

September 2014
B.S. in Chemical and Biological Engineering
Engineering Elective List

All BS CBE students are required to complete 48 credits of engineering coursework. As part of this requirement, each student must complete at least 3 credits of an engineering elective.

Eligible engineering elective courses are listed below. Students should choose the engineering elective to reinforce basic engineering concepts and to explore important engineering subjects aligned with the CBE major.

New courses appear frequently and some may be eligible for inclusion in this list. If you are interested in a course not listed below, you must have it approved as an engineering elective before the start of the semester. Engineering electives must be at the 200 level or higher and must contain significant engineering content.

Many more engineering courses are listed on the technical electives list; those shown here were selected because their prerequisites are satisfied by other courses in the CBE curriculum.

Courses with biological engineering content

Course number (credits)	Title	Prerequisite(s)
BIOM 525 (3)	Cell and Tissue Engineering	BC 351 or BMS 300
BIOM 533 (3)	Biomolecular Tools for Engineers	BMS 300 or MIP 300
CBE 504 (3)	Fundamentals of Biochemical Engineering	MIP 300, MATH 340, CBE 320 or concurrent registration
CBE 522 (3)	Bioreseparation Processes	CBE 331
CBE 524 (3)	Bioremediation	
CBE 543 (3)	Membranes for Biotechnology and Biomedicine	CHEM 343, CBE 310
CIVE 536 (1)	Wastewater Treatment	Concurrent registration in CIVE 540
CBE 540 (2)	Fundamentals of Environmental Biotechnology	None (but MIP 300 would be useful)

Courses with chemical engineering content

Course number (credits)	Title	Prerequisite(s)
ATS 555 (3)	Air Pollution	CHEM 113 and (MATH 261 or MATH 340) and PH 142
ATS 560 (2)	Air Pollution Measurement	CHEM 114 [additional CBE restriction: ATS 555 is a prerequisite]
CBE 406 (3)	Introduction to Transport Phenomena	CBE 332, CBE 310

CBE 501 (3)	Chemical Engineering Thermodynamics	MATH 340, CBE 210
CBE 502 (3)	Advanced Reactor Design	CBE 320, CBE 332
CBE 503 (3)	Transport Phenomena Fundamentals	CBE 406 (or CBE 331 and 332)
CBE 504 (3)	Fundamentals of Biochemical Engineering	CBE 320 or concurrent registration; Math 340; MIP 300
CBE 514 (3)	Polymer Science and Engineering	CHEM 343 or CHEM 346; CBE 310
CBE 521 (3)	Mathematical Modeling for Chemical Engineers	MATH 340
CIVE 538 (3)	Aqueous Chemistry	CHEM 113, MATH 340

Courses with other engineering content

Course number (credits)	Title	Prerequisite(s)
CIVE 260 (3)	Engineering Mechanics – Statics	MATH 160, PH 141 or concurrent registration
CIVE 261 (3)	Engineering Mechanics – Dynamics	CIVE 260
CIVE 322 (3)	Basic Hydrology	CBE 331*, (CIVE 202 or STAT 301 or STAT 315)**
CIVE 360 (3)	Mechanics of Solids	CIVE 260
CIVE 401 (3)	Hydraulic Engineering	CBE 331*
CIVE 413 (3)	Environmental River Mechanics	CBE 331*
CIVE 423 (3)	Groundwater Engineering	CBE 331*
CIVE 425 (3)	Soil and Water Engineering	CBE 331*
CIVE 438 (4)	Pollution Control Engineering	CHEM 113, CBE 331*
CIVE 440 (3)	Nonpoint Source Pollution	CBE 331
CIVE 450 (4)	Introduction to Geotechnical Engineering	CIVE 360
CIVE 504 (3)	Wind Engineering	CBE 331*
CIVE 520 (3)	Physical Hydrology	CIVE 322
CIVE 531 (3)	Groundwater Hydrology	CBE 331*
CIVE 560 (3)	Advanced Mechanics of Materials	CIVE 360
ECE 204 (3)	Introduction to Electrical Engineering	MATH 161, PH 142
ENGR 510 (3)	Linear Programming and Network Flows	MATH 261
ENVE 322 (3)	Basic Hydrology	Same as CIVE 322
ENVE 438 (4)	Pollution Control Engineering	Same as CIVE 438
MECH 331 (4)	Introduction to Engineering Materials	CHEM 111, CHEM 112, PH 142 (each with a C or better)
MECH 437 (3)	Internal Combustion Engines	CBE 332*
MECH 460 (3)	Aeronautics	CBE 331*

MECH 463 (3)	Building Energy Systems	CBE 332*
MECH 558 (3)	Combustion	CBE 332*
MECH 575 (3)	Solar and Alternative Energies	CBE 331*, CBE 332*

*Indicates CBE version of another course; an override from the instructor/host department will be necessary.

** It may be possible to do well in CIVE 322 without these statistics requirements; interested students should meet with the course instructor to check this and to understand what background material they should cover on their own.

Independent Study/Thesis

Independent study credits can be earned through one or more of the following courses:

BIOM 486, Biomedical Clinical Practicum

ENGR 298, Undergraduate Research

ENGR 498, Undergraduate Research

CBE 495, Independent Study

HONR 499, Honors Thesis

Independent study credits from BIOM 486, ENGR 298/498, and CBE 495 may count toward the requirements for engineering content. However, a plan for the independent study, including the topic, activities, and outcomes (e.g., research paper), must be prepared and approved by the Director of Undergraduate Studies, Dr. Reardon, prior to the start of the semester in which the course is taken. *A maximum of three credits toward the program requirements may be earned through independent study.*