ENGINEERING, BS, BIOSYSTEMS AND AGRICULTURAL ENGINEERING EMPHASIS

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

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

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Program Maps for Natural Sciences, Mathematics, and Engineering (https://programmap.csub.edu/academics/interest-clusters/4e942a6e-b8e4-4b60-a1ae-334235acc581/)

Program Description

Engineering is a broad-based general engineering degree program. As such, it provides the graduate flexibility, breadth of technical knowledge, and communication skills so important in today's rapidly changing multidisciplinary and multicultural work environment. The student may opt for a BS in Engineering with an Emphasis in Biosystems and Agricultural Engineering, Energy and Power Engineering, Engineering Management, or Petroleum Engineering by the appropriate choice of required cognate and elective courses.

The Engineering program provides a curriculum and course of training that prepares the student not only for today's challenges, but also for future ones in a fast-paced, global, and diverse society. The program emphasizes the fundamentals of engineering and modern methods, processes and technologies, and also gives the students the tools to learn by themselves and to pursue life-long learning. Furthermore, the program and the faculty strive to ensure that graduates also attain a global understanding of the environmental, ethical and societal impacts of the technologies they help develop.

The program offers opportunities for team-based design projects in collaboration with local industries and public institutions, thus preparing students for careers in for-profit and non-profit organizations, or to further their education in graduate school. Faculty members of the Department of Physics and Engineering will be pleased to advise any students who may wish to pursue this major. For student learning objectives and more information, visit our website at www.csub.edu/engineering (http://www.csub.edu/engineering/).

Program Requirements

Code	Title	Units
General Education Requirements		
First-Year Seminar (FYS) [2]		0
Lower Division Area A: Foundational Skills		6
Lower Division Area B: Natural Sciences [2]		0
Lower Division Area C: Arts and Humanities		6
Lower Division Area D: Social and Behavioral Sciences [2]		0
Lower Division Area E: Student Enrichment and Lifelong Learning (SELF) [2]		0
Lower Division Area F: Ethnic Studies		3
American Institutions: Government and History		6
Junior Year Diversity & Reflection (JYDR)		3
Graduation Writing Assessment Requirement (GWAR) [2]		0
Upper Division Thematic Area C and D [2]		0
General Education Capstone		1
General Education Subtotal [2]		*25*
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
Upper Division		
ENGR 3300	Engineering Modeling and Analysis	3
ENGR 3310	Numerical Methods and Applications in Engineering	3
ENGR 3110	Thermodynamics	4
ENGR 3120	Fluid Mechanics	4
ENGR 4110	Heat Transfer	4
ENGR 4120	Machine Design	4
ENGR 4900	Senior Design Project A	2
ENGR 4910		2
Upper Division Emphasis Electives		
ENGR 3400	Soil and Water Resource Management	3
ENGR 3410	Agricultural Machines and Instrumentation	3
ENGR 4410	Environmental Engineering	4
ENGR 4420	Food and Bioprocess Engineering Unit Operations	3
Emphasis Cognates [1]		
BIOL 2010	Introductory Biology - Cells	4
or BIOL 2110	Introductory Biology - Animals	
or BIOL 2120	Introductory Biology - Plants	
Cognate Requirements		
CHEM 1000	Foundations of Chemistry	3
CHEM 1001	Foundations of Chemistry Laboratory	2
CHEM 1600	Foundations of Physical Chemistry	2
PHIL 3318	Professional Ethics	3
PHYS 2210	Physics for Scientists and Engineers I	4

PHYS 2220	Physics for Scientists and Engineers II	4
Calculus Cognates		
MATH 2510	Single Variable Calculus I	4
or MATH 2310	Single Variable Calculus I for Engineers	
MATH 2520	Single Variable Calculus II	4
or MATH 2320	Single Variable Calculus II for Engineers	
Additional Cognates: Mathematics and Science		
Select at least three units from the following:		3
BIOL 2010	Introductory Biology - Cells	
BIOL 2110	Introductory Biology - Animals	
or BIOL 2120	Introductory Biology - Plants	
CHEM 1100	Foundations of Analytical Chemistry	
CHEM 2200	Foundations of Inorganic Chemistry	
CHEM 2300	Foundations of Organic Chemistry	
or CHEM 2500	Foundations of Food Science	
GEOL 2010	Physical Geology	
GEOL 2040	Historical Geology	
GEOL 3000	Mineralogy and Petrology	
GEOL 3010	Fundamentals of Geochemistry	
GEOL 3070	Structural Geology	
GEOL 4010	Hydrogeology	
GEOL 4050	GIS for Natural Sciences	
GEOL 4060	Fundamentals of Petroleum Exploration and Production	
GEOL 4150	Applied GIS	
or GEOL 4770	Special Topics in Geology 2	
PHYS 2230	Physics for Scientists and Engineers III	
PHYS 3010	Intermediate Laboratory in Modern Physics	
PHYS 3510	Modern Physics	
PHYS 3520	Scientific Computing	
PHYS 4700	Special Topics in Physics	
or PHYS 4800	Research Participation	
MATH 2330	Multivariable and Vector Calculus for Engineers	
MATH 2531	Multivariable Calculus	
MATH 2532	Vector Calculus	
MATH 2533	Multivariable and Vector Calculus	
MATH 2540	Ordinary Differential Equations	
MATH 2610	Linear Algebra I	
MATH 3000	Mathematical Foundations	
MATH 3200	Probability Theory	
MATH 3210	Applied Statistical Computing and Multivariate Methods	
MATH 3300	Numerical Analysis	
MATH 4500	Partial Differential Equations	
Subtotal		*95*
Additional Units		**0**
Total Units		**120**

[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 .

[2] G**eneral 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.