ENGINEERING, BS, PETROLEUM 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 Requirements

Code	Title	Units
General Education Requirements		
First-Year Seminar (FYS) [3]		*0*
Lower Division Area A: Foundational Skills [3]		6
Lower Division Area B: Natural Sciences [3]		0
Lower Division Area C: Arts and Humanities		6
Lower Division Area D: Social and Behavioral Sciences [3]		0
Lower Division Area E: Student Enrichment and Lifelong Learning (SELF) [3]		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) [3]		0
Upper Division Thematic Area C and D [3]		0
General Education Capstone		1
General Education Subtotal [3]		*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	Senior Design Project B	2
Upper Division Emphasis Electives		
ENGR 4520	Petroleum Production Engineering	3
ENGR 4530	Reservoir Engineering	4
ENGR 4540	Drilling Engineering and Completion Technology	4
Select at least two units from the following:		2
ENGR 3070	Analog Electronics	
ENGR 3400	Soil and Water Resource Management	
ENGR 3410	Agricultural Machines and Instrumentation	
ENGR 4200	Operations Research	
ENGR 4220	Project Management	
ENGR 4240	Quality Management	
ENGR 4260	Economics of Engineer Design	
ENGR 4410	Environmental Engineering	
ENGR 4420	Food and Bioprocess Engineering Unit Operations	
ENGR 4610	Conventional Energy Production	
ENGR 4620	Renewable Energy Production	
ENGR 4700	Special Topics in Engineering [1]	
ENGR 4800	Research Participation [1]	
Emphasis Cognates [2]		
GEOL 4060	Fundamentals of Petroleum Exploration and Production	4
Cognates 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 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
Additional Cognates: Mathematics and Science		*3*
Select at least three units of 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 477	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	
or 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	
Major Subtotal		*102*
Additional Units Needed Towards Graduation		**0**
Total Units		**127**

1 *ENGR 4700 Special Topics in Engineering and ENGR 4800 Research Participation are offered at the discretion of faculty on an as-needed basis. A maximum of 4 units of ENGR 4700 Special Topics in Engineering and 3 units of ENGR 4800 Research Participation can be used for upper division elective credit towards major requirements.*

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

3 **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, orMATH 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.