ENGINEERING, BS, BIOSYSTEMS AND AGRICULTURAL ENGINEERING EMPHASIS

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

Department of Physics and Engineering (https://catalog.csub.edu/ general-information/csub-information/school-natural-sciencesmathematics-engineering/department-physics-engineering/)

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Email: engineering@csub.edu

www.csub.edu/engineering (http://www.csub.edu/engineering/)

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

Program Requirements

Code	Title	Units		
General Education Requirements				
First-Year Seminar (FYS) ²				
Lower Division Area A: Foundational Skills				
Lower Division Area B: Natural Sciences ²				
Lower Division Area C: Arts and Humanities				
Lower Division Area D: Social and Behavioral Sciences ²				
Lower Division Area E: Student Enrichment and Lifelong Learning (SELF) $^{\rm 2}$				
Lower Division Area F: Ethnic Studies				
American Institutions: Government and History				
Junior Year Diversity & Reflection (JYDR)				
Graduation Writing Assessment Requirement (GWAR) $^{ m 2}$				
Upper Division Thematic Area C and D 2				
General Education Capstone				
General Education Subtotal ²				
Major Requirements				
Lower Division				
ENGR 1618	Introduction to Engineering I	2		
ENGR 1628	Introduction to Engineering II	2		
ENGR 2070	Electric Circuits	4		
ENGR 2110	Analytic Mechanics, Statics	3		
ENGR 2120	Analytical Mechanics, Dynamics	3		
ENGR 2130	Mechanics of Materials	3		
ENGR 2140	Materials Science and Engineering	4		
ENGR 2350	Engineering Graphics	2		

ENGR 3300Engineering Modeling and Analysis3ENGR 310Numerical Methods and Applications in Engineering3ENGR 3110Thermodynamics4ENGR 3120Fluid Mechanics4ENGR 4110Heat Transfer4ENGR 4120Machine Design4ENGR 4900Senior Design Project A2Upper Division Emphasis Electives2ENGR 4910Senior Design Project B2Upper Division Emphasis Electives3ENGR 4910Agricultural Machines and Instrumentation4ENGR 4410Environmental Engineering3ENGR 4420Food and Bioprocess Engineering Unit Operations3Emphasis Cognates 14Otl 2110Introductory Biology - Cells4or BIOL 2110Introductory Biology - Naimals or BIOL 21101Ordations of Chemistry3CHEM 1000Foundations of Chemistry Laboratory2CHEM 1001Foundations of Chemistry Laboratory2PHIL 3318Professional Ethics3PHYS 2210Physics for Scientists and Engineers I4Additional Cognates44Additional Cognates:4MATH 2310Single Variable Calculus I for Engineers4MATH 2310Single Variable Calculus I4Additional Cognates:Mathematics and Science3BIOL 2010Introductory Biology - Plants3CHEM 1100Foundations of Analytical Chemistry4CHEM 2000Ninaliso	Upper Division					
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or GEOL 477 Special Topics in Geology 2						
PHYS 2230 Physics for Scientists and Engineers III						
	PHYS 2230	Physics for Scientists and Engineers III				

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Tota	l Units		118
Addi	tional Units		0
Subt	otal		99
М	ATH 4500	Partial Differential Equations	
М	ATH 3300	Numerical Analysis	
М	ATH 3210	Applied Statistical Computing and Multivariate Methods	
М	ATH 3200	Probability Theory	
М	ATH 3000	Mathematical Foundations	
М	ATH 2610	Linear Algebra I	
М	ATH 2540	Ordinary Differential Equations	
М	ATH 2533	Multivariable and Vector Calculus	
М	ATH 2532	Vector Calculus	
Μ	ATH 2531	Multivariable Calculus	
М	ATH 2330	Multivariable and Vector Calculus for Engineers	
	or PHYS 480	Research Participation	
PI	HYS 4700	Special Topics in Physics	
PI	HYS 3520	Scientific Computing	
PI	HYS 3510	Modern Physics	
PI	HYS 3010	Intermediate Laboratory in Modern Physics	

¹ Although not required for the emphasis, students are strongly advised to take ENGR 3070 Analog Electronics and ENGR 4260 Economics of Engineer Design. In addition, students pursuing this emphasis are encouraged to undertake a design project related to biosystems and agricultural engineering, when available, in ENGR 4900 Senior Design Project A and ENGR 4910 Senior Design Project B.

² General Education Modifications (GEMS)

ENGR 1618 Introduction to Engineering I and ENGR 1628 Introduction to Engineering II satisfy the FYS requirement for entering Freshmen The required Physics courses (PHYS 2210 Physics for Scientists and Engineers I, PHYS 2220 Physics for Scientists and Engineers II) or CHEM 1000 Foundations of Chemistry, CHEM 1001 Foundations of Chemistry Laboratory will satisfy Areas B1 and B3

Areas A3 and B2 are satisfied by completion of the major in Engineering

Any of the required calculus courses (MATH 2310 Single Variable Calculus I for Engineers, MATH 2320 Single Variable Calculus II for Engineers, or MATH 2510 Single Variable Calculus I, MATH 2520 Single Variable Calculus II) will satisfy Area B4

The SELF requirement is met by completing a LD Area B, C, or D course with a SELF component

UD Thematic Area D is satisfied by completion of the Engineering major PHIL 3318 Professional Ethics must be taken and will satisfy UD Thematic Area C

The GWAR is satisfied with PHIL 3318 Professional Ethics course.