.

Web of Science

Web of Science (Core Collection) provides a single search across Arts & Humanities Citation Index, Science Citation Index, and Social Sciences Citation Index. Additional Web of Science databases are easily accessible.

Research and Instructional Support

In addition to the collection resources provided by the library. The College of Engineering Librarian maintains a [Computer Science and Engineering Research Guide](#), which provides a single point of reference to relevant databases and resources. The library's primary



search tool, OneSearch is useful in helping students identify relevant books and resources in the collection. Students and faculty can get personal help from the College of Engineering Librarian via email, in person, or over Zoom depending on preferences and availability. The library provides 24/7 Live Chat supported by well-trained students and librarians. Faculty can also request library research instruction sessions with the College of Engineering Librarian.



MEMORANDUM

4/25/2025

TO: Andrew Danowitz, Professor, Computer Engineering department
FROM: Joe Borzellino, Associate Vice President for Strategic Enrollment Management
SUBJECT: Physical Space assessment of master's degree in computer engineering proposal

The following is a brief physical space assessment for the proposed master's degree in computer engineering. This assessment is based on information provided to me by Andrew Danowitz of the Computer Engineering department and has been reviewed by the scheduling office of the University Registrar.

Classroom/Lab Space:

1. The proposal indicates that the master's degree in computer engineering program is intended to be delivered fully face-to-face. It is estimated that the overall additional impact on university classroom resources will be three hours per week in a 25-30 seat capacity room each quarter. Additional classroom resources required by the new program will be provided in college-scheduled space or space already assigned to scheduled undergraduate CPE courses. The final cohort size of the program is expected to be approximately 50 students total.

Office Space:

1. Office space needs were not assessed as that responsibility lies within Academic Affairs.

Summary: The proposal projects minimal impact on university classroom resources which can be easily accommodated.

The Office of the Registrar has asked that before requesting accommodation in university-scheduled classroom space, that the department look first at optimizing available space within the college.