

ENGINEERING, BS, ENERGY AND POWER 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 ²	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) ²	3
GWAR ²	0
Upper Division Thematic Area C and D ²	0
General Education Capstone	1
General Education Subtotal ²	25
Major Requirements	
<i>Lower Division</i>	
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
<i>Upper Division</i>	
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 Senior Design Project B	2
<i>Upper Division Emphasis Electives</i>	
ENGR 4610 Conventional Energy Production	3
ENGR 4620 Renewable Energy Production	3
ECE 3370 Power Systems Fundamentals	4
ECE 4380 Power System Operation with Renewable Energy Resources	3
<i>Cognates Requirements</i> ¹	
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
<i>Calculus Cognates</i>	
MATH 2310 Single Variable Calculus I for Engineers	4
MATH 2320 Single Variable Calculus II for Engineers	4
or MATH 2510 Single Variable Calculus I	
MATH 2520 Single Variable Calculus II	4
<i>Additional Cognates: Mathematics and Science</i>	
Select at least seven units of the following:	7

BIOL 2010	Introductory Biology - Cells
BIOL 2110	Introductory Biology - Animals or BIOL 2120Introductory Biology - Plants
CHEM 1100	Foundations of Analytical Chemistry
CHEM 2200	Foundations of Inorganic Chemistry
CHEM 2300	Foundations of Organic Chemistry or CHEM 2500Foundations 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 4770Special 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 4800Research 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
<i>Major Subtotal</i>	99
Additional Units Needed Towards Graduation	0
Total Units	124

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.

¹ Students pursuing this emphasis are encouraged to undertake a design project related to energy and power 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