COMPUTER SCIENCE, BS

Natural Sciences, Mathematics, and Engineering (nsme) (https:// catalog.csub.edu/general-information/csub-information/school-naturalsciences-mathematics-engineering/)

Department of Computer and Electrical Engineering and Computer Science (https://catalog.csub.edu/general-information/csubinformation/school-natural-sciences-mathematics-engineering/ department-computer-electrical-engineering-computer-science/)

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Program Maps for Natural Sciences, Mathematics, and Engineering (https://programmap.csub.edu/academics/interest-clusters/4e942a6eb8e4-4b60-a1ae-334235acc581/)

Program Requirements

This program follows the guidelines of the Association for Computing Machinery (ACM). Students in this program will take advanced courses of their choice.

Code	Title	Units				
General Education Requirements						
First-Year Seminar (FYS) 2						
Lower Division Area A: Foundational Skills ^{3, 4}						
Lower Division Area B: Natural Sciences ⁴						
Lower Division Area C: Arts and Humanities						
Lower Division Ar	ea D: Social and Behavioral Sciences ⁴	0				
Lower Division Area E: Student Enrichment and Lifelong Learning (SELF) 5						
Lower Division Area F: Ethnic Studies						
American Institutions: Government and History						
Junior Year Diversity & Reflection (JYDR)						
Graduation Writing Assessment Requirement (GWAR) ⁵ 0						
Upper Division Th	ematic Area C and D 4	0				
General Education	n Capstone ⁴	0				
General Education Subtotal ⁴						
Major Requirements						
Lower Division						
CMPS 2010	Programming I: Programming Fundamentals	4				
CMPS 2020	Programming II: Data Structures and Algorithms	4				
CMPS 2120	Discrete Structures	4				
CMPS 2240	Computer Architecture I: Assembly Language Programming	4				
Upper Division						
CMPS 3120	Algorithm Analysis	3				
CMPS 3140	Theory of Computation	3				
CMPS 3240	Computer Architecture II: Organization	4				
CMPS 3350	Software Engineering	4				

C	VPS 3420	Database Systems	4
CI	MPS 3500	Programming Languages	3
CI	MPS 3560	Artificial Intelligence	3
CI	MPS 3600	Operating Systems	4
CI	MPS 3620	Computer Networks	4
CI	MPS 3640	Distributed and Parallel Computation	3
CI	MPS 4910	Senior Project I	2
CI	MPS 4928	Senior Project II	2
Up	oper Division Elec	ctive Courses	
Se	elect 8 units from	n the following: ¹	8
	Algorithms, Cor	mplexity, Theory, and Programming Theory:	
	MATH/CMPS 3300	Numerical Analysis	
	MATH 3310	Discrete Mathematical Modeling	
	Architecture an	d Organization:	
	CMPS 4210	Advanced Computer Architecture	
	ECE 3200	Digital Circuits	
	ECE 4240	Microprocessor System Design	
	Software Engin	eering and Visual Computing:	
	CMPS 3390	Application Development	
	CMPS 3480	Computer Graphics	
	CMPS 4350	Advanced Software Engineering	
	CMPS 4480	Computer Animation	
	CMPS 4490	Game Development	
	ECE 4460	Image Processing	
	ECE 4470	Computer Vision	
	Database Syste	ems and Intelligent Systems:	
	CMPS 4420	Advanced Database Systems	
	CMPS 4430	Introduction to Data Science	
	CMPS 4450	Data Mining and Visualization	
	CMPS 4560	Advanced Artificial Intelligence	
	CMPS/ECE 4550	Applied Machine Learning	
	ECE 4570	Robotics	
	Operating Syste	ems, Networking, and Security:	
	CMPS 4510	Vulnerability Analysis	
	CMPS 4620	Network and Computer Security	
	MATH/CMPS 4300	Applied Cryptography	
	Special Topics	and Independent Study in Computer Science: ²	
	CMPS 3770	Special Topics	
	CMPS 3771	Special Topics Laboratory	
	CMPS 4770	Special Topics	
	CMPS 4771	Special Topics Laboratory	
	CMPS 4800	Undergraduate Research	
	CMPS 4860	Internship in Computer Science	
	CMPS 4870	Cooperative Education	
	CMPS 4890	Experiential Prior Learning	
Re	equired Cognate (Courses	
M	ATH 2510	Single Variable Calculus I	4
	or MATH 2310	Single Variable Calculus I for Engineers	
M	ATH 2520	Single Variable Calculus II	4
	or MATH 2320	Single Variable Calculus II for Engineers	

Total Units	Total Units 116-1			
Additional Units Needed Towards Graduation ⁶				
Major Subtotal	89-90			
SCI 1409	Introduction to Scientific Thinking			
PHYS 2230	Physics for Scientists and Engineers III			
MATH 3500	Complex Variables			
MATH 2610	Linear Algebra I			
MATH 2540	Ordinary Differential Equations			
MATH 2533	Multivariable and Vector Calculus			
MATH 2200	Introduction to Statistical Concepts and Me	ethods		
GEOL 2010	Physical Geology			
CHEM 1000	Foundations of Chemistry			
BIOL 2010	Introductory Biology - Cells			
BIOL 1039	Principles of Ecology			
BIOL 1009	Perspectives in Biology			
Select one of th	e following:	3-4		
PHIL 3318	Professional Ethics	3		
PHYS 2220	Physics for Scientists and Engineers II	4		
PHYS 2210	Physics for Scientists and Engineers I	4		
MATH 3200	Probability Theory	4		

¹ At least one course must be at the 4000-level.

- ² Only a combined total of 4 units of CMPS 377x, 477x, and 48xx may be used for elective credit.
- ³ SCI 1409 Introduction to Scientific Thinking (A3) is recommended but NOT required

⁴ Some of the courses required for the Computer Science major also satisfy General Education requirements. Students who complete each of these courses with the appropriate grade will also satisfy the GE requirement, even if they were to change majors:

- CMPS 4928 Senior Project II satisfies the Capstone requirement.
- PHIL 3318 Professional Ethics satisfies UD Thematic Area C and the Computer Science Ethics requirement.
- PHYS 2210 Physics for Scientists and Engineers I satisfies LD Area B1.
- MATH 2510 Single Variable Calculus I or MATH 2310 Single Variable Calculus I for Engineers with a grade of C- or better satisfies Foundational Skills B4.
- · PHIL 3318 Professional Ethics satisfies GWA

Computer Science majors have the following General Education Modifications (GEMs), which means they do not have to take courses to satisfy these GE requirements. These GEMs are specific to the Computer Science major and students who change to another major will not keep the modifications:

- LD Area B2 is embedded throughout the curriculum.
- 3 units of LD Area D is met through Computer Science outcomes 2 and 4.
- UD Thematic Area D is met through Computer Science outcomes 2 and 4.

Students may choose to take SCI 1409 Introduction to Scientific Thinking as their Mathematics Science elective. Completion of SCI 1409 Introduction to Scientific Thinking with a grade of C- or better satisfies Foundational Skill A3.

⁵ The SELF requirement may be met by selecting another General Education course with a SELF overlay or by taking a stand-alone

course. The GWAR may be satisfied by taking the GWAR exam, by taking another General Education course with a GWAR overlay, or by taking a stand-alone course. If a student opts to take a stand-alone course for either or both of these requirements, the course(s) will add additional units to that student's general education pathway.

⁶ Additional Units are required to meet the 120-unit requirement for graduation. Any accepted university units may be used to meet this requirement, including stand-alone courses for SELF.