Curriculum in this handbook directly applies to students who enter the CHE major

Chemical Engineering Advising Handbook

This Handbook summarizes the academic requirements of the Chemical Engineering Curriculum for students starting in Summer 2020 or later.

Designed to meet the needs of our students and faculty for decades to come, the new Chemical Engineering and Biomedical Engineering Building opened in spring 2019. (photo from Ribbon Cutting Ceremony, 4/4/19)

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Introduction to the Department

The Chemical Engineering Department is a vibrant academic unit with activities spanning undergraduate and graduate education, research, and service to the field. We have approximately 35 faculty members, 110 graduate students, and 350 undergraduate students in their 2rd year or beyond.

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Academic Requirements

The CHE major requires 133 credits for graduation. These are listed below.

GENERAL EDUCATION & OTHER GENERAL REQUIREMENTS (34 credits)

Note: Please see https://genedplan.psu.edu/ for specific details about the general education requirements. These changed for students starting after Summer 2023.

FOR STUDENTS STARTING BEFORE SUMMER 2023
General education requirements for students starting before Summer 2023.
Note that you have 6 courses you can choose. Two Interdomains (N), one GA, one GHW, one GH and one extra exploration course.

	prescribed	Choice
6 credits of quantification (GQ) (requires C or better)	MATH140	
	MATH141	
9 credits of Writing/Speaking (GWS) (requires C or better)	ENGL15	
	CAS100A or 100B	
	ENGL202C	
9 credits Natural Science (GN)	CHEM110	
	CHEM112	
	PHYS211	
3 credits GS stand-alone	ECON102 or 104	
3 credits Arts (GA) stand-alone		GA (no N)
3 credits Health and Wellness (GHW) stand-alone		GHW (no N)
3 credits Humanities (GH) stand-alone		GH (no N)
3 credits of Interdomain (ID) with GA/GH/GN/GS**		ID #1 (with N)
3 credits of Interdomain (ID) with GA/GH/GN/GS**		ID #2 (with N)
3 credits of GA/GH/GS stand-alone or ID		GA/GH/GS or ID

Note that one of these courses must have a US component and one must have an IL component.

** together these courses must have at 6 credits in GA, GH and GS. You can also petition a move 3 so that there are only 3 stand-alone credits in one domain and 9 total credits in another.

FOR STUDENTS STARTING SUMMER 2023 OR AFTER

General education requirements for students starting after Summer 2023 (45 credits)

Note that you have 6 courses you can choose. Two Interdomains (N), one GA, one GHW, one GH and one extra exploration course.

	Prescribed	Choice
6 credits of quantification (GQ) (requires C or better)	MATH140	
	MATH141	
9 credits of Writing/Speaking (GWS) (requires C or better)	ENGL15	
	CAS100A or 100B	
	ENGL202C	
3 credits Natural Science (GN) stand-alone	CHEM110	
3 credits Social Science (GS) stand-alone	ECON102 or 104	
6 credits Inter-Domain (ID) will have N		ID #1 (with N)
		ID #2 (with N)
3 credits Arts (GA) stand-alone		GA (no N)
3 credits Health and Wellness (GHW) stand-alone		GHW (no N)
3 credits Humanities (GH) stand-alone		GH (no N)
9 credits of exploration	CHEM112	
	PHYS211	
3 credits of exploration		GA/GH/GS/ID*

*** This can also be a World Language at the 12th credit level or higher.**

MATH (14 credits)

MATH 140 Calculus With Analytic Geometry I (4) (C or better)
MATH 141 Calculus with Analytic Geometry II (4) (C or better)
MATH 231 Calculus of Several Variables (2)
MATH 251 Ordinary and Partial Differential Equations (4)

PHYSICS (8 credits)

PHYS 211 General Physics: Mechanics (4) (C or better)
PHYS 212 General Physics: Electricity and Magnetism (4)

CHEMISTRY AND LIFE SCIENCES (24 credits)

CHEM 110 Chemical Principles I (3) (C or better)
CHEM 111 Experimental Chemistry I (1)
CHEM 112 Chemical Principles II (3)
CHEM 113 Experimental Chemistry II (1)
CHEM 210 Organic Chemistry I (3)
CHEM 212 Organic Chemistry II (3)
CHEM 213 Laboratory in Organic Chemistry (2)
CHEM 457 Experimental Physical Chemistry (2)
B M B 251/MICRB 251 Molecular and Cell Biology I (3)

Take 3 credits of physical chemistry from the list below:
- CHEM 452 Physical Chemistry - Quantum Chemistry (3)
- CHEM 448 Surface Chemistry (3) (Fall only) (pre-req is CHE220)
- CHEM 466 Molecular Thermodynamics (3) (Spring only) (pre-req is CHE220)

ENGINEERING (3 credits)

EDSGN100 Cornerstone Engineering Design (3) (C or better)

REQUIRED CHEMICAL ENGINEERING COURSES (35 credits)

CHE 210 Introduction to Material Balances (3) (C or better)
CHE 220 Introduction to Chemical Engineering Thermodynamics (3) (C or better)
CHE 230 Computational Tools for Chemical Engineering (1)
CHE 300 Professional Development Seminar (1) (Spring only)
CHE 320 Phase and Chemical Equilibria (3) **(C or better)**
CHE 330 Process Fluid Mechanics (3) **(C or better)**
CHE 340 Introduction to Biomolecular Engineering (3)
CHE 350 Process Heat Transfer (3) **(C or better)**
CHE 410 Mass Transfer Operations (3)
CHE 430 Chemical Reaction Engineering (3)
CHE 452 Chemical Process Safety (3)
CHE 470 Design of Chemical Plants (3)
CHE 480W Chemical Engineering Laboratory (3)

CHEMICAL ENGINEERING ELECTIVES (6 credits)

Take 6 credits in 400-level engineering electives from the following list (note that these are not guaranteed to be offered in the year you want to take them – please see current list of electives)

CHE 412 CHE and the Environment
CHE 423 Chemical Energy Technology
CHE 432 (F SC 432) Petroleum Processing
CHE 438 Bioprocess Engineering
CHE 442 (MATSE 448) Polymer Processing Technology
CHE 443 Introduction to Polymer Science
CHE 445 Bioremediation/Green Chemistry
CHE 444 Chemical Game Theory
CHE 445 Bioremediation/Green Chemistry
CHE 446 Transport Phenomena
CHE 449 Bioseparations
CHE 450 Process Dynamics and Control
CHE 455 Drug Delivery, Pharmacokinetics, and Artificial Organs
CHE 494 Research Projects in Chemical Engineering (see Note below)
CHE 496 Independent Studies
CHE 497 Special Topics in Chemical Engineering (see Note below)

Note on CHE 494: Students may use **up to 6 credits of CH E 494** towards graduation requirements in chemical engineering. Up to 3 credits may be used as a CHE 4XX electives and another 3 credits may be used as engineering elective or professional elective.

Note on CHE 496: This course is used for Independent Study of a topic under the direction of a faculty member. It is not to be used for scientific research.

Note on CHE 497: This is a generic course number for special topics that do not have a permanent course number. When multiple courses are offered on special topics, they will appear with numbers such as 497 with various section numbers. You can take multiple CHE 497 courses as long as the content is unique.

MATERIALS ELECTIVE (3 credits)

Select 3 credits from the list:

MATSE 201 Introduction to Materials Science (3) (Fall only)
MATSE 202 Introduction to Polymer Materials (3) (Spring only)
BME 443 Biomedical Materials (3) (Fall only and must be in BME minor and have MATH230)

ENGINEERING ELECTIVE (3 credits)

Select 3 credits from an approved list of engineering courses. See below for a list of common engineering electives. This is not an exhaustive list. Engineering electives must be courses that have a strong technology component and build from a background in mathematics and science. Computer programming is not required of the CHE major but is a recommended and popular topic to pursue with this elective requirement (CMPSC 201, for example). Please check with your adviser and submit a petition through coursesub.psu.edu for consideration before assuming that any course not on the list in this handbook would count as an Engineering Elective. Many ENGR courses DO NOT count as Engineering Electives. If you petition a course, be sure to explain how it satisfied the following criteria.

> *Engineering sciences are based on mathematics and basic sciences but carry knowledge further toward creative application needed to solve engineering problems. These studies provide a bridge between mathematics and basic sciences on the one hand and engineering practice on the other.*

PROFESSIONAL ELECTIVES (6 credits)

Professional electives are a broad category of electives that give you the opportunity to enhance your portfolio of professional skills, to pursue minors, or to pursue topics of personal interest that are not covered by other elective categories. Acceptable courses must be at the 200-level or above. As a wide variety of courses may count as Professional Electives, all courses that are appropriate will not automatically be placed in this category on your “Academic Requirements” record in LionPATH. If a course you intend as a Professional Elective does not automatically fall into that category in LionPATH, please submit a petition through coursesub.psu.edu and provide a brief description of how this course helped you develop as a student and/or professional.

Prerequisites

The Chemical Engineering Department enforces all pre-requisites for required CHE classes. Students will not be able to schedule courses on LionPATH if they do not have the prerequisites. Pre-requisite waiver requests can be completed on LionPATH. These waivers are only granted in exceptional conditions, such as when a student took the pre-requisite course at another university and the credits are yet to transfer.

C Requirement

The following courses require a C or better: ENGL15, CAS100A/B, ENGL202C, MATH140, MATH141, CHEM110, PHYS211, EDSGN100.

The following courses require C or better for graduation in chemical engineering:

CHE **210**, **220**, 320, 330, 350

CHE **210** **and** **220** are special courses and require a minimum grade of C before you can take ***any CHE course*** that has these courses as prerequisites. Notice that CHE 210 is a prerequisite for all 300-level courses (except CHE 300); this means that a D in 210 will require you to retake 210 before you can start taking 300-level courses.

General Scheduling Tips

- During the semester you take CHE 210 and 220, plan on a lighter credit load (~15-16 credits), especially if you are transferring from a Commonwealth Campus. It takes some effort to get used to the format and study style of chemical engineering classes and since both CHE 210 and 220 require a minimum grade of C, you should make sure you have the time to devote the required effort.
- The 300-level courses can be taken almost in any sequence. We recommend that you take CHE 320 and 330 in the fall of the junior year, then CHE 300, 350 and 340 in the spring. It is highly recommended to take CHE 330 before taking CHE 350.
- CHE 410 and 430 are prerequisites for CHE 470. A typical plan is to take 410 and 430 in the fall of the senior year, and 470 in the spring.
- The chemical engineering lab, CHE 480W, can be taken concurrently with CHE 410/430, therefore you can take it either in the fall or spring of the senior year. It is not recommended to take both 410 and 430 concurrently with the lab.
- All required CHE courses are offered both fall and spring, except for CH E 300 (spring only).

Sample course plans are shown on the next pages. Though these are typical plans, there are many possible progressions through the curriculum. It is your responsibility to ensure that the courses you want to take are available in the semester you plan to take them, and that all prerequisites are satisfied. Before making modifications to this plan see your advisor to make sure that everything will work as planned.

Sample Schedule 1 – Starting at UP and beginning CHE courses in Semester 3

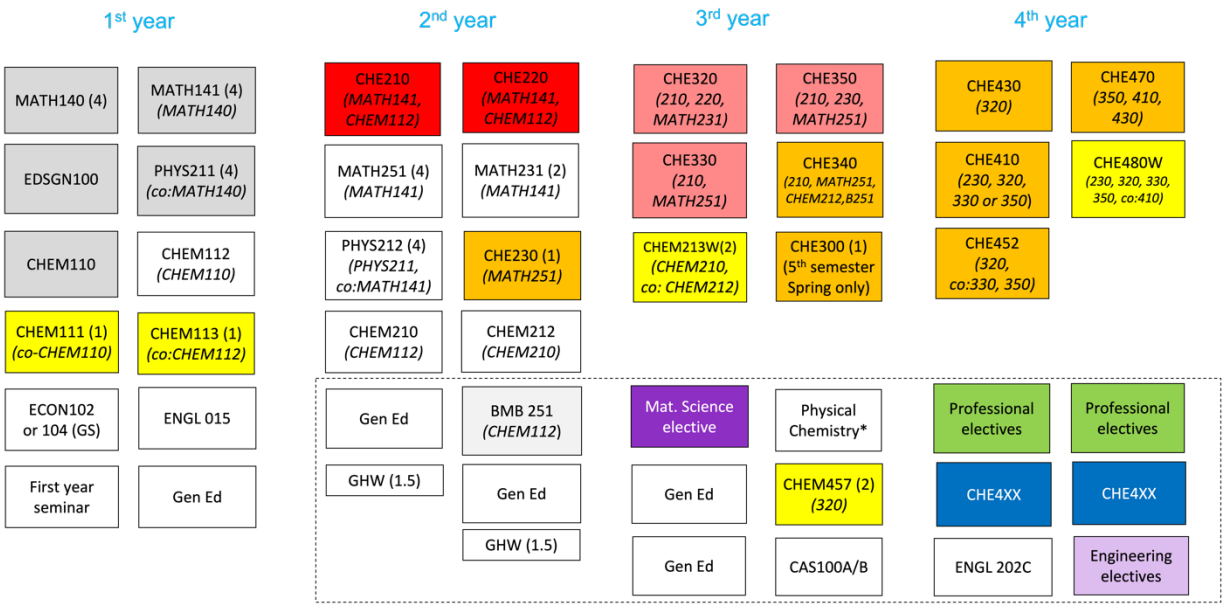
	Credits	Semester 2	credits
CHEM 110	3	CHEM 112	3
CHEM 111	1	CHEM 113	1
MATH 140	4	MATH 141	4
EDSGN 100	3	PHYS 211	4
First Year Seminar	1	ENGL 15 or ENGL 30	3
ECON 102 or 104 (Gen Ed 1)	3	Gen Ed 2	3
	15		**18**
Semester 3	**credits**	**Semester 4**	**credits**
CHE 210	**3**	**MATH 231**	2
CHEM 210	**3**	**CHE 220**	3
MATH 251	4	**CHE 230**	1
PHYS 212	4	**CHEM 212**	3
Gen Ed 3	3	BMB 251	3
		Gen Ed 4	3
		Health & Physical Activity (GHW)	1.5
	17		**16.5**
Semester 5	**credits**	**Semester 6**	**credits**
CHE 320 (210, 220, MATH231)	3	**CHE 300**	1
CHE 330 (210, MATH251)	3	**CHE 340 (210, BMB251)**	3
CHEM 213	2	**CHE 350 (210, 230, MATH251)**	3
Professional Elective	3	CHEM 457	2
Gen Ed 5	3	Physical chemistry elective	3
Gen Ed 6	3	CAS 100A/B	3
		Health & Physical Activity (GHW)	1.5
	17		**16.5**
Semester 7	**credits**	**Semester 8**	**credits**
CHE 410 (230, 320, 330 or 350)	3	**CHE 470 (350, 410, 430)**	3
CHE 430 (320)	**3**	**CHE 480W (230, 320, 330, 350**	3
CHE 452 (320, co: 330 and 350)	3	Chemical Engineering Elective	3
ENGL 202C	3	Engineering Elective	3
Materials Elective	3	Professional Elective	3
Chemical Engineering Elective	3		
	18		**15**

Total number of credits: 133

Sample Course Schedule 2 – Non-UP start, begin CHE classes in Semester 4			
Semester 1	Credits	Semester 2	credits
CHEM 110	3	CHEM 112	3
CHEM 111	1	CHEM 113	1
MATH 140	4	MATH 141	4
EDSGN 100	3	PHYS 211	4
First Year Seminar	1	ENGL 15 or ENGL 30	3
ECON 102 or 104 (Gen Ed 1)	3	Gen Ed 2	3
	15		**18**
Semester 3	**credits**	**Semester 4**	**credits**
CHEM 210	3	**CHE 210**	3
MATH 231	2	**CHE 220**	3
MATH 251	4	**CHE 230 (MATH251)**	1
PHYS 212	4	CHEM 212	3
Gen Ed 3	3	BMB 251	3
		Gen Ed 4	3
		Health & Physical Activity (GHW)	1.5
	16		**17.5**
Semester 5	**credits**	**Semester 6**	**credits**
CHE 320 (210, 220, MATH231)	3	**CHE 300**	1
CHE 330 (210, MATH251)	3	**CHE 340 (210, BMB251)**	3
CHEM 213	2	**CHE 350 (210, 230, MATH251)**	3
Professional Elective	3	CHEM 457	2
Gen Ed 5	3	Physical chemistry elective	3
Gen Ed 6	3	CAS 100A/B 3 credits GHW	1.5 credits
	7		**16.5**
Semester 7	**credits**	**Semester 8**	**credits**
CHE 410 (230, 320, MATH251)	**3**	**CHE 470 (350, 410, 430)**	3
CHE 430 (320)	**3**	**CHE 480W (230, 320, 330, 350)**	3
CHE 452	3	Chemical Engineering Elective	3
ENGL 202C	3	Engineering Elective	3
Materials Elective	3	Professional Elective	3
Chemical Engineering Elective	3		
	18		**15**
Total number of credits: 133			

Curriculum in this handbook directly applies to students who enter the CHE major

RECOMMENDED CHE SCHEDULE (WITH PRE-REQUISITES IN PARATHESES)



Academic Integrity

Professional integrity will be important to your career as a Chemical Engineer, as acting with integrity is essential to being an effective team member in the workplace. Surveys consistently show that people select co-workers who they perceive as having high integrity, and a large percentage of disciplinary issues in the workplace (including firing) occur due to integrity violations. Academic integrity is your chance to practice acting with integrity while you are a student. Our instructors and students both have a responsibility to act with integrity to create a positive and professional learning environment. As a student, acting with integrity includes:

Coming prepared for class
Treating your peers and instructors with respect
Handing in assignments on time that honestly represent your work
Coming to exams prepared and demonstrating your knowledge and abilities on exams

Any violations of academic integrity will follow university procedures to record violations and enact sanctions. Please know that sanctions cannot be enacted without going through the College of Engineering. Please see your advisor or the department head if you feel you have been unfairly accused of an academic integrity violation without going through the proper channels. You can learn more about academic integrity policies and the procedures for violations at this website: https://advising.engr.psu.edu/student-resources/academic-integrity.aspx

Substitutions and Recording Elective Choices

All requests to make substitutions for required courses are to be submitted through the coursesub.psu.edu system. Some Professional Elective choices need to be submitted through this system to have the course recorded in LionPATH as your choice as a Professional Elective. Many Professional Electives, and most Chemical Engineering and Engineering Electives are automatically moved to count towards these requirements in your LionPATH record. If a course is not appearing in the correct location on your "Academic Requirements" (also known as "degree audit") record in LionPATH, you should submit a petition to have the course moved through the coursesub system. Typical petitions include:

- **FYS:** Substituting any 1 credit course toward the FYS credit if you already received credit for a FYS. You may have received this credit from ENGL137 or 138 (from SHC) or EDSGN from another campus.
- **MATH230 for MATH231:** If you took MATH 230 (4 credits), you can petition this to count as MATH231 (2 credits) plus 2 credits of professional elective. No explanation necessary.
- **MATH250 + MATH252 for MATH251:** You can petition MATH250 (3 credits) + MATH251 (1 credit) for MATH251. No explanation necessary.
- **Professional elective:** Counting a 200-level course or above for a professional elective. Please provide a description of how this course contributed to your development as a student and/or as a professional.
- **Engineering elective:** Counting a technical course for an engineering elective. This could include your internship/co-op credit. Note that you get one credit for each semester of an internship/coop. You must describe how this course fits the following description of an engineering sciences course:

Engineering sciences are based on mathematics and basic sciences but carry knowledge further toward creative application needed to solve engineering problems. These studies provide a bridge between mathematics and basic sciences on the one hand and engineering practice on the other.

- **General Education courses:** You may want to petition a course that you took to count as a GA, GH, GS, GHW, IL, US or ID. These requests will go to the Dean's office in the College of Engineering. When making these requests please do the following:
    - Attach the syllabus of the course.
    - Describe how the course meets the requirements as found here for Knowledge Domains (GA, GH, GS): https://bulletins.psu.edu/undergraduate/general-education/domains/
    - Here for interdomains (ID): https://bulletins.psu.edu/undergraduate/general-education/integrative-studies/
    - Here for FYS, US, IL and GWS: https://bulletins.psu.edu/undergraduate/general-education/other-university-requirements/
    - Be as specific as possible and include the assignments that satisfied the learning objectives.

General Education Requirements

The "General Education" requirements of Baccalaureate degrees at Penn State are most clearly conveyed at the university's bulletin website: http://undergraduate.bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/

Advising

CHE majors are assigned a faculty member from our advising team as their faculty adviser. You will receive a chemical engineering advisor once you have declared the major AND are enrolled in CHE 210. Students can schedule appointments with their adviser in Starfish at: http://starfish.psu.edu/. Find your advisor under "my success network". Schreyer Honors students will need to email their advisor for an appointment. Advisers can serve as your primary resource for any academic questions that arise, including course scheduling, study habits, career planning, and integrating courses and extracurricular activities. Students can meet with their adviser to address specific issues (scheduling next semester's classes, developing a plan of study for the next few semesters, getting advice on struggles in their courses, planning study abroad or a co-op) or for a general "check-up" on their academic progress and plans. We suggest that students check-in with their adviser each semester.

Transferring courses from other universities towards the major

Students are permitted to transfer courses from other universities towards their graduation requirements at PSU. The following website provides information on how courses are transferred to PSU: https://admissions.psu.edu/info/future/transfer/credit/ Note that a "Transfer Tool" is linked on this website where students can find specific courses at other universities and their PSU equivalence.
In many cases, CHE courses of interest to students at other universities will not be listed as a direct-equivalent. Students often would like to know if a CHE course at another university can count towards a specific CHE major requirement before enrolling in the course (including when studying abroad).

Students are encouraged to email the undergraduate program coordinator, Stephanie Velegol (sbv1@psu.edu) if they would like to know whether a specific course at another university can be used to count towards a CHE course requirement. In the email, students should specify the university where the course is to be taken, attach the syllabus for the course, and note what PSU CHE course they are hoping to replace. Such requests cannot typically be evaluated without a syllabus, so students should contact the other university to request a syllabus before emailing.
For non-CHE courses, students will need to contact the specific department that offers the related PSU course for any pre-evaluation of equivalence.

Repeating courses

University policy limits the number of times a student can repeat a course, limiting students to *two attempts.* Both receiving a failing grade (including D in a "C or better" course) or late dropping a course count as an attempt. Students can request a third attempt by completing the form: https://www.engr.psu.edu/arws/secured/form.aspx?form_id=7
A third attempt will generally be approved if the student can provide a justification as to what will be done differently to allow for success on the third attempt. Though this form can also be used to request a fourth attempt at a class, fourth attempts are only approved under extreme circumstances.

Grade Replacement

Beginning in Summer 2020, if a student earns a D or F grade in a course and then repeats the course and earns a better grade, the student can replace the D or F with the new grade. If this grade forgiveness is granted, both grades will appear on the transcript but only the higher grade will contribute to the student's GPA. You can only use this for up to 12 credits.You can request this grade forgiveness after you have completed the second course on LionPATH under Academic Records.

Minors of Interest to Chemical Engineering Students

Chemical Engineering BS students can consider a wide array of Minors to add to their undergraduate curriculum. A typical PSU Minor requires 18 credits, but many Minors have some overlap with CHE such that credits can count towards both the CHE Major and a Minor. Some Minors count courses required of the CHE Major towards the Minor requirements. Courses in many Minors can be counted as Professional Electives or Engineering Electives within the major, or towards General Ed requirements. The requirements of any Minor are defined by the Department in which that Minor is housed. Students are encouraged to reach out to an advisor in the minor department to discuss how chemical engineering courses can be used for the minor. Students are referred to the undergraduate bulletin (https://bulletins.psu.edu/programs/#filter=.filter_24) and individual department websites to find more information about specific minors.

Table. A partial list of Minors of particular interest to CHE students.

MINOR	DEPARTMENT	CREDITS BEYOND CHE MAJOR*
Environmental Engineering	Civil and Environmental Engineering	0
Energy Engineering	Energy and Mineral Engineering	0
Biomedical Engineering	Biomedical Engineering	3
Materials Science and Engineering	Materials Science and Engineering	6
Polymer Science	Materials Science and Engineering	6
Chemistry	Chemistry	0
Mathematics	Mathematics	6
Biochemistry and Molecular Biology	Biochemistry and Molecular Biology	12
Engineering Leadership Development	SEDI	6 - 12
Entrepreneurship & Innovation (ENTI)	SEDI	12

* This value is the minimum number of extra credits needed provided a student maximizes the number of courses from the Minor that can also count towards the CHE Major, including as Professional or Engineering Electives.

Environmental Engineering Minor
https://bulletins.psu.edu/undergraduate/colleges/engineering/environmental-engineering-minor/

Energy Engineering Minor *https://bulletins.psu.edu/undergraduate/colleges/earth-mineral-sciences/energy-engineering-minor/*

Biomedical Engineering
https://bulletins.psu.edu/undergraduate/colleges/engineering/biomedical-engineering-minor/#contacttext

Materials Science and Engineering Minor
https://bulletins.psu.edu/undergraduate/colleges/capital/materials-science-engineering-minor/#programrequirementstext

Polymer Science Minor *https://bulletins.psu.edu/undergraduate/colleges/earth-mineral-sciences/polymer-science-minor/#programrequirementstext*

Chemistry Minor *https://bulletins.psu.edu/undergraduate/colleges/eberly-science/chemistry-minor/*

Mathematics Minor *https://bulletins.psu.edu/undergraduate/colleges/eberly-science/mathematics-minor/#programrequirementstext*

Biochemistry and Molecular Biology *https://bulletins.psu.edu/undergraduate/colleges/eberly-science/biochemistry-molecular-biology-minor/#programrequirementstext*

Engineering Leadership Development *https://www.sedi.psu.edu/eld/undergraduate/index.aspx*
The ELD Minor requires 18 credits and is housed in the School of Engineering Design, Technology, and Professional Programs (SEDTAPP). Up to 6 credits from the Minor (ENGR407 and ENGR408) may be used by CHE students towards their Professional Electives requirement. If you plan ahead, you can count 6 credits of your gen eds (GH, GA, GS) toward this minor. That will leave you with 6 credits extra. Note that courses in this Minor are not typically approved to count as Engineering Electives.

Entrepreneurship and Innovation Minor (ENTI) *https://cpsse.psu.edu/enti*
This is a great minor if you are interested in entering an industrial job and knowing how to lead, innovate, manage, and plan. The minor requires 18 credits. You can count 6 credits towards professional electives.

Extra-Curricular Activities

AIChE Undergraduate Student Chapter

Our department has a very active and vigorous student chapter of the American Institute of Chemical Engineers. This chapter organizes academic, social, and career-oriented activities to help students integrate into the department and the profession. Activities include networking sessions with companies, outreach activities to educate K-12 students about science and engineering, intramural sports teams, a graduation celebration, and the Penn State THON fundraiser. Students can begin involvement at any time during their studies, including during their first semester at PSU. For more information, visit: http://sites.psu.edu/aiche/

Omega Chi Epsilon (Beta Alpha Student Chapter)

Omega Chi Epsilon (OXE) is the national honor society for the Chemical Engineering field. Students become eligible for induction to the chapter following completion of 6 credits (typically, CHE 210 and CHE 220) in Chemical Engineering, and must have a 3.5 GPA or higher at the time of induction. Students are also asked to participate in service activities prior to induction. The main service activity OXE participates in is providing tutoring to students in the 2xx and 3xx CHE courses. OXE also holds luncheon meetings with faculty to learn about research and other academic issues, holds resume workshops, and participate in high school outreach. For more information, please visit:https://sites.google.com/a/psu.edu/oxe/home

Internships/CO-OPs https://career.engr.psu.edu/students/intern-coop/index.aspx

Chemical Engineering undergraduate students participate in paid internships (during the summer) and CO-OPs (during the academic year) with companies in the field. These experiences provide a great chance to learn about possible career paths and build experience that helps make students competitive for job opportunities following graduation. In our 2023 exit surveys, 94% of CHE majors reported participating in a paid industrial internship or CO-OP while an undergraduate in our program. Students are encouraged to discuss career options with their advisors and CHE professors, and to attend company information sessions. Career Fairs are held in fall and spring semesters, and students are encouraged to attend these beginning during their first year to help learn about opportunities and build relationships with possible future employers. For CHE-specific questions about CO-OPs and internships, students are referred to Professor Gary Aurand, our department's co-op officer (gza140@psu.edu).We also recommend that you meet with a College of Engineering Career Envoy to answer questions about your resume, cover letters, interviews, and professionalism.
https://career.engr.psu.edu/students/envoys.aspx

College of Engineering career fair: https://career.engr.psu.edu/calendar.aspx
Penn State career fair: https://studentaffairs.psu.edu/career/fairs

If students register for the ENGR 195/295/395 CO-OP/internship courses, these can count as a Professional Elective in the CHE major. If the experience has sufficient technical content, it can be used as an Engineering Elective. Students wanting this to count as an Engineering Elective should submit a petition on coursesub.psu.edu and include their final report, explaining the technical content of the experience, as an attachment.

Undergraduate Research

There are many opportunities in the CHE department for undergraduate students to get involved in research activities. Students pursuing honors in Chemical Engineering are typically involved in research over multiple semesters and complete a thesis. Though there are many Schreyer Honor's students pursuing research in the department, research is not restricted to honors students. On our 2023 graduation surveys, 48% of all CHE BS students reported getting involved in research during their undergraduate careers. Students can complete research for credit (CHE 294 or CHE 494) during the school year. There are also opportunities through department endowments and National Science Foundation sponsorship to get paid to do research during the summer.

To get involved in research, students are encouraged to peruse the research descriptions of faculty on our department website and contact (email, or in person) faculty that lead groups with research in an area of interest. Students should get an agreement from a faculty member to perform research for credit before registering for CHE 294(H) or 494(H).

LIST OF ENGINEERING ELECTIVES

Courses listed below are approved to count as Engineering Electives within the Chemical Engineering Major. Many of these courses have enrollment controlled by the department offering the course, and the availability of seats in these courses may vary from semester to semester.

Courses outside this list with sufficient technical content can be petitioned. Such courses are expected to be at the 300-400 level and have prerequisites in Math, Physics or Chemistry as appropriate for the subject.

CO-OP credits may be petitioned as Engineering Electives. Approval is subject to review of the final CO-Op report, which is expected to demonstrate sufficient depth in the application of chemical engineering principles. Since approval is not automatic, consult with your advisor before submitting such a petition.

Many of the courses in the list below require prerequisites that are outside the courses normally taken by chemical engineering students. It is the student's responsibility to ensure that he or she has the proper prerequisites for the course of their choice. For some courses, students may find they can substitute a CHE course for a pre-req required in other departments (for example, an advanced ME course might list a ME Thermodynamics pre-req, but CHE 220/320 may also be acceptable). Questions about prerequisites should be directed to the department or instructor that offers the course of interest.

Most common Engineering Electives (prerequisites in paratheses)

BIOLOGICAL ENGINEERING

BE 301 MATHEMATICAL MODELING OF BIOLOGICAL AND PHYSCIAL SYSTEMS (3) (MATH251)
BE 307 PRINCIPLES OF SOIL AND WATER ENGINEERING (3) (CE 360 OR ME 320 OR PETITION CHE330)
BE465 FOOD AND BIOLOGICAL PROCESS ENGINEERING (3) (BE302 OR PETITION CHE350 AND CHE410)

BIOMEDICAL ENGINEERING

BME 410 BIOMEDICAL APPLICATIONS OF MIRCOFLUIDICS (CHE 330)
BME 413 MASS TRANSPORT IN BIOLOGICAL SYSTEMS (CHE 220, MATH 251, BIOL 141 OR 240W)
BME 419 ARTIFICIAL ORGANS AND PROSTHETIC DEVICES (BIOL 141 OR BIOL 240W, CMPSC 200 OR 201 OR 121)
BME 423 REACTION KINETICS OF BIOLOGICAL SYSTEMS (BIOL 141 OR BIOL 240W, MATH 251, CHE 210, CHE 410)
BME 437 BIOMEDICAL DATA SCIENCE FOR BIOENGINEERS
BME 445 TISSUE ENGINEERING: CONCEPTS, CALCULATIONS AND APPLICATIONS (BMB 251)
BME 446 POLYMERS IN BIOMEDICAL ENGINEERING (EMCH 210)

CIVIL ENGINEERING

CE 370 INTRODUCTION TO ENVIRONMENTAL ENGINEERING (3) (MUST BE IN ENV. ENG MINOR)

COMPUTER SCIENCE

CMPSC 121 INTRODUCTION TO PROGRAMMING TECHNIQUES (3)

CMPSC 131 PROGRAMMING AND COMPUTATION 1: FUNDAMENTALS (3)
CMPSC 200 PROGRAMMING FOR ENGINEERS WITH MATLAB (3)
CMPSC 201 PROGRAMMING FOR ENGINEERS WITH C++ (3)

ENGINEERING MECHANICS
EMCH 211 STATICS (3) (MATH 140)

MATERIAL SCIENCE AND ENGINEERING
MATSE 403/ BME 443 BIOMEDICAL MATERIALS (3) (MATSE 201, MATH 231)
MATSE 404/ BME 444 SURFACES AND THE BIOLOGICAL RESPONSE TO MATERIALS
MATSE 445 THERMODYNAMICS, MICROSTRUCTURE, AND CHARACTERISTICS OF POLYMERS (MATSE 202)
MATSE 446 MECHANICAL AND ELECTRICAL PROPERTIES OF POLYMERS AND COMPOSITES (MATSE 202)

ENERGY AND GEO-ENVIRONMENTAL ENGINEERING
EGEE 420 HYDROGEN AND FUEL CELLS (3) (EME 301 OR CHE 210 WITH WAIVER)
EGEE 441 ELECTROCHEMICAL ENGINEERING FUNDAMENTALS (3) (CHE 220 AND CHE 330)
EGEE 455 MATERIALS FOR ENERGY APPLICATIONS (3) (EGEE 302 OR CHE 220 WITH WAIVER, MATSE 201)
EGEE 439 ALTERNATIVE FUELS FROM BIOMASS SOURCES (3)

ENVIRONMNETAL SYSTEMS ENGINEERING
ENVSE 400 ENVIRONMENTAL SYSTEMS ENGINEERING (3)
ENVSE 450 ENVIRONMENTAL HEALTH AND SAFETY (3)
ENVSE 470 ENGINEERING RISK ANALYSIS (3) (MATH 251)

FUEL SCIENCE
FSC 431 CHEMISTRY OF FUELS (3) (CHEM 210 AND EGEE 302/CHE 220 WITH WAIVER)
FSC 432 PETROLEUM PROCESSING (3) (CHEM 210)