

Academic Advising Guide

(Updated October 10, 2018)

Chemical Engineering

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Contents

Introduction	2
Curriculum	3
Course Descriptions.....	4
Prerequisites.....	7
Requirements and Policies.....	7
Transfer Students.....	8
Technical Electives.....	9
Degree Check.....	15
MS Quick Start Program.....	17
Frequently Asked Questions.....	18
Forms and Petitions.....	21



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“A goal without a plan is just a wish.” — Antoine de Saint-Exupéry

“Before anything else, preparation is the key to success.” — Alexander Graham Bell

Introduction

The Guide

This guide was created with one important thing in mind: **We want you to be successful!** This guide describes the curriculum, course descriptions, prerequisites, and the general requirements for graduation. It also contains information about technical requirements, which give you the opportunity to shape your program further. With this Academic Advising Guide, you will be aware of the program policy, familiar with the procedures, and able to plan ahead your study.

You need this guide if you want to:

- meet with your advisor for advising
- plan ahead your study
- consider technical requirements
- check some requirements
- check course description and prerequisites
- take undergraduate research or internship
- take an MS Quick Start Program
- request exceptions
- find forms and petitions
- transfer a course from another university
- find other important information

Since the contents of this Advising Guide always change with time, check the advising website regularly to obtain the latest updates. We will update the Advising Guide once every semester before the advising week. It is the responsibility of the student to know the latest updates on the program policies and curriculum.

Help Corner

1. Where can I find the information if I cannot find it on this guide?

a. Check our website first at:

<http://www.uwyo.edu/chemical>

If you still cannot find the answer, please contact us.

2. Where can I obtain this guide (word file)?

Download it at:

<http://www.uwyo.edu/chemical>



Curriculum

The curriculum below is the suggested course arrangement. Each student may have a different course arrangement depending on a lot of factors. When you plan your study:

- Always check the prerequisites of courses & always check the semester in which courses are usually offered.

CHEMICAL ENGINEERING CURRICULUM				
(for students entering UW Spring 2018 or later)				
FALL	Grade	SPRING	Grade	
FRESHMAN YEAR				
1101 First Year Seminar (FYS)	3	MATH 2205 Calculus II	4	
None		C in MATH 2200		
MATH 2200 Calculus I (Q)	4	CHEM 1060 Adv Gen Chemistry II	4	
C Math 1405 or 1450, MPE 5, ACT 27, SAT 600		CHEM 1050 (or CHEM 1020)		
CHEM 1050 Adv Gen Chemistry I (PN)	4	PHYS 1210 Engr Physics I* (PN)	4	
Concurrent MATH 2200		C in MATH 2200, Concurrent MATH 2205		
LIFE 1010 General Biology I	4	ENGL 1010 Coll Comp & Rhet (COM1)	3	
C in MATH 0921 or MPE 2, ACT 21, SAT 600		None		
		CHE 1005 Intro to Chemical Eng.	1	
		Concurrent with MATH 2200		
	15		16	
SOPHOMORE YEAR				
MATH 2210 Calculus III	4	MATH 2310 Applied Differential Eqns I	3	
C in MATH 2205		C in MATH 2205		
CHEM 2420 Organic Chemistry I	4	CHEM 2440 Organic Chemistry II	4	
CHEM 1060 (or CHEM 1030)		CHEM 2420		
CHE 2005 Chem Process Analysis	3	CHE 2060 CHE Computing	3	
Concurrent MATH 2205, C- in CHEM 1050 (or CHEM 1020)		C- in CHE 1005 or ES 1060, C- in CHE 2005, & Concurrent MATH 2310		
PHYS 1220 Engr Physics II	4	CHE 2070 Chemical Thermo I	3	
C in MATH 2200, 2205, Concurrent in MATH 2210		C- in CHE 2005, PHYS 1210 & C in Math 2210		
COM 2	3	CHE 2080 Che. Eng. Fluid Mechanics	3	
(O,WB)		C- in CHE 2005 & PHYS 1210, C in MATH 2210 & Concurrent MATH 2310		
	18		16	
JUNIOR YEAR				
CHE 3015 Chemical Thermo II	3	CHE 3028 Mass Transfer	3	
C- in CHE 2060 & CHE 2070 or ES 2310		C- in CHE 2060 & CHE 2080 or ES 2330		
CHE 3026 Heat Transfer	3	CHE 3070 Process Simul & Econ	3	
C- in CHE 2060 & CHE 2080 or ES 2330		C- in CHE 3015 & CHE 3026 and Concurrent CHE 3028		
CHEM 4507 Physical Chemistry I	3	CHE 4060 Reaction Engineering	3	
MATH 2210, PHYS 1220, CHEM 1060 or 1030		C- in CHE 3015 & CHE 3026 and concurrent CHE 3028		
Technical Elective	3	Human Culture (H)	3	
Technical Elective	3	None		
		Technical Elective	3	
	15		15	
SENIOR YEAR				
CHE 3040 Unit Ops Lab I	3	CHE 4050 Unit Ops Lab II	3	
C- in CHE 3026, CHE 3028 & CHE 4060		C- in CHE 3040		
CHE 4070 Process Design I	4	CHE 4080 Process Design II (COM3)	4	
C- in CHE 3028, CHE 3070 & CHE 4060		C- in CHE 4070 & COM 2		
CHE 4090 Process Dyn & Control	3	US & Wyo Const (V)	3	
C- in CHE 3028 and CHE 4060		None		
Human Culture (H)	3	Technical Elective	3	
Technical Elective	3	Technical Elective	3	
	16		16	
Total Hours:	127			

18 credits of Technical Electives required (10 credits must be 3000+)

At least one Chemical Engineering Technical Elective (3 credits) is required. Additional Chemical Engineering elective courses may be used as Technical Electives. For more Information, see CHE Advising Guide found at: <http://www.uwyo.edu/chemical/undergraduate/chindex.html>

Updated 1/10/18

Course Descriptions

For other course descriptions, see: http://www.uwyo.edu/registrar/university_catalog/

1005. Introduction to Chemical Engineering. 1. Provides an overview of chemical engineering and its role in the current technological importance: energy, biotechnology, production of chemicals, and materials processing. Introduces strategies for solving engineering problems, including ethical considerations, discusses process variables, units, mass balance, and data analysis, and incorporates active learning exercises using spreadsheet to solve chemical engineering problems. Prerequisite: C- in either CHEM 1050 or CHEM 1020 and concurrent enrollment in PHYS 1210.

2005. Chemical Process Analysis. 3. Introduces analysis of chemical processes using stoichiometry, material and energy balances, thermodynamics and economics. Prerequisite: Concurrent in MATH 2205 and C- in either CHEM 1050 or CHEM 1020. (Normally offered fall semester)

2060. Introduction to Chemical Engineering Computing. 3. Introduces chemical engineering problems, develops computational skills needed to solve them, and reinforces a computational tool that will be useful for other CHE classes. Prerequisites: Grade of C- or better in CHE 1005 or ES 1060 and concurrent enrollment in MATH 2310. (Normally offered spring semester)

2070. Chemical Thermodynamics I. 3. Discusses first and second laws of thermodynamics applied to chemical processes, production of power from heat, refrigeration, and liquefaction processes, develops thermodynamic relations for calculating thermodynamic properties of fluids, including the use of equations of state, and introduces heat effects, Gibbs-energy change of reaction, and chemical-reaction equilibria. Prerequisites: C- in PHYS 1210, MATH 2210, and CHE 2005. (Normally offered spring semester)

2080. Chemical Engineering Fluid Mechanics. 3. Introduces the fundamental aspects of macroscopic fluid mechanics, including physical properties, fluid statics, mass, energy, and momentum balances, momentum transport, and flow through pumps, pipes, and other chemical engineering equipment for both incompressible and compressible fluids, and of microscopic fluid mechanics, including differential mass and momentum balances. Prerequisites: C- in PHYS 1210, MATH 2210, CHE 2005 and concurrent enrollment in MATH 2310.

3015. Chemical Thermodynamics II. 3. Introduces mixture properties, such as chemical potentials, excess properties, partial molar properties, heats of mixing, fugacities, and practical tools for estimating them from solution theories and equations of state. These tools and concepts are applied to phase and chemical equilibria. Cross listed with PETE 3015. Prerequisite: C- in CHE 2060, CHE 2070 or ES 2310. (Normally offered fall semester)

3026. Heat Transfer. 3. Introduces the theory and application of energy transport (e.g. conduction, convection, radiation), discusses in depth fundamentals of microscopic energy transport, and applies the knowledge to macroscopic chemical engineering processes and systems. Prerequisites: C- in CHE 2080 or ES 2330. (Normally offered fall semester)

3028. Mass Transfer. 3. Introduces mass transfer concepts, including molecular diffusion, convective mass transfer, and mass transfer between phases, and the development of mathematical models of these physical phenomena, applicable to the analysis and design of chemical processes. Prerequisites: C- in CHE 2080 or ES 2330. (Normally offered fall semester)

3035. Separation Processes. 3. Applies transport and equilibrium concepts and models to the analysis and design of separation processes, such as distillation, absorption, extraction, leaching, adsorption, crystallization, and membrane separation processes. Prerequisites: C- in CHE 3015 and 3028. (Normally offered spring semester)

3040. Unit Operations Laboratory I. 3. Illustrates fluid-flow and heat-transfer principles with experiments, for example, on pipe flow, fluid viscosity, and convective heat transfer. Emphasizes experimental-error analysis and technical communication, both written and oral. Prerequisite: C- in CHE 3026. (Normally offered fall semester)

3070. Process Simulation and Economics. 3. Introduces the process simulation software used in the chemical industry and its applications, including examples of heat and material balances, physical properties, phase and chemical equilibria, equilibrium-stage separations and costs and profitability analysis. Prerequisites: C- in CHE 3015 and concurrent enrollment in CHE 3035.

3900. Undergraduate Research. 1-6 (Max. 6). Students carry out research appropriate to undergraduates, under faculty supervision. May be taken more than once. Prerequisite: Junior standing in chemical engineering and approval from a faculty sponsor. (Normally offered each semester)

4050. Unit Operations Laboratory II. 3. Illustrates mass-transfer principles with experiments, for example, on extraction, gas absorption, and distillation. Emphasizes experiment planning and technical communication, both written and oral. Prerequisite: C- in CHE 3035. (Normally offered spring semester)

4060. Reaction Engineering. 3. Introduces chemical process kinetics, catalysis and reactor design. Includes homogeneous and heterogeneous reaction kinetics; design of batch, stirred-tank and tubular reactors; and non-isothermal operation. Prerequisites: C- in CHE 3015, 3026, and 3028. (Normally offered spring semester)

4070. Process Design I. 4. Encompasses engineering design of chemical processes. Introduces engineering economics, process safety management and environmental management. Prerequisites: C- in CHE 3035, 3070, and 4060. (Normally offered fall semester)

4080. Process Design II. 4. Intended for the last semester of the senior year. Applies all previous courses to the design of safe, economical and environmentally benign chemical processes. Prerequisite: C- in COJO 2010 and CHE 4070. (Normally offered spring semester)

4090. Process Dynamics and Control. 3. Encompasses analysis and design control systems for the chemical process industry including steady-state approximation, types of controllers, simple unsteady-state analysis, use of mathematical models and process dynamics under control. Prerequisites: C- in CHE 3035 and 4060.

4100. Biochemical Engineering. 3. Applies chemical engineering principles to the analysis and design of biological processes widely used in the pharmaceutical, food and environmental remediation industries. Topics include kinetics of enzyme-catalyzed reactions, cellular growth and metabolism, bioreactor design and mass transfer considerations. Dual listed with CHE 5100. Prerequisites: MOLB 2021 or concurrent enrollment and CHE 4060 or concurrent enrollment.

4110. Air Pollution for Chemical Engineers. 3. Focuses on strategies and technologies for complying with air pollution control regulations. Introduces atmospheric mixing and dispersion modeling to describe impact of process air emissions on the environment. Examines chemistries of pollutant production and atmospheric fate of air pollutants. Prerequisites: CHE 2005.

4160. Biomedical Engineering-Transport Processes. 3. Focus on chemical and physical transport processes with applications toward the development of drug delivery systems, artificial organs, bioartificial organs and tissue

engineering. This will involve topics covering body fluids, capillary solute transport, pharmacokinetic models and cell physiology. Prerequisites: consent of instructor and grade of C or better in 3 courses counting no more than two from CHEM 1020, CHEM 1030, CHEM 1050, LIFE 1010, LIFE 1020 and at least one from LIFE 2022, MATH 2200, KIN 2040, MOLB 2021, MOLB 2240, CHE 3000, ES 2310.

4165. Biomaterials. Material science and engineering of the various materials used for biomedical applications, in-depth discussion of the molecular and cellular interactions to implanted materials, as well as a survey of practical applications. Materials covered will include polymers, ceramics, metals, composites, silicones, and natural materials, such as collagen, elastin, and silk. Prerequisites: LIFE 1010 and CHEM 1020 or CHEM 1050, or permission of instructor.

4170. Polymeric Materials Synthesis. 3. An introduction to the polymer technology, with emphasis on the synthesis of polymeric materials and polymerization processes. Applications cover commodity polymers, such as polyolefins and advanced materials, such as nanomaterials, aerospace materials and biomaterials and biomaterials for drug delivery, artificial tissues and organs. Prerequisites: CHEM 2340 or 2440.

4190. Polymeric Materials: Characterization and Properties. 3. Intended for science and engineering students, an introduction to the characterization and properties of polymeric materials. Introduces synthesis, architecture, molecular microstructure analysis, molecular weight determination, solution properties, thermal properties and mechanical properties of polymeric materials. Dual listed with CHE 5190. Prerequisite: CHEM 4507.

4200. Industrial Chemical Production. 3. Integration of chemical engineering and chemistry as practiced in modern industry. Engineering of chemical reactions and processes for commodity chemicals, petroleum-based fuels, petrochemicals, intermediates, specialty chemicals, pharmaceuticals, and engineered materials. Environmental strategies for waste minimization and pollution prevention. Prerequisites: CHEM 2420 and CHE 3015 (may be taken concurrently).

4210. Natural Gas Processes and Modeling. 3. After a quick introduction to the Hysys simulation program, the main chemical processes used to convert well-head gas to products will be reviewed and modeled (fractionation train, sulfur recovery, tail gas clean-up, dehydration, refrigeration, nitrogen rejection) in high detail, including appropriate property models to use. Prerequisite: CHE 3070.

4270. Advanced Process Simulation. 3. Advanced topics for a commercial process simulation software that is routinely used in industry will be covered. Topics will include: electrolyte systems, physical property methods and regression of parameters, petroleum industry component selection and distillation, solids handling capabilities including coal processing, advanced recycle stream convergence techniques, and equation-oriented solution methods. Prerequisite: CHE 3070.

4340. Numerical Analysis. 3. Considers computer methods and their accuracy for applied mathematics. Topics include machine arithmetic, analysis of rounding error, solution methods for linear systems and nonlinear equations, interpolations, numerical differentiation and numerical solution of differential equations. Includes some programming. Prerequisites: grade of C or better in COSC 1010, MATH 2310, and either MATH 2250 or 3310.

4970. Internship in Chemical Engineering. 1-6 (Max. 6). Enables credit for students in appropriate engineering activities while serving as interns in an industrial, government, or other setting. Prerequisite: approval from a faculty sponsor and involvement in a chemical engineering co-op/internship experience.

4990. Topics in Chemical Engineering. 1-6 (Max. 6). Features topics not included in regularly offered classes. Section I is individual study. Other sections are group study by seminar or in class format. Prerequisite: CHE 3000 or concurrent enrollment.

Prerequisites

Prerequisites must be satisfied before you can take any courses. If you do not have the prerequisites for a certain course but you still want to take the class, you must submit a petition to waive the prerequisites. If your request to waive the prerequisite is granted, you can take the course. You could find the prerequisites highlighted in blue of all courses in the Course curriculum sheet on page 3 of this document.

Requirements and Policies

General Requirements

1. In order to receive a degree from the College, minimum GPA requirements must be met. First, the student must have at least a 2.0 cumulative GPA on all courses completed at UW. Secondly, the student must also have at least a 2.0 cumulative GPA on all engineering courses completed at UW. Note that transfer work and AP credit do not enter into the computation of a UW grade point average.
2. The required minimum number of credits for upper division is 48 credits.
3. To graduate from UW, a minimum of 30 credits of upper division must be taken from UW.
4. A grade of C- or better in the following prerequisite courses is required:
 - MATH courses
 - All Chemical Engineering course prerequisites.

University Studies Program (USP) Policies

1. Students must complete all required USP 2015 courses: Communication (COM1, COM2, and COM3), Human Culture (H), Physical & Natural World (PN), Quantitative Reasoning (Q), and US & Wyoming Constitutions (V) courses.
2. All three components of the freshmen USP (FYS, Q, and COM1) should be completed the first year, except if remedial math is required, but the other two components should not be delayed.
3. ENGL 1010, ESL 1210, and HP 1020 will count for the WA requirement under USP 2003 and the COM 1 requirement under USP 2015.
4. Students must earn a grade of C or better in the First-Year Seminar and Communication 1, 2, and 3 courses.
5. Students who have earned more than 30 post-high school credit hours are exempt from taking a FYS by submitting a University Studies petition form. Exemptions may also be granted by sending an email to the Registrar requesting this exception. Please send it to: registrar@uwyo.edu.

Second Bachelor's/Dual degree

For students seeking a second bachelor's degree who obtained the first degree at an accredited institution, the following guidelines must be followed:

1. Students have to complete a minimum of 30 additional credits at UW, 12 of which must be upper division.
2. Students have to meet the program requirement.

3. Students do not have to meet the USP requirements (except the U.S./Wyoming Constitution course and Communication 3).
4. Students may meet the V requirement in one of three ways:
 - Completion of a UW V course;
 - Completion of a course that has been articulated with UW; or
 - Completion of a U.S. Constitution course and a passing grade on the WY Challenge exam administered by the Political Science department (<http://www.uwyo.edu/pols/challenge-exam/>).

Transfer students

1. Community college students who earn an AA, AS, or AB degree during the spring of 2015 or after will receive a waiver for all USP 2015 requirements except the U.S./Wyoming Constitution course and Communication 3.
2. Community college students who have not earned an AA, AS, or AB degree will have to fulfill all USP 2015 requirements.
3. Students who have earned more than 30 post-high school credit hours are exempt from taking a FYS by providing proof of a high school graduation date to the Registrar.
4. Transfer students may meet the V requirement in one of three ways:
 - Completion of a UW V course;
 - Completion of a course that has been articulated with UW; or
 - Completion of a U.S. Constitution course and a passing grade on the WY Challenge exam administered by the Political Science department (<http://www.uwyo.edu/pols/challenge-exam/>).
5. Transfer students can meet the COM 2 requirement in several ways:
 - Completion of a UW COM 2 course;
 - Completion of a COM 2 course that has been articulated with UW;
 - Completion of a COM 2-type course that has been nominated for USP inclusion by a community college (articulation paperwork will be necessary);
 - Completion of an intermediate composition course and a public speaking course;
 - Completion of either an intermediate composition course and a passing score on the public speaking exam administered by the Communication & Journalism Department or completion of a public speaking course and successful petition for advanced writing status at UW.

Other Policies

- Students may not take a course for S/U credit to satisfy any requirement for a degree from the College of Engineering and Applied Science, unless the course is offered for S/U credit only.
- All Wyoming Community College equivalent courses will be evaluated for acceptance into the CHE program.
- For upper-division coursework, **no more than 2 CHE 3000+ courses can be transferred and applied to the CHE degree**, however, CHE 4070 Process Design I and CHE 4080 Process Design II may NOT be transferred to UW.
- **All CHE transfer courses must be C- or better.**
- The upper-division rules may be waived for classes taken during Study Abroad and National Student Exchange Programs with pre-approval.

Chemical Engineering Technical Electives

At least one Chemical Engineering Technical Elective (3 credits) is required. Additional Chemical Engineering elective courses may be used as Technical Electives.

Additional Technical Electives

In addition to the Chemical Engineering Technical elective, 15 credit hours of Technical Electives are required (total of 18 credits). These Technical Electives can be used to earn a minor or major in a discipline related to Chemical Engineering. Alternatively, Technical Electives can be earned by meeting the requirements of the General Chemical Engineering program.

Majors and Minors in Related Disciplines

Courses used to earn a major or minor in a discipline related to Chemical Engineering may be used to meet the 15 required credit hours of technical electives. Majors or minors in the following disciplines are approved for the purpose of meeting the Technical Elective course requirements:

- Business
- Chemistry
- Computer Science
- Economics
- Engineering (any Engineering discipline in addition to Chemical Engineering)
- Geology
- Management
- Mathematics
- Molecular Biology
- Physics

A dual degree program in Chemical Engineering and Petroleum Engineering can be completed in 5 years. Please see your advisor for details.

Majors and minors in other disciplines may be used as technical electives, but require approval by the Department of Chemical Engineering. **Please see the appropriate department for minor or second major requirements. The corresponding department will assign you a minor or second major advisor.**

For a student to use these courses as their Chemical Engineering technical electives, the student must formally declare and successfully complete the minor or second major. If a student fails to do this, then they will be subject to the General Chemical Engineering technical elective requirements.

Courses at any level (freshman through graduate) may be used as technical electives so long as they are required by the minor or second major program. **A minimum of 48 upper division (3000+) credit hours is required for the B.S. in Chemical Engineering degree.**

General Chemical Engineering Technical Electives

Students who are not using a minor or second major in a related discipline to meet their Technical Electives requirement are subject to the General Chemical Engineering Technical Electives requirements. Generally, a technical elective must be an upper division (3000+) course in science, engineering, or math. Lower division classes may also be used as technical electives, but only if they are prerequisites for upper division technical electives. If the upper division course is not completed, then the lower division course may not be used as a technical elective.

The following courses **may not** be used as technical electives:

1. Any course that has a University Studies H designation. This includes ARE 3030 History of Architecture.
2. Any course that is taught at a lower level than a required course. This includes CHEM 3550 Physical Chemistry for the Life Sciences.
3. COSC/MATH 3340 Introduction to Scientific Computing. This is because this course is very similar to a required course, CHE 2060 Chemical Engineering Computing.
4. PETE 3015 Multicomponent Thermodynamics. This is because this course is very similar to a required course, CHE 3015 Multicomponent Thermodynamics.
5. PETE 3025 Heat and Mass Transfer. This is due to the similarity to two required courses, CHE 3026 Heat Transfer and CHE 3028 Mass Transfer.

Pre-approved Technical Electives

The following courses are pre-approved as technical electives. Additional courses, including courses transferred from another college or university, may be approved as technical electives on a case-by-case basis. *Disclaimer: The listed prerequisites may not be complete or up-to-date. Please check the UW catalog for current prerequisites.*

College of Agriculture and Natural Resources

MOLB 3610 Principles of Biochemistry
MOLB 4100 Clinical Biochemistry
MOLB 4400 Immunology
MOLB 4495 Bioinformatics
RNEW 3000 Tropical Ecology

Prerequisites

LIFE 1010, CHEM 2420
MOLB 3610 or MOLB 4600
MICR 2200
MOLB 3610
LIFE 1010

College of Arts and Sciences

CHEM 3020 Environmental Chemistry
CHEM 4000 Career Skills
CHEM 4040 Chemical Literature
CHEM 4050 Solar Energy Conversion
CHEM 4100 Inorganic Chemistry Laboratory
CHEM 4110 Introductory Inorganic Chemistry
CHEM 4230 Instrumental Methods of Chemical Analysis
CHEM 4400 Biological Chemistry
CHEM 4508 Physical Chemistry II
CHEM 4515 Applied Mathematics in Physical Chemistry I
CHEM 4516 Applied Mathematics in Physical Chemistry II
CHEM 4525 Physical Chemistry Lab I
CHEM 4530 Physical Chemistry Lab II
CHEM 4560 Molecular Modeling
LIFE 3050 Genetics
LIFE 3600 Cell Biology
MATH 2250 Elementary Linear Algebra
MATH 3310 Applied Differential Equations II
MATH 4440 Introduction to Partial Differential Equations I
STAT 4220 Basic Engineering Statistics
STAT 4255 Mathematical Theory of Probability
ZOO 3115 Human Systems Physiology
ZOO 4125 Integrative Physiology

Prerequisites

CHEM 2420
CHEM 4110 or concurrent enrollment
CHEM 2420, CHEM 4507
CHEM 1060, PHYS 1201, MATH 2200
CHEM 2440, concurrent CHEM 4110
CHEM 2420
CHEM 2230
CHEM 2440
CHEM 4507
CHEM 1060, MATH 2205
CHEM 4515
Concurrent CHEM 4507
CHEM 4525, concurrent CHEM 4508
CHEM 4507
See catalog
See catalog
C or better in MATH 2200 or 2350
MATH 2210, MATH 2310
MATH 2210, MATH 2310
MATH 2205
MATH 2210
CHEM 1050, LIFE 1010
ZOO 3115

College of Business

DSCI 4240 Computer Applications in Decision Sciences
 ECON 3010 Intermediate Macroeconomics
 ECON 3020 Intermediate Microeconomics
 ECON 4320 Mathematical Economics
 ECON 4350 Game Theory
 ECON 4400 Environmental Economics
 ECON 4410 Natural Resource Economics
 ECON 4430 Energy Economics
 FIN 3250 Corporate Finance
 IMGT 3400 Database Management Systems
 IMGT 4020 Information Security
 MGT 3110 Business Ethics
 MGT 3210 Management and Organization

Prerequisites

IMGT 2400, DSCI 3210, STAT 2010
 ECON 1010, ECON 1020, MATH 2200
 ECON 1010, ECON 1020, MATH 2200
 ECON 3010, ECON 3020, MATH 2205
 ECON 3010, ECON 3020
 ECON 3020
 ECON 3020
 ECON 3020, MATH 2200
 ACCT 1010, STAT class
 IMGT 2400
 IMGT 3400
 Sophomore
 COM1

College of Engineering and Applied Science

All upper division courses except:

- ARE 3030 History of Architecture
- COSC 3340 Introduction to Scientific Computing
- PETE 3015 Multicomponent Thermodynamics

In addition, any course with a University Studies H designation may not be used as a technical elective.

School of Energy Resources

ERS 3010 Air Quality Management
 ERS 4050 Solar Energy Conversion

Prerequisites

CHEM 1020, COM1
 CHEM 1060, PHYS 1210, MATH 2200

Areas of Emphasis

Areas of emphasis are suggested lists of Technical Electives that concentrate on an area of study related to Chemical Engineering. **Areas of emphasis are not listed on the diploma.** Since areas of emphasis are suggestions, rather than curriculum requirements, students are not required to strictly adhere to the courses listed in the concentration area. Students pursuing an area of emphasis are subject to the requirements for General Chemical Engineering Technical Electives.

Biological Engineering

12 credits of Chemical Engineering coursework:

CHE 3100 Fundamentals of Bioengineering
 CHE 4100 Biochemical Engineering
 CHE 4160 Biomedical Engineering – Transport Processes
 CHE 4165 Biomaterials

Prerequisites

LIFE 1010
 Concurrent CHE 3100 or MOLB 2021
 See catalog
 LIFE 1010, CHEM 1050

Choose 6 credits from these courses:

CHE 3900 Undergraduate Research
 LIFE 3050 Genetics
 LIFE 3600 Cell Biology
 MICR 2021 General Microbiology
 MOLB 2240 Medical Microbiology

Consent of instructor
 See catalog
 See catalog
 LIFE 1010, CHEM 1050
 LIFE 1010

MOLB 4100 Clinical Biochemistry
MOLB 4400 Immunology
MOLB 4495 Bioinformatics
ZOO 3115 Human Systems Physiology
ZOO 4125 Integrative Physiology

MOLB 3610 or MOLB 4600
MICR 2220
MOLB 3610
CHEM 1050, LIFE 1010
ZOO 3115

Chemical Process Industry

Courses from the following list, including 9 credits of Chemical Engineering electives:

CHE 4000 Environment, Technology, and Society
CHE 4100 Biochemical Engineering
CHE 4200 Industrial Chemical Production
CHE 4210 Natural Gas Processes and Modeling
CHE 4270 Advanced Process Simulation
CHE 4970 Internship in Chemical Engineering
EE 4620 Automatic Control Systems
EE 5885 Topics: Process Control
ES 4910 Survey of Engineering Management
MGT 3110 Business Ethics
MGT 3210 Management and Organization
STAT 4220 Basic Engineering Statistics

Prerequisites

Junior, 2 lab sciences
Concurrent CHE 3100 or MOLB 2021
CHEM 2420, concurrent CHE 3015
CHE 3070
CHE 3070
Concurrent CHE internship
EE 2220
Instructor approval
See instructor
Sophomore
COM1
MATH 2205

Environmental Engineering

Take the following courses:

ATSC 2100 Global Warming
CE 3400 Introduction to Environmental Engineering
CHE 4000 Environment, Technology, and Society

Prerequisites

None
MATH 2205, CHEM 1050
Junior, 2 lab sciences

Take one of the following courses:

CHE 3100 Fundamentals of Bioengineering
CHE 4100 Biochemical Engineering

LIFE 1010
Concurrent CHE 3100 or MOLB 2021

Select additional courses from this list:

MICR 2021 General Microbiology
CE 4400 Design of Water Treatment Facilities
CE 4410 Design of Wastewater Treatment Facilities
CE 4430 Environmental Engineering Chemistry
CE 4441 Solid Waste Engineering
CHE 3900 Undergraduate Research (on appropriate topic)

LIFE 1010, CHEM 1050
CE 3400
CE 3400
CE 3400
CE 3400, CHEM 1050
Instructor consent.

Graduate School Preparation

Select courses from the following list, including 3 credits of Undergraduate Research and 6 additional credits of Chemical Engineering electives:

CHE 3900 Undergraduate Research (up to 6 credits)
MATH 2250 Elementary Linear Algebra
MATH 3310 Applied Differential Equations II
MATH 4440 Introduction to Partial Differential Equations I
STAT 4220 Basic Engineering Statistics
CHE 5000+ Any Chemical Engineering class at the graduate level.

Prerequisites

Instructor consent
MATH 2200
MATH 2210, MATH 2310
MATH 2210, MATH 2310
MATH 2205
See catalog

Materials Science and Engineering

Select courses from the following list, including 9 credits of Chemical Engineering electives:

	<u>Prerequisites</u>
CHE 3900 Undergraduate Research (up to 6 credits)	Instructor consent
CHE 4165 Biomaterials	LIFE 1010, CHEM 1050
CHE 4170 Polymeric Materials Synthesis	CHEM 2440
CHE 4990 Polymer Chemistry and Engineering	See instructor
ME 3450 Properties of Materials	CHEM 1050, ES 2310
ES 2410 Mechanics of Materials	ES 2110, MATH 2205
EE/PHYS 4340 Semiconductor Materials and Devices	PHYS 1220
CHEM 4050 Solar Energy Conversion	CHEM 1060, PHYS 1210, MATH 2200

Petroleum Engineering

Take 9 credits of Chemical Engineering electives plus additional courses from the following list:

	<u>Prerequisites</u>
PETE 2050 Fundamentals of Petroleum Engineering	MATH 2205, PETE 1060
PETE 3200 Reservoir Engineering	PETE 2050
PETE 3255 Basic Drilling Engineering	PETE 2050
PETE 3715 Production Engineering	ES 2310, ES 2330, PETE 2050
PETE 4225 Well Testing	PETE 3200
PETE 4320 Well Log Interpretation	PETE 2050

Pre-Medicine and other Pre-Health Programs

Please see the Preprofessional Health Advising office for a list of courses.

Note: An area of emphasis is not a minor and will not be stated on your diploma.

Degree Check

A Degree Check must be done before you graduate. You need to complete it 2-3 semesters out from graduation. This check is done by you, your advisor, department head, and college and university designees. We want to make sure that all of your degree requirements will be met.

1. To initiate this, you have to submit the advisor-approved degree check sheet enlisting your grades of all courses to the department one year before your graduation date. This will provide you enough time for any corrective actions needed. Please be sure to type the degree check sheet, get your advisor's signature and then submit it to Elyse in Engineering 4055. She will take care of the remaining signatures.
2. On the degree check sheet, you also need to indicate when the courses left should be taken and what elective or human culture courses to take if you still have any. Please insert the semester and year you plan on taking them.
3. Please note the institution of any transfer courses taken in the right hand column under comments.
4. The degree check sheet is not a binding contract, you still can change the elective/human culture courses you eventually want to take, but you have to inform your advisor about the changes and your advisor will inform the college.
5. You will be informed if there is any corrective action needed.

The Degree Check Sheet is also needed for other purposes. You are required to update your degree check sheet before you meet with your advisor or before you submit a petition. The consideration of certain petitions will not be performed without the advisor-approved degree check sheet.

Download the Degree Check sheet at: <http://www.uwyo.edu/chemical/undergraduate/chindex.html>



CHEMICAL ENGINEERING DEGREE CHECK (2018-2019)

STUDENT _____
 STUDENT e-mail: _____
 ADVISOR _____

W# _____
 CONCENTRATION AREA: _____
 TRANSFER WORK: _____ GRAD DATE: _____

GENERAL		Hrs	Credit	Grade	Prerequisites	Comments
FYS	1101	3				
COM1	ENGL 1010	3			C in ENGL 1010 (or ESL 1210 or HP 1020)	
COM2		3				
		Minimum Required	[9]	0		
MATH					Prerequisites	
Q	MATH 2200	4			C in MATH 1405 or 1450, or MPE 5, or ACT 27, or SAT 600	
	MATH 2205	4			C in MATH 2200	
	MATH 2210	4			C in MATH 2205	
	MATH 2310	3			C in MATH 2205	
		Minimum Required	[15]	0		
SCIENCE					Prerequisites	
PN	CHEM 1050	4			Concurrent enrollment in MATH 2200	
	CHEM 1060	4			CHEM 1050 (or CHEM 1020)	
	CHEM 2420	4			CHEM 1060 (or CHEM 1030)	
	CHEM 2440	4			CHEM 2420	
	CHEM 4507	3			MATH 2210, PHYS 1220, CHEM 1060 (or CHEM 1030)	
PN	PHYS 1210	4			C in MATH 2200, Concurrent in MATH 2205	
	PHYS 1220	4			C in MATH 2205, Concurrent in MATH 2210	
	LIFE 1010	4			C in MATH 0921, or MPE 2, or ACT 21, or SAT 600	
		Minimum Required	[31]	0		
US & WY Constitution and Human Culture						
V		3				
H		3				
H		3				
		Minimum Required	[9]	0		
CHEMICAL ENGINEERING					Prerequisites	
	CHE 1005	1			Concurrent with MATH 2200	
	CHE 2005	3			Concurrent in MATH 2205, C- in CHEM 1050 (or CHEM 1020)	
	CHE 2060	3			C- in CHE 1005 or ES 1060, C- CHE 2005, & Concurrent MATH 2310	
	CHE 2070	3			C- in CHE 2005, PHYS 1210 & C in MATH 2210	
	CHE 2080	3			C- in CHE 2005 & PHYS 1210, C in MATH 2210 & Concurrent MATH 2310	
	CHE 3015	3			C- in CHE 2060 & CHE 2070 or ES 2310	
	CHE 3026	3			C- in CHE 2060 & CHE 2080 or ES 2330	
	CHE 3028	3			C- in CHE 2060 & CHE 2080 or ES 2330	
	CHE 3040	3			C- in CHE 3026, CHE 3028 & CHE 4060	
	CHE 3070	3			C- in CHE 3015 & CHE 3026 & Concurrent CHE 3028	
	CHE 4050	3			C- in CHE 3040	
	CHE 4060	3			C- in CHE 3015 & CHE 3026 & Concurrent CHE 3028	
	CHE 4070	4			C- in CHE 3028, CHE 3070 & CHE 4060	
COM3	CHE 4080	4			C- in CHE 4070 & COM 2	
	CHE 4090	3			C- in CHE 3028 & CHE 4060	
		Minimum Required	[45]	0		
APPROVED ELECTIVES					At least 10 hrs must be 3000-level or higher	
		3				
		3				
		3				
		3				
		3				
		3				
		Minimum Required	[18]	0		
		Total Hours	[127]	0		
TOTAL HOURS REMAINING = 127						

Student Signature _____	Date _____	Advisor approval _____	Date _____
Department approval _____	Date _____	College approval _____	Date _____

BS/MS Quick Start Program

The BS/MS Quick Start program in Chemical Engineering is designed to present highly qualified UW students with the opportunity to begin graduate study while they complete their Bachelor of Science (BS) degree in Chemical Engineering. This program allows for early planning of the graduate portion of a student's education and provides more flexibility in the number of required courses and the order in which they are taken. The more efficient and better-planned use of time should result in reduction of the time required for obtaining the Master of Science in Chemical Engineering.

The Quick Start program contains two essential elements:

1. Qualified students may receive provisional admission to the Chemical Engineering graduate program prior to completing the normal application process. This provisional admission will permit students to make their long-term educational plans earlier in their studies, thus providing enhanced opportunities for course selection and involvement in research. To apply go to: <http://www.uwyo.edu/chemical/undergraduate/quickstart.html>
2. Students in the program may apply up to six credit hours of 5000-level courses toward both the BS and MS degree programs. By completing successfully up to six credit hours of graduate classes during their senior year, these students will have demonstrated their ability to do graduate-level course work as undergraduates, easing their transition to the graduate program.

Admission

Application for admission to the Quick Start program may be made when the student enters the second semester of their junior year. Minimum requirements for admission to the joint program are:

1. A minimum cumulative GPA of 3.4
2. A minimum GPA of 3.4 in CPE courses
3. Three letters of recommendation (at least two must be from Chemical Engineering faculty at UW)

Retention requirements

Prior to completion of all requirements for the BS degree, students in the Quick Start program must complete all requirements for admission to the Chemical Engineering graduate program. However, the Graduate Records Examination (GRE) requirement may be waived. Failure to complete admission requirements will result in suspension from the program. A student in the Quick Start program must maintain a cumulative GPA of at least 3.4 in their undergraduate courses, 3.4 in their departmental courses and at least 3.0 in 5000-level courses in order to remain in good standing in the program. Failure to meet the GPA requirement places a student on probation for one semester. If the GPA requirement is not met after that semester, the student will be suspended from the program.

Plan of study

Students in the BS/MS Quick Start program must complete a Plan A or Plan B master program of study in consultation with a faculty advisor. The program of study must include all the courses to be taken from the senior year through the end of the MS program. This plan must be filed with the Chemical Engineering Graduate Coordinator by the end of the first semester in which the student has been admitted into the program. For the Program of Study, go to: <http://www.uwyo.edu/chemical/undergraduate/quickstart.html>

UNIVERSITY OF WYOMING

QUICKSTART PROGRAM OF STUDY

**PLEASE PRINT AND READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.
THIS FORM MUST BE TYPED AND TRANSCRIPTS ATTACHED**

Date	Student ID	Last Name	First Name
Phone Number	Academic Department		
Mailing Address	Street	City	State Zip Code
Email	Degree (masters, ed specialist, doctoral)		Major or Certificate Program and Option (if applicable)

MASTER'S STUDENTS ONLY: Plan A (Thesis Option) Plan B (Non-thesis Option)

PREVIOUS DEGREES RECEIVED:

Degree	Date	Major	Institution
Degree	Date	Major	Institution
Degree	Date	Major	Institution

PROPOSED PROGRAM:

A. Transfer work from other institutions - Up to 9 hours of graduate coursework can be transferred toward a master's program. Official transcript must be on file or sent to the Graduate School upon completion. Must carry a letter grade of B or better. S/U or P/F grading not permitted.

Dept.	Course #	Course Title	Sem Hrs.	Grade	Institution	Date (Sem/Yr)	Comments
TOTAL TRANSFER HOURS							

B. List the two dual credit hours taken during the senior year of the BS/MS program in lines number one and two below for a total of six (6) credit hours. Any other courses taken during the undergraduate program must be approved by the Graduate School and reserved for graduate credit. These hours will count toward the Rule of 12 and should be listed under Section B.

Dept.	Course #	Course Title	Sem Hrs.	Grade	Date (Sem/Yr)	Comments
						For the office of the Registrar Degree Analysts - leave blank
1						
2						

Graduate courses taken at the University of Wyoming including courses student has taken, is taking, and will take as part of program of study. A combined total of 12 non-degree seeking hours (includes any reserved undergrad courses, transfer, and non-degree coursework) may be applied to the program of study. If more lines are needed, please continue on page 3.

Dept.	Course #	Course Title	Sem Hrs.	Grade	Date (Sem/Yr)	Comments
						For the office of the Registrar Degree Analysts - leave blank
TOTAL UW COURSE HOURS						
TOTAL COURSE HOURS A&B						

Frequently Asked Questions

- **How many credits should I take?**

You should take the number of credits you are comfortable taking. Be mindful of your other responsibilities, coupled with a sound academic plan. The number of credits you take may vary from semester to semester.

- **How do I view my Degree Works?**

To access your Degree Evaluation, log on to WyoRecords and find the tab for Registration. A link for Degree Evaluation will be listed under the Registration options. This link will direct you to the audit of your requirements within Degree Works.

- **All of my grades are not visible on my degree works. How can I change this?**

There is a possibility that all of your grades may not be updated in the system. You can visit the Office of the Registrar and inform them of missing grades of your degree works or communicate this to the Coordinator, Student Advising.

- **I am about to graduate soon, what preparations are necessary?**

It is important that your degree check sheet has been approved and you have taken the Fundamentals of Engineering (FE) exam. When your degree check sheet has been approved, you will receive an email from the college's Susan McCormack Center for Student Success stating that it has been approved, the anticipated graduation date form which you would need to complete and information on the FE exam.

- **Where can I find the degree check sheet?**

You can find the department's degree check sheet on the Chemical Engineering webpage.

<http://www.uwyo.edu/chemical/undergraduate/chindex.html> You are encouraged to download and save this sheet on your personal computer and update it each semester.

- **When do I hand in my degree check sheet?**

Your Degree Check Sheet should be handed in 2-3 semesters before the anticipated graduation date.

- **How do I complete my degree check sheet?**

Students are encouraged to complete their degree check sheet with their advisor. The degree check sheet is an excel document that automatically populates the Credit column when the grade for each course is entered in the Grade column. If a course grade was transferred, indicate this by putting a T in front of the letter grade. For instance TB, which stands for transfer grade B. After filling in the degree check sheet (be sure it's typed and not hand-written) print, sign, meet with your advisor and ask him/her to sign, and turn it in to Heather Warren in Engineering 4055.

- **I took a course at a previous institution that I think may be the same as a course here at UW but it is not in the transfer catalog. How can I determine if this course can be transferred?**

In a case like this, students are encouraged to get the complete syllabus for the course. If the course is an engineering course, students need to fill out the college's transfer evaluation form. This form along with the syllabus should be taken to Heather Warren in Engineering 4055. It will then be given to the appropriate faculty member for evaluation. If the course is a subject outside of the engineering college, for instance the Chemistry department, students are encouraged to take the syllabus to the respective department for an evaluation.

- **What happens if my cumulative GPA goes below 2.0?**

If your cumulative GPA falls below 2.0, you will be placed on academic probation at the end of the semester. You will be notified of this and encouraged to visit with your advisor to develop a plan to help you to improve in the following semester. If your semester GPA falls below a 2.0 while on academic probation you will be suspended from the university.

- **How do I get reinstated if I was placed on academic suspension?**

A student placed on academic suspension can petition for reinstatement after sitting out for one full semester. He/she will need to visit the Office of the Registrar's page, print the Petition for Academic Reinstatement form and complete it.

- **How do I go about changing my major?**

You will need to visit the office of the Coordinator, Student Advising for the department and complete the change of major form. After it is signed by the Department Head you will need to collect your folder from the office of the Coordinator, Student Advising and take both folder and form to your new department.

- **How do I find my advisor?**

The name of your advisor can be found in the Student Resources tab in your WyoWeb account. It will be listed in the Academic Profile box.

- **Is advising restricted to advising week?**

Advising is not restricted to advising week only. It is important that you get to know your advisor and feel comfortable checking in with him/her throughout the semester.

- **How do I prepare for advising week?**

It is very important that students are prepared for advising week to maximize the benefits.

- 1. Be aware of when advising week will take place*
- 2. Know your advisor. Some students may have a different advisor than they did in the previous semester. It is important that each student knows the name of his/her advisor and where to find him/her*
- 3. Check your email daily and read carefully any emails sent out by staff and/or advisor regarding advising week*
- 4. Ensure that you schedule a specific day and time to meet with your advisor. Each advisor will indicate how and when they would like their advisees to schedule an advising appointment*
- 5. Ensure that you collect a Course Request Form from the main office or the office of the Coordinator, Student Advising before advising week begins*
- 6. Be mindful of the courses you are hoping to take in the upcoming semester and ensure that you have all the necessary prerequisites for each course*
- 7. Come prepared with any questions or concerns that you may have. This week is a great opportunity to talk with your advisor about a possible minor, class options, internships etc.*
- 8. If you have any questions about advising week, ask! The Coordinator, Student advising or your advisor*

- **I have an associate's degree. Will I be exempt from any courses?**

Yes. Students with an Associate of Arts degree (AA) or an Associate of Science degree (AS) will be exempt from all USP courses except the US & Wyoming Constitutions course. Students with an Associate of Applied Science (AAS) degree will not be exempt from the P requirement (PEAC 1001) on the 2003 catalog or the US & Wyoming Constitutions course.

- **I have a previous bachelor's degree and I am currently a second bachelor's degree seeking student. Will I be able to be exempt from any courses?**

Yes. Just like a student who has completed their Associate's degree, students with a previous bachelor's degree will be exempt from all USP courses except the US & Wyoming Constitutions course.



Forms and Petitions

All forms in the Forms and Petitions section can be downloaded or printed out by double-clicking the form. You need to submit a form or petition when:

1. You want to take an **undergraduate research or internship**. You must submit the form found at: <http://www.uwyo.edu/chemical/undergraduate/chindex.html> before taking undergraduate research or internship. No credits will be given when the undergraduate research or internship is done first without submitting the form.
2. You want to **adjust your curriculum** because
 - a. you have taken a course/similar course at another institution, which might be a good substitute for an existing course in the Petroleum Engineering Curriculum at UW, or
 - b. you have taken a similar course at other programs at UW, which might be a good substitute for an existing course in the Petroleum Engineering Curriculum at UW, or
 - c. you plan on taking a similar course at other programs at UW, but you are not certain if that particular course can be a substitute for your targeted course in the Petroleum Engineering Curriculum at UW.

Submit a curriculum adjustment petition found at: <http://www.uwyo.edu/chemical/undergraduate/chindex.html>

3. You want to **transfer a course** that you have taken at another institution, or you plan to take a course at another institution but you are not certain if that particular course is transferrable back to UW. Submit the Transfer Evaluation Form on Page 21. By doing this, if the transfer course is considered equivalent to an existing course at UW, the equivalency will be kept on the database. For future students from the same institution, the transfer of the same course will then be automatic.s
4. You want to **change/add major or minor**. Submit the form found at: http://www.uwyo.edu/registrar/students/forms_and_petitions.html
5. You want to **request an exception**, such as adding/dropping a course or withdraw from a course after the deadline. Submit the form found at: http://www.uwyo.edu/registrar/students/forms_and_petitions.html
6. You want to **take courses more than the maximum credit hour load** in one semester. Submit the overload petition form found at: http://www.uwyo.edu/registrar/students/forms_and_petitions.html

Undergraduate Research and Internship Form. Found at: <http://www.uwyo.edu/chemical/undergraduate/chindex.html>

Curriculum Adjustment Petition. Found at: <http://www.uwyo.edu/chemical/undergraduate/chindex.html>

Transfer Evaluation Form. Found at: http://www.uwyo.edu/registrar/students/forms_and_petitions.html

Change/Add Major or Minor. Found at: http://www.uwyo.edu/registrar/students/forms_and_petitions.html

Exception Request Form. Found at: http://www.uwyo.edu/registrar/students/forms_and_petitions.html

Overload Petition. Found at: http://www.uwyo.edu/registrar/students/forms_and_petitions.html

Prerequisite Waiver Form. Found at: <http://www.uwyo.edu/chemical/undergraduate/chindex.html>