

SOFTWARE ENGINEERING (BS)

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (https://catalog.calpoly.edu/academic-standards-policies/general-requirements-bachelors-degree/) section of this catalog, including:

- · 40 units of upper-division courses
- 2.0 GPA
- · Graduation Writing Requirements (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major or Support courses may be selected as credit/no credit. In addition, no more than 12 units of cooperative or internship courses can count towards your degree requirements.

Code	Title	Units
MAJOR COURSES		
CSC/CPE 1000	Computing Majors Orientation	1
CSC 1001	Fundamentals of Computer Science	4
& 1001L	and Fundamentals of Computer Science Laboratory	
CSC/CPE 1024	Introduction to Computing	2
CSC 2001	Data Structures	4
& 2001L	and Data Structures Laboratory	
CSC/CPE 2050	System Software Mechanics	3
CSC 3001	Modern Application Development	4
CSC 3100	Software Engineering	4
CSC/CPE 3201	Introduction to Computer Security	3
CSC 3300	Programming Languages	3
CSC 3449	Algorithms and Complexity	4
CSC 3660	Introduction to Databases ¹	2-4
or CSC 3665	Introduction to Database Management Systems	
CSC 4160	Software Engineering Capstone I	4
CSC 4161	Senior Project - Software Engineering Capstone II	4
Software Engineering Electives		
Select from the following: ²		3-4
CSC 4100	Software Evaluation	
CSC 4170	Special Advanced Topics in Software Engineering	
CSC 4184	User-Centered UI/UX Design	
CSC 4186	Human-Computer Interaction	
CSC 4191	Seminars in Software Engineering	
CSC 4192	Research Experience in Software Engineering	
CSC 4193	Projects in Software Engineering	
CSC 4210	Software Security	
CSC 4471	Special Advanced Laboratory	
CSC 4472	Special Advanced Activity	
CSC 5100	Modern Software Engineering	
CSC 5170	Special Advanced Topics in Software Engineering	
CSC 5571	Special Advanced Laboratory	
CSC 5572	Special Advanced Activity	
Technical Electives		
Select from the list in Technical Electives by	pelow: ²	3-7
SUPPORT COURSES		

Select from the following: (5A & 5C)³



Select from the following: (2) 3 Calculus I MATH 1261 Calculus II MATH 1262 and Calculus II MATH 263 Calculus for Data Science I & MATH 2031 Transition to Advanced Mathematics APHL 3323 Ethics, Science, and Technology (Upper-Division 3) 3 3 PSY 2201 Introductory Psychology (4B) 3 3 Select from the following: 4 Small Group Collaboration and Creativity 3 PSY 3350 Teamwork 3 STAT 3210 Engineering Statistics (Upper-Division 2/5) 3 3 WGGS/ES 3350 Gender, Race, Culture, Science, and Technology 4 or WGQS 3351 Gender, Race, Class, Nation: Critical Computing and Engineering Studies Life Science Support Electives Select from the following: (5B) 3 General Biology 4 & BIO 1111 General Biology 4 & BIO 1112 and Biology Laboratory for Non-Majors 8 BIO 1150 Life: History and Diversity BIO 1150 Life: History and Cells BOT 1121 General Botany 4 MCRO 2221 Introduction to Microbiology	PHYS 1141	General Physics I	
MATH 1261 Calculus I & MATH 1262 and Calculus II MATH 1264 Calculus for Data Science I & MATH 1265 and Calculus for Data Science II MATH 2031 Transition to Advanced Mathematics SHIL 3323 Ethics, Science, and Technology (Upper-Division 3) 3 3 PSY 2201 Introductory Psychology (4B) 3 3 Select from the following: 4 Small Group Collaboration and Creativity PSY 3350 Teamwork STAT 3210 STAT 3210 Engineering Statistics (Upper-Division 2/5) 3 3 WGQS/ES 3350 Gender, Race, Culture, Science, and Technology 4 or WGQS 3351 Gender, Race, Class, Nation: Critical Computing and Engineering Studies 4 Life Science Support Electives Select from the following: (5B) 3 4 BIO 1111 General Biology 4 & BIO 1112 and Biology Laboratory for Non-Majors 1 BIO 1150 Life: History and Diversity 1 BIO 1151 Life: Molecules and Cells 5 BOT 1121 General Botany 4 MCRO 2221 In	MATH 1151	Linear Algebra	3
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Approved Mathematics/Statistics/Science Electives Select from the list in Approved Mathematics/Statistics/Science Electives below: GENERAL EDUCATION (GE) (See GE program requirements below) FREE ELECTIVES Free Electives 0	BOT 1121	General Botany	
Select from the list in Approved Mathematics/Statistics/Science Electives below: GENERAL EDUCATION (GE) (See GE program requirements below) FREE ELECTIVES Free Electives 0	MCRO 2221	Introduction to Microbiology	
GENERAL EDUCATION (GE) (See GE program requirements below) FREE ELECTIVES Free Electives 0	Approved Mathematics/Statisti	ics/Science Electives	
(See GE program requirements below) 24 FREE ELECTIVES Free Electives 0	Select from the list in Approved	Mathematics/Statistics/Science Electives below:	6
Free Electives 0	GENERAL EDUCATION (GE)		
Free Electives 0	(See GE program requirements	below)	24
100 - 000	FREE ELECTIVES		
Total Units 120	Free Electives		0
	Total Units		120

CSC 3665 will satisfy this requirement and 2 units of Technical Electives.

Required in Major or Support; also satisfies General Education (GE) requirement.

Technical Electives

Guidelines: Courses used to satisfy any other Major, Support, or General Education requirement are not allowed to count toward the Technical Electives requirement. Credit/No Credit grading is not allowed.

Code	Title	Units
REQUIRED COURSES		
Select from the following: 1		3-7
CSC 3113	Teaching Computing	
CSC 3203	Cryptography Engineering and Applications	
CSC 3250	Introduction to Privacy: Policy and Technology	
CSC 3445	Theory of Computation	
CSC 3662	Introduction to Non-Relational Database Systems	
CSC 3710	Game Design and Development	
CSC 3760	Introduction to Mixed Reality	

A combined maximum of 6 units may be taken from CPE 4491, CPE 4492, CPE 4493, CSC 4091, CSC 4092, CSC 4093, CSC 4191, CSC 4192, CSC 4193, CSC 4291, CSC 4292, CSC 4293, CSC 4400, CSC 4495, CSC 4691, CSC 4692, CSC 4693, CSC 4791, CSC 4792, CSC 4793, CSC 4891, CSC 4892, CSC 4893, CSC 4991, CSC 4992, CSC 4993, DATA 4720, ENGR 2995, and ENGR 4995; of which up to a combined 4 units may be taken from CPE 4491, CSC 4091, CSC 4191, CSC 4291, CSC 4400, CSC 4495, CSC 4691, CSC 4791, CSC 4891, CSC 4991, and DATA 4720.

PSY 3350 will satisfy this requirement and 1 unit of Technical Electives.



SSC 4036	CSC 3780	Game Engineering and Critical Analysis
CSC 4091 Seminars in Computer Science CSC 4093 Projects in Computer Science CSC 4093 Projects in Computer Science CSC 4170 Special Advanced Topics in Software Engineering CSC 4170 Special Advanced Topics in Software Engineering CSC 4184 User-Centered U/UX Design CSC 4185 Human-Computer Interaction CSC 4191 Seminars in Software Engineering CSC 4192 Research Experience in Software Engineering CSC 4193 Projects in Software Engineering CSC 4210 Software Security CSC 4211 Malware Design and Analysis CSC 4212 Malware Design and Analysis CSC 4214 Binary Exploitation: Tools and Techniques CSC 4214 Binary Exploitation: Tools and Techniques CSC 4216 Selonic Project - Privacy and Security Capstone I CSC 4270 Special Advanced Topics in Computer Security CSC 4281 Seminars in Privacy and Security Capstone II CSC 4291 Research Experience in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4490 Special Advanced Topics in Computer	CSC 4036	Mobile Application Development
SSC 4092 Research Experience in Computer Science	CSC 4037	Web Development
CSC 4030 Projects in Computer Science CSC 4170 Special Advanced Topics in Software Engineering CSC 4184 User-Centered UIVLX Design CSC 4186 Human-Computer Interaction CSC 4191 Seminars in Software Engineering CSC 4192 Research Experience in Software Engineering CSC 4193 Projects in Software Engineering CSC 4210 Software Security CSC 4211 Malware Design and Malysis CSC 4212.0 Malware Design and Malysis CSC 4213 Binary Exploitation: Tools and Techniques CSC 4220 Web and Gloud Security CSC 4221 Binary Exploitation: Tools and Techniques CSC 4222 Web and Gloud Security CSC 4223 Web and Gloud Security CSC 4220 Special Advanced Topics in Computer Security CSC 4221 Sepicial Advanced Topics in Computer Security CSC 4222 Research Experience in Privacy and Security CSC 4223 Projects in Privacy and Security CSC 4310 Compiler Construction CSC 4420 Special Advanced Topics in Computer Security CSC 44310	CSC 4091	Seminars in Computer Science
GSC 4100 Software Evaluation CSC 4170 Special Advanced Topics in Software Engineering CSC 4184 User-Centered UI/UX Design CSC 4189 Seminars in Software Engineering CSC 4191 Seminars in Software Engineering CSC 4192 Research Experience in Software Engineering CSC 4193 Projects in Software Engineering CSC 4210 Software Security CSC 4212 Malware Design and Analysis CSC 4214 Binary Exploitation: Tools and Techniques CSC 4220 Web and Cloud Security CSC 4220 Interdisciplinary Privacy and Security Capstone I CSC 4220 Senior Project - Privacy and Security Capstone II CSC 4270 Special Advanced Topics in Computer Security CSC 4291 Seminars in Privacy and Security CSC 4292 Research Experience in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4294 Research Experience in Privacy and Security CSC 4400 Special Advanced Topics CSC 4410 Special Advanced Topics CSC 4470 Special Advanced Topics C	CSC 4092	Research Experience in Computer Science
CSC 4170 Special Advanced Topics in Software Engineering CSC 4184 User-Centered U/UX Design CSC 4186 Human Computer Interaction CSC 4191 Seminars in Software Engineering CSC 4191 Research Experience in Software Engineering CSC 4193 Projects in Software Engineering CSC 4193 Projects in Software Engineering CSC 4193 Projects in Software Engineering CSC 4210 Software Security CSC 4211 Malware Design and Analysis CSC 4212 Malware Design and Analysis CSC 4214 Binary Exploitation: Tools and Techniques CSC 4220 Web and Gloud Security CSC 4230 Web and Gloud Security CSC 4270 Senior Project - Privacy and Security Capstone I CSC/CPE 4260 Interdisciplinary Privacy and Security Capstone I CSC 4270 Special Advanced Topics in Computer Security CSC 4291 Seminars in Privacy and Security CSC 4291 Seminars in Privacy and Security CSC 4292 Research Experience in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4400 Special Problems CSC 4440 Special Problems CSC 44470 Special Advanced Topics CSC 4477 Special Advanced Laboratory CSC 4477 Special Advanced Activity CSC 4475 Special Advanced Activity CSC 4475 Special Advanced Activity CSC 4495 Cooperative Education Experience CSC/CPE 4553 Introduction to Operating Systems CSC 4565 Database Management Systems CSC 45670 Special Advanced Topics in Computer Systems CSC 4665 Database Management Systems CSC 4670 Special Advanced Topics in Computer Systems CSC 4671 Introduction to Operating Systems CSC 4670 Special Advanced Topics in Computer Graphics CSC 4770 Special Advanced Topics in Computer Graphics CSC 4780 Advanced Pendering Techniques CSC 4791 Seminars in Data Engineering CSC 4792 Research Experience in Graphics CSC 4793 Projects in Data Engineering CSC 4898 Computer Vision CSC 4899 Seminars in Data Engineering CSC 4899 Seminars in Data Engineering CSC 4899 Seminars	CSC 4093	Projects in Computer Science
CSC 4186 Human-Computer Interaction CSC 4191 Seminars in Software Engineering CSC 4192 Research Experience in Software Engineering CSC 4193 Projects in Software Engineering CSC 4193 Projects in Software Engineering CSC 4210 Software Security CSC 4211 Malware Design and Analysis CSC 4212 Malware Design and Analysis CSC 4214 Binary Exploitation: Tools and Techniques CSC 4220 Web and Cloud Security CSC 4220 Web and Cloud Security CSC 4220 Interdisciplinary Privacy and Security Capstone I CSC 4220 Seption Project Privacy and Security Capstone I CSC 4270 Sepcial Advanced Topics in Computer Security CSC 4291 Seminars in Privacy and Security CSC 4292 Research Experience in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4310 Computer Construction CSC 4440 Special Advanced Topics CSC 4440 Special Advanced Topics CSC 4471 Special Advanced Topics CSC 4471 Special Advanced Laboratory CSC 4471 Special Advanced Laboratory CSC 4472 Special Advanced Laboratory CSC 4472 Special Advanced Topics CSC 4472 Special Advanced Topics CSC 4472 Special Advanced Topics CSC 4554 Implementation of Operating Systems CSC 4565 Database Management Systems CSC 4565 Database Management Systems CSC 45665 Database Management Systems Construction CSC 4693 Projects in Data Engineering CSC 470 Special Advanced Popics in Computer Systems CSC 4693 Projects in Data Engineering CSC 470 Special Advanced Topics in Computer Systems CSC 470 Special Advanced Topics in Computer Systems CSC 4693 Projects in Data Engineering CSC 470 Special Advanced Topics in Computer Graphics CSC 470 S	CSC 4100	Software Evaluation
CSC 4196 Seminars in Software Engineering CSC 4191 Research Experience in Software Engineering CSC 4192 Research Experience in Software Engineering CSC 4193 Projects in Software Engineering CSC 4110 Software Security CSC 4212 Malware Design and Analysis CSC 4211 Binary Exploitation: Tools and Techniques CSC 4214 Binary Exploitation: Tools and Techniques CSC 4220 Web and Cloud Security CSC/CPE 4260 Interdisciplinary Privacy and Security Capstone I CSC/CPE 4261 Senior Project - Privacy and Security Capstone I CSC/CPE 4261 Senior Project - Privacy and Security Capstone II CSC 4270 Special Advanced Topics in Computer Security CSC 4291 Seminars in Privacy and Security CSC 4291 Seminars in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4293 Compiler Construction CSC 4400 Special Problems CSC 4448 Bioinformatics Algorithms CSC 4447 Special Advanced Topics CSC 4477 Special Advanced Topics CSC 4477 Special Advanced Caboratory CSC 4472 Special Advanced Caboratory CSC 4475 Special Advanced Caboratory CSC 4475 Special Advanced Topics CSC 4554 Implementation of Operating Systems CSC 4556 CSC 4570 Special Advanced Topics in Computer Systems CSC 4570 Special Advanced Topics in Computer Systems CSC 4655 Seminars in Data Engineering CSC 4693 Projects in Data Engineering CSC 4693 Projects in Data Engineering CSC 470 Special Advanced Topics in Computer Graphics CSC 4710 Introduction to Computer Graphics CSC 4770 Special Advanced Topics in Computer Graphics CSC 4770 Special Advanced Topics in Computer Graphics CSC 4770 Special Advanced Topics in Computer Graphics CSC 4792 Research Experience in Data Engineering CSC 4792 Research Experience in Graphics CSC 4792 Research Experience in Graphics CSC 4888 Computer Vision CSC 4893 Seminars in Graphics CSC 4893 Seminars in Artificial Intelligence CSC 4893 Seminars in Artificial Intelligence and Machine Learning CSC 4893 Seminars in Artificial Intelligence and Machine Learning	CSC 4170	Special Advanced Topics in Software Engineering
CSC 4191 CSC 4192 Research Experience in Software Engineering CSC 4193 Projects in Software Engineering CSC 4210 Software Security CSC 4210 Software Security CSC 4214 Malware Design and Analysis CSC 4214 Binary Exploitation: Tools and Techniques CSC 4220 Web and Cloud Security CSC 4220 Web and Cloud Security CSC/CPE 4260 Interdisciplinary Privacy and Security Capstone I CSC 4270 Special Advanced Topics in Computer Security CSC 4291 Semiorars in Privacy and Security CSC 4292 Research Experience in Privacy and Security CSC 4292 Research Experience in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4330 Compiler Construction CSC 4400 Special Problems CSC 4410 Special Advanced Topics CSC 4470 Special Advanced Topics CSC 4471 Special Advanced Topics CSC 4477 Special Advanced Topics CSC 4477 Special Advanced Laboratory CSC 4495 CSC 4495 Cooperative Education Experience CSC 4495 CSC 4570 Special Advanced Topics in Computer Systems CSC 4565 Implementation of Operating Systems CSC 4565 Seminars in Data Engineering CSC 4691 Seminars in Data Engineering CSC 4692 Research Experience in Data Engineering CSC 4693 Projects in Data Engineering CSC 470 Special Advanced Topics in Computer Systems CSC 470 Special Advanced Topics in Computer Graphics CSC 4770 Special Advanced Fopics in Computer Graphics CSC 4770 Special Advanced Fopics in Computer Graphics CSC 4770 Special Advanced Fopics in Computer Graphics CSC 4791 Seminars in Data Engineering CSC 4792 Research Experience in Graphics CSC 4792 Research Experience in Graphics CSC 4793 Projects in Data Engineering CSC 4898 Computer Vision CSC 4898 Computer Vision CSC 4891 Seminars in Artificial Intelligence CSC 4891 Seminars in Artificial Intelligence and Machine Learning CSC 4891 Seminars in Game Development	CSC 4184	User-Centered UI/UX Design
CSC 4192 Research Experience in Software Engineering CSC 4193 Projects in Software Engineering CSC 4210 Software Security CSC 4212 Malware Design and Analysis CSC 4214 Binary Exploitation: Tools and Techniques CSC 4230 Web and Cloud Security CSC/CPE 4260 Interdisciplinary Privacy and Security Capstone I CSC/CPE 4261 Senior Project - Privacy and Security Capstone I CSC 4270 Special Advanced Topics in Computer Security CSC 4291 Seminars in Privacy and Security CSC 4292 Research Experience in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4310 Compiler Construction CSC 4400 Special Problems CSC 4448 Bioinformatics Algorithms CSC 4471 Special Advanced Laboratory CSC 4472 Special Advanced Activity CSC 4455 Cooperative Education Experience CSC 4554 Implementation of Operating Systems CSC 4550 Special Advanced Topics in Computer Systems CSC 4691 Seminars in Data Engineering CSC 4692 </td <td>CSC 4186</td> <td>Human-Computer Interaction</td>	CSC 4186	Human-Computer Interaction
CSC 4193 Projects in Software Engineering CSC 4210 Software Security CSC 4212 Malware Design and Analysis CSC 4214 Binary Exploitation: Tools and Techniques CSC 4230 Web and Cloud Security CSC 4230 Web and Cloud Security CSC 4250 Interdisciplinary Privacy and Security Capstone I CSC 4260 Interdisciplinary Privacy and Security Capstone I CSC 4270 Special Advanced Topics in Computer Security CSC 4291 Seminars in Privacy and Security Capstone II CSC 4272 Seminars in Privacy and Security CSC 4292 Research Experience in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4393 Projects in Privacy and Security CSC 4430 Compiler Construction CSC 4440 Special Advanced Laboratory CSC 4441 Bioinformatics Algorithms CSC 4470 Special Advanced Laboratory CSC 4471 Special Advanced Laboratory CSC 4472 Special Advanced Laboratory CSC 4472 Special Advanced Laboratory CSC 4472 Special Advanced Laboratory CSC 4475 Cooperative Education Experience CSC 4554 Implementation of Operating Systems CSC 4554 Implementation of Operating Systems CSC 4556 Special Advanced Topics in Computer Systems CSC 4565 Database Management Systems Organization CSC 4661 Seminars in Data Engineering CSC 4692 Research Experience in Data Engineering CSC 4693 Projects in Data Engineering CSC 470 Special Advanced Rendering Techniques CSC 4710 Introduction to Computer Graphics CSC 4791 Seminars in Graphics CSC 4791 Seminars in Graphics CSC 4792 Research Experience in Graphics CSC 4793 Projects in Fasphics CSC 4880 Artificial Intelligence CSC 4893 Projects in Artificial Intelligence and Machine Learning CSC 4891 Seminars in Graphics Intelligence and Machine Learning CSC 4891 Seminars in Graphics Intelligence and Machine Learning CSC 4891 Seminars in Game Development	CSC 4191	Seminars in Software Engineering
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CSC 4214 Binary Exploitation: Tools and Techniques CSC 4230 Web and Cloud Security CSC/CPE 4260 Interdisciplinary Privacy and Security Capstone I CSC/CPE 4261 Senior Project - Privacy and Security Capstone II CSC 4270 Special Advanced Topics in Computer Security CSC 4291 Seminars in Privacy and Security CSC 4292 Research Experience in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4310 Compiler Construction CSC 4400 Special Problems CSC 4410 Special Advanced Topics CSC 4471 Special Advanced Topics CSC 4471 Special Advanced Laboratory CSC 4472 Special Advanced Activity CSC 4495 Cooperative Education Experience CSC/CPE 4553 Introduction to Operating Systems CSC 4564 Implementation of Operating Systems CSC 4570 Special Advanced Topics in Computer Systems CSC 4661 Seminars in Data Engineering CSC 4691 Seminars in Data Engineering CSC 4692 Research Experience in Data Engineering CSC 4730 Advanced Topics in Computer Graphics CSC 4730 Advanced Rendering Techniques CSC 4740 Computer Animation CSC 4770 Special Advanced Topics in Computer Graphics CSC 4770 Special Advanced Topics in Computer Graphics CSC 4792 Research Experience in Graphics CSC 4793 Projects in Bata Engineering CSC 4791 Seminars in Graphics CSC 4792 Research Experience in Graphics CSC 4793 Projects in Graphics CSC 4888 Computer Vision CSC 4893 Projects in Graphics CSC 4891 Seminars in Graphics CSC 4893 Projects in Graphics CSC 4899 Seminars in Artificial Intelligence and Machine Learning CSC 4891 Seminars in Game Development	CSC 4210	Software Security
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CSC/CPE 4261 Senior Project - Privacy and Security Capstone II CSC 4270 Special Advanced Topics in Computer Security CSC 4291 Seminars in Privacy and Security CSC 4292 Research Experience in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4293 Projects in Privacy and Security CSC 4310 Compiler Construction CSC 4400 Special Problems CSC 4448 Bioinformatics Algorithms CSC 4470 Special Advanced Topics CSC 4471 Special Advanced Topics CSC 4472 Special Advanced Activity CSC 4472 Special Advanced Activity CSC 4475 CSC 4475 CSC 4475 CSC 4476 Special Advanced Activity CSC 4476 Special Advanced Topics in Computer Systems CSC 4570 Special Advanced Topics in Computer Systems CSC 4570 Special Advanced Topics in Computer Systems CSC 4665 Database Management Systems Organization CSC 4691 Seminars in Data Engineering CSC 4692 Research Experience in Data Engineering CSC 470 CSC 4710 Introduction to Computer Graphics CSC 4730 Advanced Rendering Techniques CSC 4740 Computer Animation CSC 4760 Real-Time 3D Computer Graphics Software CSC 4791 Seminars in Graphics CSC 4792 Research Experience in Graphics CSC 4793 Projects in Graphics CSC 4880 Artificial Intelligence CSC 4891 Seminars in Artificial Intelligence and Machine Learning CSC 4892 Research Experience in Artificial Intelligence and Machine Learning CSC 4893 Projects in Advance of Intelligence and Machine Learning CSC 4891 Seminars in Game Development	CSC 4230	Web and Cloud Security
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CSC 4730 Advanced Rendering Techniques CSC 4740 Computer Animation CSC 4760 Real-Time 3D Computer Graphics Software CSC 4770 Special Advanced Topics in Computer Graphics CSC 4791 Seminars in Graphics CSC 4792 Research Experience in Graphics CSC 4793 Projects in Graphics CSC 4880 Artificial Intelligence CSC 4888 Computer Vision CSC 4891 Seminars in Artificial Intelligence and Machine Learning CSC 4892 Research Experience in Artificial Intelligence and Machine Learning CSC 4893 Projects in Artificial Intelligence and Machine Learning CSC 4991 Seminars in Game Development	CSC 4693	Projects in Data Engineering
CSC 4740 Computer Animation CSC 4760 Real-Time 3D Computer Graphics Software CSC 4770 Special Advanced Topics in Computer Graphics CSC 4791 Seminars in Graphics CSC 4792 Research Experience in Graphics CSC 4793 Projects in Graphics CSC 4880 Artificial Intelligence CSC 4888 Computer Vision CSC 4891 Seminars in Artificial Intelligence and Machine Learning CSC 4892 Research Experience in Artificial Intelligence and Machine Learning CSC 4893 Projects in Artificial Intelligence and Machine Learning CSC 4991 Seminars in Game Development	CSC 4710	Introduction to Computer Graphics
CSC 4760 Real-Time 3D Computer Graphics Software CSC 4770 Special Advanced Topics in Computer Graphics CSC 4791 Seminars in Graphics CSC 4792 Research Experience in Graphics CSC 4793 Projects in Graphics CSC 4880 Artificial Intelligence CSC 4888 Computer Vision CSC 4891 Seminars in Artificial Intelligence and Machine Learning CSC 4892 Research Experience in Artificial Intelligence and Machine Learning CSC 4893 Projects in Artificial Intelligence and Machine Learning CSC 4891 Seminars in Game Development	CSC 4730	Advanced Rendering Techniques
CSC 4791 Seminars in Graphics CSC 4792 Research Experience in Graphics CSC 4793 Projects in Graphics CSC 4880 Artificial Intelligence CSC 4888 Computer Vision CSC 4891 Seminars in Artificial Intelligence and Machine Learning CSC 4892 Research Experience in Artificial Intelligence and Machine Learning CSC 4893 Projects in Artificial Intelligence and Machine Learning CSC 4891 Seminars in Game Development	CSC 4740	Computer Animation
CSC 4791 Seminars in Graphics CSC 4792 Research Experience in Graphics CSC 4793 Projects in Graphics CSC 4880 Artificial Intelligence CSC 4888 Computer Vision CSC 4891 Seminars in Artificial Intelligence and Machine Learning CSC 4892 Research Experience in Artificial Intelligence and Machine Learning CSC 4893 Projects in Artificial Intelligence and Machine Learning CSC 4991 Seminars in Game Development	CSC 4760	Real-Time 3D Computer Graphics Software
CSC 4792 Research Experience in Graphics CSC 4793 Projects in Graphics CSC 4880 Artificial Intelligence CSC 4888 Computer Vision CSC 4891 Seminars in Artificial Intelligence and Machine Learning CSC 4892 Research Experience in Artificial Intelligence and Machine Learning CSC 4893 Projects in Artificial Intelligence and Machine Learning CSC 4991 Seminars in Game Development	CSC 4770	Special Advanced Topics in Computer Graphics
CSC 4793 Projects in Graphics CSC 4880 Artificial Intelligence CSC 4888 Computer Vision CSC 4891 Seminars in Artificial Intelligence and Machine Learning CSC 4892 Research Experience in Artificial Intelligence and Machine Learning CSC 4893 Projects in Artificial Intelligence and Machine Learning CSC 4991 Seminars in Game Development	CSC 4791	Seminars in Graphics
CSC 4880 Artificial Intelligence CSC 4888 Computer Vision CSC 4891 Seminars in Artificial Intelligence and Machine Learning CSC 4892 Research Experience in Artificial Intelligence and Machine Learning CSC 4893 Projects in Artificial Intelligence and Machine Learning CSC 4991 Seminars in Game Development	CSC 4792	Research Experience in Graphics
CSC 4888 Computer Vision CSC 4891 Seminars in Artificial Intelligence and Machine Learning CSC 4892 Research Experience in Artificial Intelligence and Machine Learning CSC 4893 Projects in Artificial Intelligence and Machine Learning CSC 4991 Seminars in Game Development	CSC 4793	Projects in Graphics
CSC 4891 Seminars in Artificial Intelligence and Machine Learning CSC 4892 Research Experience in Artificial Intelligence and Machine Learning CSC 4893 Projects in Artificial Intelligence and Machine Learning CSC 4991 Seminars in Game Development	CSC 4880	Artificial Intelligence
CSC 4892 Research Experience in Artificial Intelligence and Machine Learning CSC 4893 Projects in Artificial Intelligence and Machine Learning CSC 4991 Seminars in Game Development	CSC 4888	Computer Vision
CSC 4893 Projects in Artificial Intelligence and Machine Learning CSC 4991 Seminars in Game Development	CSC 4891	
CSC 4991 Seminars in Game Development	CSC 4892	Research Experience in Artificial Intelligence and Machine Learning
·	CSC 4893	Projects in Artificial Intelligence and Machine Learning
CSC 4992 Research Experience in Game Development	CSC 4991	Seminars in Game Development
	CSC 4992	Research Experience in Game Development



CSC 4003	Draigata in Cama Davalanment
CSC 4993	Projects in Game Development
CSC 5100	Modern Software Engineering
CSC 5113	Computing Education Research and Practice
CSC 5170	Special Advanced Topics in Software Engineering
CSC 5201	Computer Security and Privacy
CSC 5210	Software Security
CSC 5220	Advanced Network Security and Privacy
CSC 5270	Special Advanced Topics in Computer Security
CSC 5281	System Security
CSC 5370	Special Advanced Topics in Programming Languages
CSC 5445	Advanced Theory of Decidability and Reducibility
CSC 5447	Advanced Algorithmic Graph Theory
CSC 5449	Advanced Algorithm Design and Analysis
CSC 5550	Research in Operating Systems
CSC 5570	Special Advanced Topics
CSC 5571	Special Advanced Laboratory
CSC 5572	Special Advanced Activity
CSC 5660	Advanced Database Management Systems
CSC 5669	Distributed Computing
CSC 5670	Special Advanced Topics in Computer Systems
CSC 5710	Computer Graphics
CSC 5740	Advanced Compute Shaders in Computer Graphics
CSC 5770	Special Advanced Topics in Computer Graphics
CSC 5870	Special Advanced Topics in Artificial Intelligence
CPE 2300	Introduction to Computer Systems
CPE 2301	Introduction to HDL and Digital Design Laboratory
CPE 3160	Microcontrollers and Embedded Applications
CPE 4190	Applied Parallel Computing
CPE 4220	Network Security
CPE 4250	Wireless Security
CPE 4464	Introduction to Computer Networks
CPE 4465	Advanced Computer Networks
CPE 4470	Special Advanced Topics
CPE 4471	Special Advanced Laboratory
CPE 4472	Special Advanced Activity
CPE 4491	Seminar in Computer Engineering
CPE 4492	Research Experience in Computer Engineering
CPE 4493	Projects in Computer Engineering
CPE 4650	Scalable Server Implementation and Testing
CPE 4669	Distributed Systems
CPE 5564	Research Topics in Computer Networks
DATA 3301	Introduction to Data Science
DATA 4632	Graph Mining
DATA 4720	Data Science Seminar
ENGR 2995	Vertically Integrated Project Experience I
ENGR 4995	Vertically Integrated Project Experience II

A combined maximum of 6 units may be taken from CPE 4491, CPE 4492, CPE 4493, CSC 4091, CSC 4092, CSC 4093, CSC 4191, CSC 4192, CSC 4193, CSC 4291, CSC 4292, CSC 4293, CSC 4400, CSC 4495, CSC 4691, CSC 4692, CSC 4693, CSC 4791, CSC 4792, CSC 4793, CSC 4891, CSC 4892, CSC 4893, CSC 4991, CSC 4992, CSC 4993, DATA 4720, ENGR 2995, and ENGR 4995; of which up to a combined 4 units may be taken from CPE 4491, CSC 4091, CSC 4191, CSC 4291, CSC 4400, CSC 4495, CSC 4691, CSC 4791, CSC 4891, CSC 4991, and DATA 4720.



Approved Mathematics/Statistics/Science Electives

Guidelines: Courses used to satisfy any other Major or Support requirement are not allowed to count toward the Approved Mathematics/Statistics/Science Electives requirement. Credit/No Credit grading is not allowed.

Code	Title	Units
REQUIRED COURSES		
Select from the following:		6
ASTR 3301	Stars and Planetary Systems	
ASTR 3302	Galaxies and Cosmology	
BIO 1113	Biology of Sex	
BIO 1114	Plant Diversity and Ecology	
BIO 2213	Life Science for Engineers	
BIO 2217	Wildlife Conservation Biology	
BIO 2252	Orientation to Biotechnology	
BIO 3312	Human Genetics	
BIO 3315	Biology of Cancer	
BIO 3318	Genetic Engineering Technology	
BIO 3351	Principles of Genetics	
CHEM 1122	Fundamentals of Chemical Reactivity	
GEOL 2240	Physical Geology	
GEOL 2241	Physical Geology Laboratory	
MATH 2263	Calculus III	
MATH 2341	Linear Analysis	
MATH 2343	Differential Equations	
MATH 2621	Introduction to Mathematical Optimization	
MATH 3011	History of Mathematics	
MATH 3051	Combinatorics I	
MATH 3055	Graph Theory	
MATH 3111	Number Theory	
MATH 3511	Euclidean Geometry	
MATH 3622	Mathematics of Data Science	
MATH 3651	Introduction to Numerical Analysis	
MATH 3681	Mathematical Programming	
MATH 4052	Combinatorics II	
MATH 4531	Differential Geometry	
MATH 4911	Game Theory	
MCRO 2227	General Microbiology II	
MCRO 3301	Wine Microbiology	
MCRO 3342	Public Health Microbiology	
MCRO 4421	Food Microbiology	
MSCI 1111	The Oceans	
MSCI 1112	The Oceans Laboratory	
PHYS 1141	General Physics I	
STAT 1510	Statistics I	
STAT 1810	Introduction to Statistical Computing with R	
STAT 2610	Introduction to Probability and Simulation	
STAT 3430	Applied Regression Analysis	
STAT 3520	Statistics II	
STAT 3800	Introduction to Statistical Computing with SAS and SQL	
STAT 3820	Intermediate Statistical Computing with R	
STAT 4610	Probability Theory	
STAT 4750	Bayesian Reasoning and Methods	



STAT 4770	Survival Analysis Methods
STAT 4790	Applied Multivariate Statistics

General Education (GE) Requirements

- 43 units required, 19 of which are specified in Major and/or Support.
- If any of the remaining 24 Units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (https://catalog.calpoly.edu/academic-standards-policies/general-requirements-bachelors-degree/#generaleducationtext).
- A grade of C- or better is required in one course in each of the following GE Areas: 1A (English Composition), 1B (Critical Thinking), 1C (Oral Communication), and 2 (Mathematics and Quantitative Reasoning).

Lower-Division General Education

Area 1	English Communication and Critical Thinking	
1A	Written Communication	3
1B	Critical Thinking	3
1C	Oral Communication	3
Area 2	Mathematics and Quantitative Reasoning	
2	Mathematics and Quantitative Reasoning (3 units in Support) 1	0
Area 3	Arts and Humanities	
3A	Arts	3
3B	Humanities: Literature, Philosophy, Languages other than English	3
Area 4	Social and Behavioral Sciences (Area 4 courses must come from at least two different course prefixes.)	
4A	American Institutions (Title 5, Section 40404 Requirement)	3
4B	Social and Behavioral Sciences (3 units in Support) 1	0
Area 5	Physical and Life Sciences	
5A	Physical Sciences (3 units in Support) 1	0
5B	Life Sciences (3 units in Support) 1	0
5C	Laboratory (may be embedded in a 5A or 5B course) (1 units in Support) ¹	0
Area 6	Ethnic Studies	
6	Ethnic Studies	3
Upper-Division General Education		
Upper-Division 2/5	Mathematics and Quantitative Reasoning or Physical and Life Sciences (3 units in Support) ¹	0
Upper-Division 3	Arts and Humanities (3 units in Support) 1	0
Upper-Division 4	Social and Behavioral Sciences (Area 4 courses must come from at least two different course prefixes.)	3
Total Units		24

Required in Major or Support; also satisfies General Education (GE) requirement.