Michigan Technological University

Chemical Engineering

UNDERGRADUATE ADVISING

FOR CHEMICAL ENGINEERING STUDENTS STARTING AT MICHIGAN TECH IN THE 2024-25 ACADEMIC YEAR

CATALOG YEAR: 202408, 202501, AND 202505

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ABET ACCREDITATION

Michigan Tech's chemical engineering program is accredited by the Engineering Accreditation Commission of ABET.

WHY IS ACCREDITATION IMPORTANT?

We are proud of our accreditation achievement because it demonstrates our commitment to providing you a quality engineering education. Accreditation requires a deliberate, continuous evaluation of our program to meet the ever-changing needs of our communities and industry.

PROGRAM CRITERIA

The chemical engineering curriculum will provide you with a thorough grounding in the basic sciences including chemistry and physics, with some content at an advanced level, as well as the engineering applications of these basic sciences in the design, analysis, and control of chemical and physical processes, including the hazards associated with them.

STUDENT OUTCOMES

Upon graduation you will have the ability to:

1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. Communicate effectively with a range of audiences.
4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Acquire and apply new knowledge as needed, using appropriate learning strategies.

EDUCATIONAL OBJECTIVES

As a graduate of our program, we are preparing you to:

1. Be successful early and have sustained success in your professional career.
2. Be valued for your hands-on engineering ability and safety culture.
3. Effectively communicate your technical knowledge via publications, reports, the internet, and other media.
4. Provide service to society.
5. Earn advanced degrees or participate in continuing education.
6. Achieve leadership positions in your chosen profession.

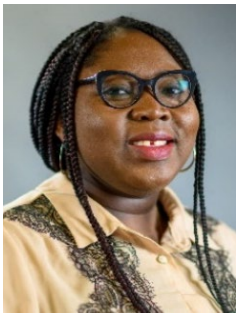
DEPARTMENT DIRECTORY

Michael Mullins
Professor and
Department Chair

Gerard Caneba
Professor

Aytug Gencoglu
Assistant Professor

Caryn Heldt
Professor



Sulihat Aloba
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Associate Teaching
Professor

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Assistant Professor

Jon Herlevich
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Postdoctoral Scholar

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Assistant Research
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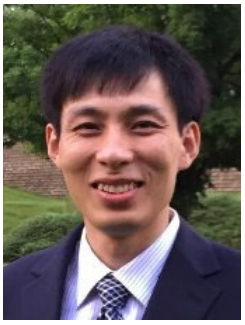


Lei Pan
Associate Professor

David Shonnard
Research Professor

Morgan LeFaye
Administrative Aide

Alberto Mejia
Research Scientist

Kristi Pieti
Dept. Coordinator

Molly Skinner
Postdoctoral Scholar

Shelby Stubenrauch
Office Assistant

Stefan Wisniewski
Lab Manager

We're happy you're here!

ACADEMIC ADVISING

We're here to support you in developing an individualized plan to progress towards your goals.

ACADEMIC ADVISOR

Brooke Forseth

Brooke Forseth, an MTU engineering graduate, is happy to help with your academic planning and questions throughout the undergraduate years.

Advising Office: Room 310A Chem Sci. Building, which is located inside room 310, The Chemical Engineering Learning Commons.

Phone: 906-487-4327

Email your advising questions to cmadvise@mtu.edu

PEER MENTORS

Get help from current chemical engineering students with the college experience.

Katherine Baker

Joey Gannon

James Hays

Abby Mello

Chazz Rohrer

Scan to go to Peer Mentors webpage.

CAREER ADVISORS

For help from faculty with career guidance and information on graduate school.

Kyle Griffin

Jon Herlevich

Adrienne Minerick

John Sandell

WHAT YOU'RE EXPECTED TO DO:

Understand the degree requirements and learning goals.

Take responsibility for your academic planning.

Seek assistance from advisors, instructors, learning centers, and other university resources.

Be open to revising your plans as interests, circumstances, and opportunities evolve.

MEET WITH US!

Use your Google calendar to know what's going on. We recommend adding the following calendars to it:

- Michigan Tech Academic Calendar
- AIChE Chapter
- ChE Undergrad Events

ATTEND A WORKSHOP

Your peer mentors and academic advisor will be hosting workshops throughout the semester. These are informal get-togethers where we sit down and discuss a particular topic or answer questions you might have. Some topics we've covered in the past include: how Enterprise works, finding an undergraduate research mentor, and what it's like to go on co-op. These events will be posted on the ChE Undergrad Events calendar.

STOP BY FOR ACADEMIC ADVISING

Students can schedule an appointment or just walk-in to the Advising Office located in Chem-Sci 310A or meet virtually. Our amazing peer mentors will be available to help during busy times like the **start of the semester** and during **registration weeks**.

MAKE AN APPOINTMENT

Your academic advisor, peer mentors, and career advisors are available for one-on-one meetings. Use your Google calendar to set up a meeting. Meetings can be in-person or virtual. Whatever works best for you.

TIP! When faced with a difficult question or challenging situation, an advisor is always a good place to start.

There is more to being a university student than just going to classes. If you want to get the most out of your time at Michigan Tech, then take on the tasks below because this is what worked for some of our most successful graduates.

ORIENTATION WEEK AND BEFORE - PREPARING FOR YOUR FIRST SEMESTER

- ☐ **Review your transcript on Banweb.** Are all of your AP credits and transfer credits in place? Is anything missing? AP and transfer credits should be in place by mid-July for students starting in fall semester.
- ☐ **Review your class schedule.** You will finalize your schedule during Orientation week.
- ☐ **Meet your academic advisor.** You will have an opportunity to meet your academic advisor during Orientation week.
- ☐ **Explore campus resources.**
    - Chemical Engineering advising webpage
    - Registrar's Office
    - Undergraduate Catalog
    - Dean of Students Office
    - Library
    - Center for Student Mental Health and Well-being

YEAR 1 - ADJUSTING TO COLLEGE LIFE

- ☐ **Attend your department's first-year advising meeting.** If you are unsure about your major, meet with:
    - The academic advisor for other majors you are considering, or
    - The general sciences/arts undeclared advisor, or
    - The general/undecided engineering advisor, or
    - A career advisor in Career Services.
- ☐ **Review your degree requirements.** Run your interactive degree audit each time you make changes to your schedule or register for classes.
- ☐ **Know your learning goals.** There are major specific learning goals and general undergraduate student learning goals.
- ☐ **Prepare for your first job search.** Visit Career Services, create a resume, and attend career fairs.
- ☐ **Explore career building opportunities.** Check out internships and co-ops, undergraduate research, study away and abroad, minors, Enterprise program, honors program.
- ☐ **Get involved on campus.** There are lots of different campus activities and student organizations. Try a mix of professional and social organizations.

YEAR 2 - CAREER EXPLORATION AND PERSONAL DEVELOPMENT

- ☐ **Plan out your future classes.** Begin looking at electives and review your plan with your advisor.
- ☐ **Run your interactive degree audit.** Do this each time you make changes to your schedule or register for classes.
- ☐ **Network.** Talk to people who can help you explore your interests, strengths, and career options. This includes instructors of your classes, faculty in your major, students in their junior and senior year in your major, and company recruiters, many of whom are Michigan Tech alumni.
- ☐ **Apply for co-ops and internships.** Visit Career Services (again), update your resume, attend career fairs (again), and expand your job search by using Handshake, LinkedIn, and reaching out directly to companies or people you know.
- ☐ **Get involved in career building opportunities.** Start participating in internships and co-ops, undergraduate research, study away and abroad, minors, Enterprise program, and/or the honors program.
- ☐ **Build your leadership skills.** Take on a small leadership role in the campus activities and student organizations in which you are involved.

YEAR 3 – CONTINUED CAREER EXPLORATION AND PERSONAL DEVELOPMENT

- ☐ **Repeat all year 2 activities.** Plus:
- ☐ **Consider graduate school.** Talk to faculty in your major to learn more. If you will be going to graduate school at Michigan Tech, there are two programs that allow you to start earning graduate credit while still an undergraduate:
    - Accelerated Master's Program
    - Senior Rule
- ☐ **Challenge yourself to take on a larger leadership role within your favorite student organization.** You'll learn a lot from these experiences, and they can help you reach your career goals.
- ☐ **Challenge yourself to write down three career goals.** They may or may not be related to your major and it's ok if you are unsure because your goals will likely change with time. If you'd like help finding ways to work toward these goals, then share them with an advisor.

FINAL YEAR - TRANSITIONING INTO CAREER OR GRADUATE SCHOOL

- ☐ **Apply for graduation.** This is due by week 10 of the semester prior to your last semester.
- ☐ **Finalize career and/or graduate school plans.** Career Services, faculty, and advisors can help you with this.
- ☐ **Let us know what you'll be doing after graduation.** Complete the First Destination survey on Handshake.
- ☐ **Complete loan exit counseling for Financial Aid**, if needed.
- ☐ **Participate in department and university events to celebrate your graduation.**

TYPICAL MICHIGAN TECH SEMESTER

Academic events, such as adding and dropping classes, happen at certain times in the semester. Below is a general timeline of what to expect.

Week	Day	Event
week before classes start	Wednesday	Tuition bills and enrollment confirmation are due, late fee begins at close of business day.
		First half of term (weeks 1-7)
Week 1	Friday	Last day to add full-semester course without instructor permission.
Week 2	Wednesday	Last day to add full-semester courses or change a section; and Financial aid full-time status established; and Last day to change majors or add minor effective for this semester.
Week 3	**Friday**	**Last day to drop full-semester courses without a grade.**
Week 4		
Week 5		
Week 6		
Week 7	Monday	Mid-term grades available on Banweb after close of business for first-year students only.
		Second half of term (weeks 8-14)
Week 8		
Week 9	all week	First week of the initial registration period for the following semester. Registration time is based on earned credits. During fall: register for spring and summer semesters. During spring: register for fall semester.
Week 10	all week	Second week of the initial registration period.
Week 10	**Friday**	**Last day to drop full-semester courses with a 'W'**
Week 11	all week	Third week of the initial registration period. Registration closes for everyone at the end of the week.
Week 12	Wednesday	Registration reopens and stays open until the next semester starts.
Week 13		
Week 14		
Finals Week		

Dates for adding/dropping/withdrawing from half-semester courses can be found on the on the Registrar's Office webpage. Look for the academic calendar.

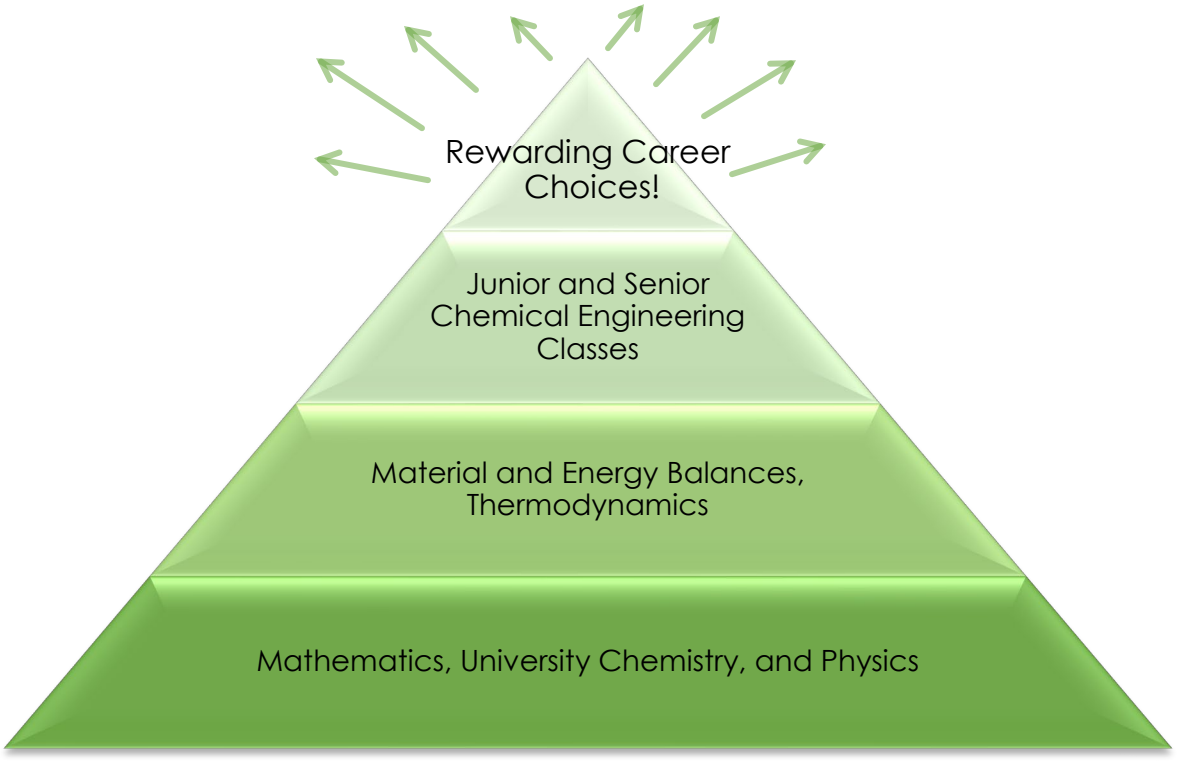
TIP! Add these events to your Google calendar by adding the "Michigan Tech Academic Calendar".

SUCCEEDING IN CHEMICAL ENGINEERING

Chemical engineering is known to be a rigorous and tough major across the country. So, what can you do to best prepare yourself to succeed?

Study to know!

Knowledge, problem-solving, and critical thinking skills gained in your early classes are vitally important to your continued success in the chemical engineering program and in your career.



If you receive a **CD or D** in any of these foundational classes, then we strongly recommend retaking the class BEFORE continuing in the next class in the curriculum.

It can be really tempting to just "get through" a difficult class and celebrate the victory! However, it may take a while to grasp how all the pieces fit together. For chemical engineering students, that moment of realization is often in the junior year, which builds on all the math, physics, and chemical engineering fundamentals that you've put such effort into learning. So, when studying foundational subjects, remember you will see this information again and are working to prepare yourself for the junior and senior classes.

REPEATING CLASSES

If you retake a class, there is an important rule that you must consider:

The most recent grade <u>always</u> replaces the prior grade.

For better or worse. And you may only take a class three times, and you need special permission for a third attempt. For the details, visit the Registrar's Office webpage. Retaking classes you have previously passed may also impact your financial aid. Contact Financial Aid for an evaluation of your situation.

Bookmark these pages because you'll be using them frequently.

ChE Advising webpage

Registrar's Office webpage

Banweb (your student records)

Are all of your AP/dual enrollment/transfer credits in place? You are the only person who can determine this and your schedule cannot be finalized without it.

Go to Banweb to check your Michigan Tech transcript and see if everything is there. Track down all of your classes, because many times these "extra" classes can be used as electives.

ONLINE DEGREE AUDITS

Go to Banweb to run your interactive online degree audit. Run it every time you register for a class or change your schedule. Be sure to run the audit labeled "Latest" because this will use your correct catalog year. New students are able to start running their audit 30 days before the semester starts.

Sometimes audits need to be manually adjusted. Contact your advisor if something doesn't look right.

FUTURE SEMESTERS

Plan your future semesters based on your interests. To do this, most students do the following:

1. **Find the flowchart, 4- or 5-year sample schedule, or degree audit to use as a checklist.** These are on the department's advising or Registrar's Office webpages.
2. **Cross off requirements that are completed or in-progress.** Write down elective courses next to the corresponding requirement to keep track of them.
3. **Run your online degree audit on Banweb to make sure classes are counting where you expect them to.** If they are not, then contact your academic advisor to find out why.
4. **Write down the classes you plan to take for each future semester.** It usually makes the most sense to start with the major required classes, then minor classes if you are doing a minor, and finally remaining elective classes.

TIP! Remember that your plan is a draft and subject to change as you explore your interests.

DEGREE REQUIREMENTS

The degree requirements are organized in the following categories:

CHEMICAL ENGINEERING MAJOR REQUIREMENTS: 104 CREDITS

- Required engineering courses: 47 credits
- Required math and science courses: 40 credits
- Technical electives: 17 credits
    - These are engineering, math, science, or applied business classes that you get to choose from a wide variety of approved courses.
    - CM 1000 Introduction to Chemical Engineering is a technical elective. This course is optional.

GENERAL EDUCATION CORE REQUIREMENTS: 12 CREDITS

- UN 1015 Compositions: 3 credits
- UN 1025 Global Issues or a 3000-level or higher modern language course: 3 credits
- Critical and Creative Thinking course: 3 credits
- Social Responsibility and Ethical Reasoning course: 3 credits

GENERAL EDUCATION HASS REQUIREMENTS: 12 CREDITS

- Communication and Composition HASS course: 3 credits
- Humanities and Fine Arts HASS course: 3 credits
- Social and Behavioral Science HASS course: 3 credits
- An additional course from any HASS list above or the Restricted HASS list: 3 credits

Of the HASS courses taken above, at least 6 credits must be at the 3000-level or higher.

We suggest EC 3400 Economic Design Analysis prior or during fall senior year because it helps with process design senior year. It is a 3000-level Social and Behavioral Science HASS course.

Students may choose to move into the future Essential Education requirements, when available.

GENERAL EDUCATION CO-CURRICULAR REQUIREMENTS: 3 UNITS

Units are like credits but are not counted in your GPA or total credits for the degree.

These are active courses, primarily in physical education, ROTC physical conditioning, and music performance.

FREE ELECTIVE REQUIREMENT: 3 CREDITS

Free electives are any course 1000-level or higher that are not co-curricular courses.

TOTAL CREDITS FOR GRADUATION: 131 CREDITS + 3 UNITS OF CO-CURRICULAR

IMPORTANT! The Registrar's Office maintains the official list of requirements for graduation.
Lists, sample schedules, and flowcharts in this book and on the department webpage are not official lists of degree requirements and are provided for your convenience.

REQUIRED CHEMICAL ENGINEERING CLASSES

The table below gives information on the required chemical engineering courses to help you plan out future semesters.

Year	Course	Title	Prerequisites	Semesters Offered and Mode
2	CM 2110	Material and Energy Balances	calc I* & CH 1150 & CH 1151	Fall (in-person) Spring(in-person) Summer (online)
2	CM 3230	Thermodynamics for ChE	MA 2160 & PH 2100 & CM 2110	Fall (in-person) Spring (in-person)
3	CM 3110	Transport & Unit Operations I	MA 3160 & diff eqns** & PH 2100 & CM 2110	Fall (in-person or online) Spring (in-person)
3	CM 3120	Transport & Unit Operations II	CM 3110 & CM 3230	Spring (in-person)
3	CM 3215	ChE Fundamentals Lab	UN 1015 & CM 3110 (C)	Fall (in-person) Spring (in-person)
3	CM 3240	Separation Processes	MA 2160 & CM 3230	Fall (in-person) Spring (in-person)
3	CM 3310	Process Control	diff eqns** & PH 2200 & CM 2110	Fall (in-person) Spring (in-person)
3	CM 3510	Chemical Reaction Engineering	diff eqns** & CM 2110 & CM 3110 & CM 3230	Spring (in-person)
3	CM 3980	Sustainable Chemical Engg	diff eqns** & CM 2110	Fall (in-person) Spring (in-person)
4	CM 4110	Unit and Plant Operations Lab I	CM 3120 & CM 3215 & CM 3240 & CM 3310 & CM 3510	Fall (in-person)
4	CM 4120	Unit and Plant Operations Lab II	CM 4110	Spring (in-person)
4	CM 4320	Chemical Process Safety	CM 3120 & CM 3230 & CM 3510	Fall (in-person)
4	CM 4855	Process Analysis & Design I	CH 2410 & CM 3120 & CM 3215 & CM 3240 & CM 3510 & CM 3980 (C)	Fall (in-person)
4	CM 4860	Process Analysis & Design II	CM 3980 & CM 4855	Spring (in-person)
4	CM 4861	Capstone Design Project***	CM 3980 & CM 4860 (C)	Spring (in-person)

(C) indicates a prerequisite that you can take concurrently, in the same semester.

* For calc I, any of the following courses are acceptable: MA 1160 or MA 1161 or MA 1121.

**For differential equations, any of the following courses are acceptable: MA 3520 or MA 3521 or MA 3530 or MA 3560.

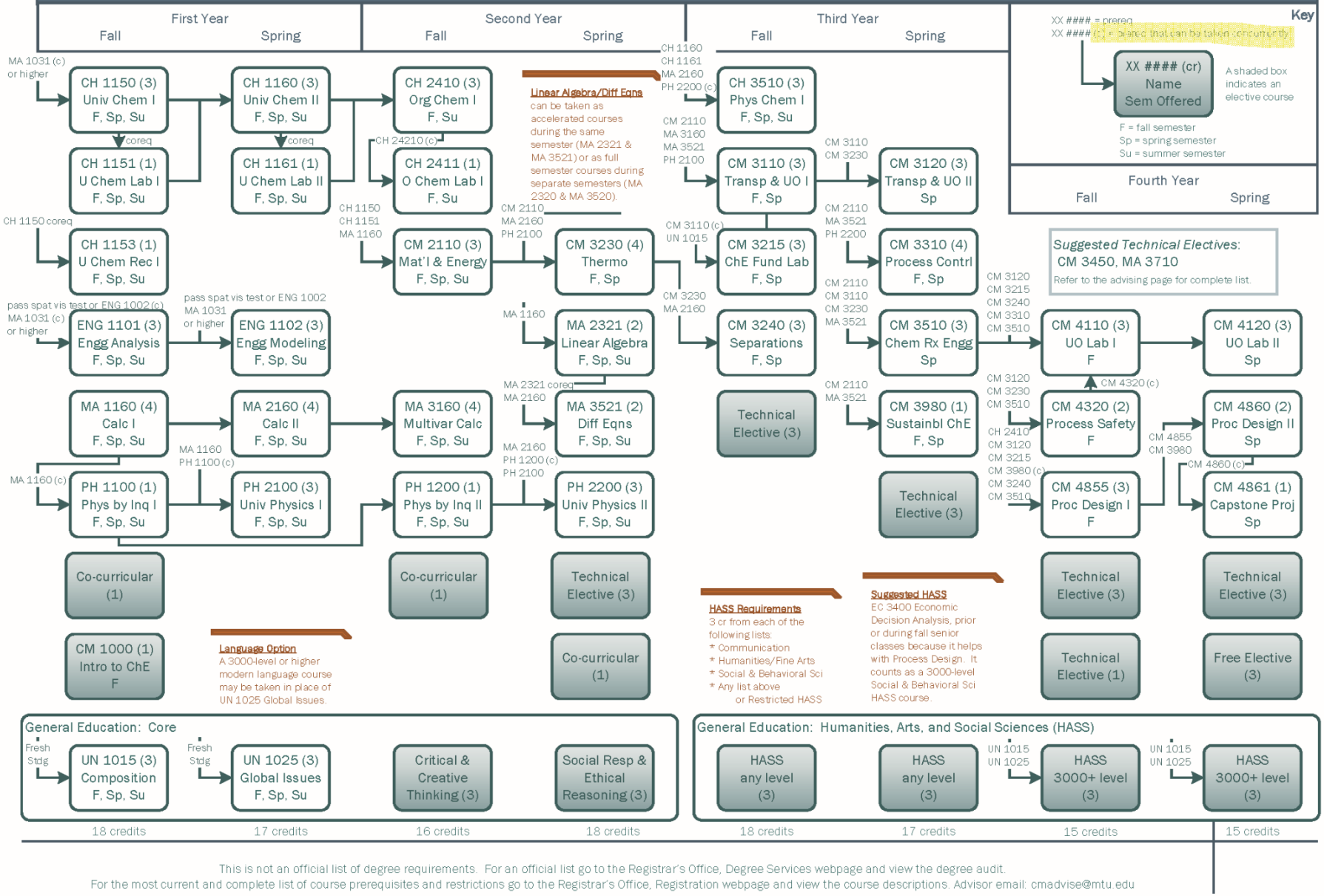
*** Appropriate Enterprise project-work semesters may replace CM 4861 if approved. Consult with Academic Advisor for rules.

Bachelor of Science in Chemical Engineering

Michigan Tech

For students starting in the 2024-25 academic year.

Updated 7/9/2024



This is not an official list of degree requirements. For an official list go to the Registrar's Office, Degree Services webpage and view the degree audit.
For the most current and complete list of course prerequisites and restrictions go to the Registrar's Office, Registration webpage and view the course descriptions. Advisor email: cmadvise@mtu.edu

FOUR-YEAR SAMPLE PLAN

This is a suggested plan for students starting in calculus.

FIRST YEAR

Course	Title	Credits
CH 1150	University Chemistry I	3
CH 1151	U Chem Lab I	1
CH 1153	U Chem Recitation I	1
CM 1000	Intro to Chemical Engg*	1
ENG 1101	Engg Analysis & Probl…	3
MA 1160	Calculus w/Technology I	4
PH 1100	Physics by Inquiry I	1
UN 1015	Compositions	3
	Co-curricular*	1
	Total Fall Credits	*18*

Course	Title	Credits
CH 1160	University Chemistry II	3
CH 1161	U Chem Lab II	1
ENG 1102	Engg Modeling & Design	3
MA 2160	Calculus w/Technology II	4
PH 2100	University Physics I	3
UN 1025	Global Issues (or lang)	3
	Total Spring Credits	*17*

SECOND YEAR

Course	Title	Credits
CH 2410	Organic Chemistry I	3
CH 2411	Organic Chemistry Lab I	1
CM 2110	Material & Energy Bal…	3
MA 3160	Multivariable Calc	4
PH 1200	Physics by Inquiry II	1
	Core Critical & Creat…*	3
	Co-curricular*	1
	Total Fall Credits	*16*

Course	Title	Credits
CM 3230	Thermodynamics for ChE	4
MA 2321	Elem Linear Algebra	2
MA 3521	Elem Differential Eqns	2
PH 2200	University Physics II	3
	Technical Elective*	3
	Core Social Resp…*	3
	Co-curricular*	1
	Total Spring Credits	*18*

THIRD YEAR

Course	Title	Credits
CH 3510	Physical Chemistry I	3
CM 3110	Transport & Unit Ops I	3
CM 3215	ChE Fundamentals Lab	3
CM 3240	Separation Processes	3
	Technical Elective*	3
	HASS Course, any level*	3
	Total Fall Credits	*18*

Course	Title	Credits
CM 3120	Transport & Unit Ops II	3
CM 3310	Process Control	4
CM 3510	Chemical Reaction Engg	3
CM 3980	Sustainable ChE	1
	Technical Elective*	3
	HASS Course, any level*	3
	Total Spring Credits	*17*

FOURTH YEAR

Course	Title	Credits
CM 4110	Unit & Plant Ops Lab I	3
CM 4320	Chemical Process Safety	2
CM 4855	Process Design I	3
	Technical Elective*	3
	Technical Elective*	1
	HASS Course, 3000+ level*	3
	Total Fall Credits	*15*

Course	Title	Credits
CM 4120	Unit & Plant Ops Lab II	3
CM 4860	Process Design II	2
CM 4861	Capstone Design Project	1
	Technical Elective*	3
	HASS Course, 3000+ level*	3
	Free Elective*	3
	Total Spring Credits	*15*

*Starred courses are electives. Choose from the correct electives list following degree requirements.

FIVE-YEAR SAMPLE PLAN WITH A CO-OP

This is a suggested plan for students starting in calculus.

FIRST YEAR

Course	Title	Credits
CH 1150	University Chemistry I	3
CH 1151	U Chem Lab I	1
CH 1153	U Chem Recitation I	1
CM 1000	Intro to Chemical Engg*	1
ENG 1101	Engg Analysis & Probl…	3
MA 1160	Calculus w/Technology I	4
PH 1100	Physics by Inquiry I	1
UN 1015	Composition	3
	Total Fall Credits	17

Course	Title	Credits
CH 1160	University Chemistry II	3
CH 1161	U Chem Lab II	1
ENG 1102	Engg Modeling & Design	3
MA 2160	Calculus w/Technology II	4
PH 2100	University Physics I	3
UN 1025	Global Issues (or lang)	3
	Total Spring Credits	17

SECOND YEAR

Course	Title	Credits
CH 2410	Organic Chemistry I	3
CH 2411	Organic Chemistry Lab I	1
CM 2110	Material & Energy Balan.	3
MA 3160	Multivariable Calc	4
PH 1200	Physics by Inquiry II	1
	Core Critical & Creat…*	3
	Co-Curricular*	1
	Total Fall Credits	*16*

Course	Title	Credits
MA 2321	Elem Linear Algebra	2
MA 3521	Elem Differential Eqns	2
PH 2200	University Physics II	3
CM 3230	Thermodynamics for ChE	4
	Core Social Resp/Ethic'l..	3
	Total Spring Credits	*14*

THIRD YEAR

Course	Title	Credits
UN 3002	Co-op / Technical Elec.	2
	Total Fall Credits	*2*

Course	Title	Credits
CM 3110	Transport & Unit Ops I	3
CH 3510	Physical Chemistry I	3
	Technical Elective*	3
	HASS course, any level*	3
	Co-Curricular*	1
	Total Spring Credits	*13*

FOURTH YEAR

Course	Title	Credits
CM 3215	ChE Fundamentals Lab	3
CM 3240	Separation Processes	3
	Technical Elective*	3
	HASS course, any level*	3
	HASS course 3000+ level*	3
	Total Fall Credits	*15*

Course	Title	Credits
CM 3120	Transport & Unit Ops II	3
CM 3310	Process Control	4
CM 3510	Chemical Reaction Engg	3
CM 3980	Sustainable ChE	1
	Co-Curricular*	1
	Total Spring Credits	*12*

FIFTH YEAR

Course	Title	Credits
CM 4110	Unit & Plant Ops Lab I	3
CM 4320	Chemical Process Safety	2
CM 4855	Process Design I	3
	Technical Elective*	3
	Technical Elective*	1
	Free elective*	3
	Total Fall Credits	*15*

Course	Title	Credits
CM 4120	Unit & Plant Ops Lab II	3
CM 4860	Process Design II	2
CM 4861	Capstone Design Project	1
	HASS course 3000+ level*	3
	Technical Elective*	3
	Technical Elective*	1
	Total Spring Credits	*13*

*Starred courses are electives. Choose from the correct electives list following degree requirements.

FIVE-YEAR SAMPLE PLAN WITH A PRECALCULUS START

This is a suggested schedule for students starting in precalculus.

FIRST YEAR

Course	Title	Credits
CH 1150	University Chemistry I	3
CH 1151	U Chem Lab I	1
CH 1153	U Chem Recitation I	1
CM 1000	Intro to Chemical Engg*	1
ENG 1101	Engg Analysis & Probl…	3
MA 1032	Precalculus	4
UN 1015	Composition	3
	Total Fall Credits	*16*

Course	Title	Credits
CH 1160	University Chemistry II	3
CH 1161	U Chem Lab II	1
CH 1163	U Chem Rec II (recom)	1
ENG 1102	Engg Modeling & Design	3
MA 1161	Calculus Plus w/Tech I	5
UN 1025	Global Issues (or lang)	3
	Co-Curricular*	1
	Total Spring Credits	*17*

SECOND YEAR

Course	Title	Credits
CH 2410	Organic Chemistry I	3
CH 2411	Organic Chemistry Lab I	1
MA 2160	Calculus w/Technology II	4
PH 1100	Physics by Inquiry I	1
PH 2100	University Physics I	3
	Core Critical & Creat…*	3
	Co-Curricular*	1
	Total Fall Credits	*16*

Course	Title	Credits
MA 3160	Multivariable Calc	4
PH 1200	Physics by Inquiry II	1
PH 2200	University Physics II	3
	Technical Elective*	3
	Core Social Resp…*	3
	Co-Curricular*	1
	Total Spring Credits	*15*

THIRD YEAR

Course	Title	Credits
CH 3510	Physical Chemistry I	3
CM 2110	Material & Energy Bal…	3
MA 2321	Elem Linear Algebra	2
MA 3521	Elem Differential Eqns	2
	HASS Course, any level*	3
	Total Fall Credits	*13*

Course	Title	Credits
CM 3230	Thermodynamics for ChE	4
CM 3110	Transport & Unit Ops I	3
	Technical Elective*	3
	HASS Course, any level*	3
	Total Spring Credits	*13*

FOURTH YEAR

Course	Title	Credits
CM 3215	ChE Fundamentals Lab	3
CM 3240	Separation Processes	3
CM 3980	Sustainable ChE	1
	Technical Elective*	3
	HASS Course, 3000+ level*	3
	Total Fall Credits	*13*

Course	Title	Credits
CM 3120	Transport & Unit Ops II	3
CM 3310	Process Control	4
CM 3510	Chemical Reaction Engg	3
	HASS Course, 3000+ level*	3
	Total Spring Credits	*13*

FIFTH YEAR

Course	Title	Credits
CM 4110	Unit & Plant Ops Lab I	3
CM 4320	Chemical Process Safety	2
CM 4855	Process Design I	3
	Technical Elective*	3
	Technical Elective*	1
	Total Fall Credits	12

Course	Title	Credits
CM 4120	Unit & Plant Ops Lab II	3
CM 4860	Process Design II	2
CM 4861	Capstone Design Project	1
	Technical Elective*	3
	Optional extra course	3
	Total Spring Credits	*12*

*Starred courses are electives. Choose from the correct electives list following degree requirements.

FIVE-YEAR SAMPLE PLAN WITH A CO-OP AND A PRECALCULUS START

This is a suggested schedule for students starting in precalculus.

FIRST YEAR

Course	Title	Credits
CH 1150	University Chemistry I	3
CH 1151	U Chem Lab I	1
CH 1153	U Chem Recitation I	1
CM 1000	Intro to Chemical Engg*	1
ENG 1101	Engg Analysis & Probl…	3
MA 1032	Precalculus	4
UN 1015	Composition	3
	Co-Curricular*	1
	Total Fall Credits	*17*

Course	Title	Credits
CH 1160	University Chemistry II	3
CH 1161	U Chem Lab II	1
CH 1163	U Chem Rec II (recom)	1
ENG 1102	Engg Modeling & Design	3
MA 1161	Calculus Plus w/Tech I	5
UN 1025	Global Issues (or lang)	3
	Total Spring Credits	*16*

SECOND YEAR

Course	Title	Credits
CH 2410	Organic Chemistry I	3
CH 2411	Organic Chemistry Lab I	1
MA 2160	Calculus w/Technology II	4
PH 1100	Physics by Inquiry I	1
PH 2100	University Physics I	3
	Core Critical & Creat…*	3
	Total Fall Credits	*15*

Course	Title	Credits
MA 3160	Multivariable Calc	4
PH 1200	Physics by Inquiry II	1
PH 2200	University Physics II	3
	Technical Elective*	3
	Core Social Resp…*	3
	Co-Curricular*	1
	Total Spring Credits	*15*

THIRD YEAR

Course	Title	Credits
CH 3510	Physical Chemistry I	3
CM 2110	Material & Energy Bal…	3
MA 2321	Elem Linear Algebra	2
MA 3521	Elem Differential Eqns	2
	HASS Course, any level*	3
	Total Fall Credits	*13*

Course	Title	Credits
UN 3002	Co-op / Technical Elective*	2
	Total Spring Credits	*2*

FOURTH YEAR

Course	Title	Credits
CM 3215	ChE Fundamentals Lab	3
CM 3230	Thermodynamics for ChE	4
CM 3110	Transport & Unit Ops I	3
	Technical Elective*	3
	HASS Course, 3000+ level*	3
	Total Fall Credits	16

Course	Title	Credits
CM 3120	Transport & Unit Ops II	3
CM 3310	Process Control	4
CM 3510	Chemical Reaction Engg	3
CM 3240	Separation Processes	3
CM 3980	Sustainable ChE	1
	HASS Course, 3000+ level*	3
	Total Spring Credits	*17*

FIFTH YEAR

Course	Title	Credits
CM 4110	Unit & Plant Ops Lab I	3
CM 4320	Chemical Process Safety	2
CM 4855	Process Design I	3
	Technical Elective*	3
	Technical Elective*	1
	Co-Curricular*	1
	Total Fall Credits	13

Course	Title	Credits
CM 4120	Unit & Plant Ops Lab II	3
CM 4860	Process Design II	2
CM 4861	Capstone Design Project	1
	Technical Elective*	3
	Technical Elective*	1
	HASS Course, any level*	3
	Total Spring Credits	*13*

*Starred Courses are electives. Choose from the correct electives list following degree requirements.

TECHNICAL ELECTIVES

Take a minimum of 17 credits of technical electives.

- Plan ahead. Some electives are offered once every other year and most have prerequisites.
- Additional engineering, math, science or applied business courses are allowed by approval.
- Courses on the general education HASS lists are not approved for technical electives.

Courses on the Very Short List and the Short List are good ones to consider first.

THE VERY SHORT LIST

We recommend these courses to everyone because they are universally useful.

CM 3450	Computer-Aided Problem Solving	3
CM 4320	Engineering Statistics	3

THE SHORT LIST

These courses are a good place to start.

BL 1200	Gen Bio II: Intro to Cellular Bio	3
BL 1210	Gen Bio II Lab: Intro to Cellular Bio	1
CH 2420	Organic Chemistry II	3
CM 1000	Intro to Chemical Engineering	1
CM 2200	Intro Minerals and Materials	3
CM 3025	Bioprocessing Lab	1
CM 3450	Computer-Aided Problem Solving	3
CM 3830	Mineral Processing Lab	1
CM/ENT 3979	Alternative Energy Tech	1
CM/MSE 4740	Hydro/Pyrometallurgy	4
CS 1121	Intro to Programming I	3
EE 2230	Printed Circuit Seminar Series	3
EE 2231	Printed Circuit Fabrication	1
EE 3010	Circuits and Instrumentation	3
ENG 2120	Statics-Strength of Materials	4
ENG 4515	Intro to Sustainability & Resilience	3
ENT 2950	Enterprise Project Work I	1
GE 2300	Mineral Science	3
MA 3710	Engineering Statistics	3
MEEM 2110	Statics	3
MIS 2100	Intro to Business Programming	3
MSE 2100	Intro to Materials Sci and Engg	3
UN 3002	Undergrad Cooperative Ed	var
N/A	Undergraduate Research	var

THE LONG LIST

This is the full list of approved technical electives.

Biomedical Engineering		
BE 2000+	2000-level or higher courses	var
Biological Sciences		
BL 1100	Gen Bio I: Intro to Organismal Bio	3
BL 1110	Gen Bio I Lab: Intro to Org Bio	1
BL 1200	Gen Bio II: Intro to Cellular Biology	3
BL 1210	Gen Bio II Lab: Intro to Cellular Bio	1
BL 1400	Principles of Biology	3
BL 1410	Principles of Biology Lab	1
BE 2000+	2000-level or higher courses	var
Civil and Environmental Engineering		
CEE 2000+	2000-level or higher courses	var

THE LONG LIST CONTINUED

Chemistry		
CH 2000+	2000-level or higher courses	var
Chemical Engineering		
CM 1000	Intro to Chemical Engineering	1
CM 2000+	2000-level or higher courses	var
Computer Science		
CS 1111	Intro to Programming in C/C++	3
CS 1121	Intro to Programming I	3
CS 1122	Intro to Programming II	3
CS 1131	Accelerated Intro to Program	5
CS 1142	Programming at Hardware Interface	3
CS 2000+	2000-level or higher courses	var
Electrical Engineering		
CS 2000+	2000-level or higher courses	var
Electrical Engineering Technology		
EET 1121	Circuits I	3
EET 1122	Circuits I Lab	1
EET 1411	Basic Electronics	4
EET 2000+	2000-level or higher courses	var
Engineering Fundamentals		
ENG 2000+	2000-level or higher courses	var
Enterprise		
ENT 2000+	2000-level or higher courses	var
Forest Resources and Environmental Sciences		
FW 1035	Wood Anatomy and Properties	3
FW 2000+	2000-level or higher courses	var
Geological and Mining Engineering and Sciences		
GE 2000+	2000-level or higher courses	var
Mathematical Sciences		
MA 1600	Intro to Scientific Simulation	3
MA 2000+	2000-level or higher courses	var
Mechanical Engineering-Engineering Mechanics		
MEEM 2000+	2000-level or higher courses	var
Management Information Systems		
MIS 2000+	2000-level or higher courses	var
Materials Science and Engineering		
MSE 2000+	2000-level or higher courses	var
Operation and Supply Chain Management		
OSM 2000+	2000-level or higher courses	var
Physics		
PH 1090	The Physics Behind Music	3
PH 1091	The Physics Behind Music Lab	1
PH 1500	Extraordinary Concepts in Physics	2
PH 1600	Introductory Astronomy	2
PH 1610	Introductory Astronomy Lab	1
PH 2000+	2000-level or higher courses	var
System Administration Technology		
SAT 2000+	2000-level or higher courses	var
University Wide		
UN 2000+	2000-level or higher courses	var

FOCUS AREAS

Why so many choices? Chemical engineering is a very broad field. You can take classes in several different areas to experience a wide range of topics or you can take classes in a specific area for a deeper dive.

Here are some general topics areas that are currently popular and growing. Need or want help? See your academic advisor!

Bioengineering

BL 1200	Gen Bio II: Intro to Cellular Biology	3
BL 1210	Gen Bio II Lab: Intro to Cellular Bio	1
BL 3020	Biochemistry I	3
BL 3210	General Microbiology	4
BL 3310	Environmental Microbiology	3
CH 2420	Organic Chemistry II	3
CH 4110	Medicinal Chem: Drug Action	3
CH 4120	Medicinal Chem: Drug Design	3
CH 4140	Intro to Pharmaceutical Analysis	3
CH 4710	Biomolecular Chemistry I	3
CM 3025	Bioprocessing Lab	1
CM 4710	Biochemical Processes	3
CM 4780	Biomanufacturing and Biosafety	3
FW 2100	Intro to Biochemistry	3

Minor in Biochemistry
Minor in Bioprocess Engineering
Minor in Medicinal Chemistry

Data Analytics

CS 1111	Intro to Programming in C/C++	3
CS 1121	Intro to Programming I	3
EET 3131	Sensors and Instrumentation	3
EET 3373	Intro to Programmable Controllers	3
MA 2600	Scientific Computing	3
MA 3710	Engineering Statistics	3
MA 3720	Probability	3
MA 3740	Statistical Programming & Analysis	3
MA 4720	Design & Analysis of Experiments	3
MIS 2100	Intro to Business Programming	3
SAT 4650	Intro Applied Computing w/Python	3

Minor in Computer Science
Minor in Data Acquisition and Industrial Control
Minor in Statistics

Energy

CM/ENT 3979	Alternative Energy Tech	1
EE 3010	Circuits and Instrumentation	3
EE 3120	Electric Energy Systems	3
EE 3140	Electromagnetics	3
GE 4610	Formation Eval & Petroleum Engg	3
MEEM 4200	Principles of Energy Conversion	3
MEEM 4220	Internal Combustion Engines I	3
MEEM 4240	Combustion and Air Pollution	3
MEEM 4260	Fuel Cell Technology	3

Minor in Alternative Energy Technology

Leadership

ENG/OSM 4300	Project Management	3
ENT 2950	Enterprise Project Work I	1
N/A	Entrepreneurialism Continued	N/A
ENT 3953	Ignite: Ideate, Innovate, Create!	1
ENT 3954	Enterprise Market Principles	1
ENT 3958	Ethics in Engg Design & Implem	1
ENT 3959	Fundamentals of Six Sigma I	1
ENT 3961	Building & Leading Teams	1
ENT 3964	Funds of Project Management	1
ENT 3971	Seven Habits of Highly Effective	1
ENT 3982	Contin Improv Using Lean	1
OSM 4650	Six Sigma Fundamentals	3

Minor in Business
Minor in Enterprise

Materials

CM/CH 4610	Intro to Polymer Science	3
CM/CH 4620	Polymer Chemistry	3
ENG 2120	Statics-Strength of Materials	4
MEEM 2110	Statics	3
MEEM 2150	Mechanics of Materials	3
MSE 2100	Intro to Materials Sci and Engg	3
MSE 2110	Intro to Materials Sci and Engg II	3
MSE 3100	Materials Processing I	4
MSE 3120	Materials Characterization I	4
MSE 4110	Introduction to Polymer Engg	3
MSE 4430	Composite Materials	3

Minor in Polymer Science and Engineering

Mineral Processing

CM 2200	Intro Minerals and Materials	3
CM 3830	Mineral Processing Lab	1
CM 4505	Particle Technology	3
CM 4510	Interfacial Engineering	3
CM/MSE 4740	Hydro/Pyrometallurgy	4
GE 2020	Intro to Mining Eng and Methods	2
GE 2300	Mineral Science	3
MSE 4320	Corrosion & Environmental Effects	3
MSE 4325	Fundamentals of Corrosion	1

Minor in Mineral Processing
Minor in Mining

Sustainability

CEE 3502	Envir Monitoring and Meas Analysis	3
CEE 3503	Environmental Engineering	3
CEE 4501	Envir Eng Chemical Processes	4
ENG 4515	Intro to Sustainability & Resilience	3
ENG 4525	Systems Analysis for Sustain & Res	3
FW 1035	Wood Anatomy and Properties	3
FW 3097	Forest Biomaterials	3
FW 3098	Adding Value to Biomaterials	2

Minor in Sustainable Biomaterials

Research credits from other departments allowed by approval, subject to the same limits of no more than 6 credits of research total, and no more than 3 credits earned per semester

ENGINEERING DESIGN OPTIONS

Students will choose either Capstone Design or Enterprise Project Work for their engineering design requirements. Apply your major skills in a meaningful chemical engineering application with a project team of peers guided by faculty. All students take Process Design I (CM 4855) and Process Design II (CM 4860) in their last year.

CAPSTONE DESIGN – CM 4861

Participate on a Senior Design team project by taking CM 4861, Capstone Design in Spring of the last year. Apply a culmination of skills learned in our curriculum required courses, leading to the last year. The team project is like a real-world chemical engineering experience. The Capstone Design option is shown on the sample flowcharts in spring of the last year.

ENTERPRISE PROJECT WORK – ENT 3960, ENT 4950, AND ENT 4960

Or, join an enterprise project team in one of many Enterprise groups for a minimum of three semesters. Start no later than that point in time when you have three semesters remaining on campus, and you can join as early as your second semester if you wish. Each enterprise group has a unique section number for registration time, and the course numbers are synced with fall or spring semesters, with some flexibility.
Below is a general guide for enterprise course registration:

YEAR	Fall Semester	Spring Semester
First		ENT 1960 – 1 credit
Second	ENT 2950 – 1 credit	ENT 2960 – 1 credit
Third (or Fourth of Five)	ENT 3950 – 1 credit	ENT 3960 – 1 credit
Fourth (or Fifth)	ENT 4950 – 2 credits	ENT 4960 2 credits

Enterprise Project Work credits will count toward Technical Electives or Free Electives. One credit of ENT 4960 will take the place of CM 4861, if a minimum of three semesters of enterprise project work are completed, including ENT 4950 and ENT 4960. Meet with the Academic Advisor for help with fitting enterprise project-work into your semesters.

ENT 4950 and ENT 4960 projects must meet engineering design requirements for capstone design and department approval is required. Consider joining an enterprise hosted by the Chemical Engineering Department, but other enterprises may have projects available for Chemical Engineering majors.

- Alternative Energy Enterprise (AEE)
- Consumer Product Manufacturing Enterprise (CPM)
- Green Campus Enterprise

Students can earn a minor or have a concentration in Enterprise; both are optional.

GENERAL EDUCATION CORE COURSES

You must take 12 credits of core courses meeting these requirements:

- Three credits from UN 1015 Compositions
- Three credits from UN 1025 Global Issues or 3000-level or higher modern language course
- Three credits from the Critical and Creative Thinking list
- Three credits from the Social Responsibility and Ethical Reasoning list

Courses on more than one list can only satisfy one requirement.
The official list of approved core courses is on the Registrar's Office, General Education webpage.

CRITICAL AND CREATIVE THINKING LIST

Minimum of 3 credits required:

ART 1000	Art Appreciation	3
HU 2130	Introduction to Rhetoric	3
HU 2324	Introduction to Film	3
HU 2501	American Experience in Literature	3
HU 2503	Introduction to Literature	3
HU 2538	British Experience in Literature	3
HU 2700	Introduction to Philosophy	3
HU 2701	Logical and Critical Thinking	3
HU 2820	Communication and Culture	3
HU 2910	Language and Mind	3
MUS 1000	Music Appreciation	3
SND 1000	Sound in Art and Science	3
SS 2300	Environment and Society	3
THEA 1000	Theatre Appreciation	3
TA2XX4	Critical & Creative Thinking Core (transfer agreement credit only)	var

SOCIAL RESPONSIBILITY AND ETHICAL REASONING LIST

Minimum 3 credits required:

EC 2001	Principles of Economics	3
PSY 2000	Introduction to Psychology	3
SS 2100	Intro to Cultural Anthropology	3
SS 2200	Introduction to Archaeology	3
SS 2400	Intro to Human Geography	3
SS 2500	United States History to 1877	3
SS 2501	US History Since 1877	3
SS 2502	European History to 1650	3
SS 2503	European History Since 1650	3
SS 2504	World History to 1500	3
SS 2505	World History Since 1500	3
SS 2600	American Government & Politics	3
SS 2610	Introduction to Law and Society	3
SS 2700	Introduction to Sociology	3
TA 2XX8	Social Resp & Ethical Reas Core (transfer agreement credit only)	var

GENERAL EDUCATION HASS COURSE

You must take a minimum of 12 credits in HASS courses meeting these requirements:

- Three credits from the Communication and Composition list
- Three credits from the Humanities and Fine Arts list
- Three credits from the Social and Behavioral Science list
- Three credits from any list above or the Restricted HASS list
- Of the credits taken above, at least 6 credits must be taken at the 3000-level or higher.

All 3000-level or higher, non-language HASS courses have prerequisites of UN1015 and (UN1025 or modern language – 3000 level or higher).
Courses on more than one list can only satisfy one requirement.
The official list of approved HASS courses is on the Registrar's Office, General Education webpage.

COMMUNICATION AND COMPOSITION HASS LIST

Minimum of 3 credits required:

HU 2500	Ways of Reading	3
HU 2810	Research & Writing in Commun	3
HU 2830	Public Speaking & Multimedia	3
HU 2840	Interpersonal Comm & Tech	3
HU 3015	Advanced Composition	3
HU 3120	Technical and Professional Comm	3
HU 3130	Rhetoric of Science and Tech	3
HU 3151	The Rhetoric of Everyday Texts	3
HU 3517	Literary Theory and Criticism	3
HU 3606	Editing	3
HU 3621	Introduction to Journalism	3
HU 3693	Science Writing	3
HU 3694	Grant Writing	3
HU 3800	Media and Society	3
HU 3832	Advanced Digital Presentation	3
HU 3840	Organizational Communication	3
HU 3845	Human-Machine Communication	3
HU 3852	Surveillance Media and Film	3
HU 3871	Media Theory	3
HU 4625	Risk Communication	3
SS 4040	Civic Communications	3
TA 1XX5	Communication Elective (transfer agreement credit only)	var
TA 3XX5	Communication Elective (transfer agreement credit only)	var

HUMANITIES AND FINE ARTS HASS LIST

Minimum of 3 credits required:

ART 1000	Art Appreciation	3
ART 1100	Drawing I	3
ART 1110	Art + Design Studio	3
ART 2110	Outdoor Sculpture	3
ART 2130	Creative Drawing Processes	3
ART 2140	Ceramics I	3
ART 2145	Beginning Wheel Throwing	3
ART 2160	Creative Practices	3
ART 2190	Art & Nature	3
ART 2201	Art History I	3
ART 2202	Art History II	3
ART 2950	Creative Campus: Local Arts Imm	3
ART 3140	Creative Ceramics	3
ART 3180	Color and Creativity	3

HUMANITIES & FINE ARTS LIST CONTINUED

ART 3410	Contemporary Sculpture Studio	3
ART 3420	Traditional Sculpture Studio	3
ART 3850	Special Topics: Art	var
ART 3900	Study Away: US Arts Immersion	var
ART 3950	International Arts Immersion	var
HU 2130	Introduction to Rhetoric	3
HU 2200	Introduction to World Cultures	3
HU 2241	Level I-A Less Common Lang (transfer or study abroad credit only)	var
HU 2242	Level I-B Less Common Lang (transfer or study abroad credit only)	var
HU 2271	Level I-A French Lang & Culture	3
HU 2272	Level I-B French Lang & Culture	3
HU 2273	Transitional Level I French Lang	3
HU 2281	Level I-A German Lang & Culture	3
HU 2282	Level I-B German Lang & Culture	3
HU 2291	Level I-A Spanish Lang & Culture	3
HU 2292	Level I-B Spanish Lang & Culture	3
HU 2293	Transitional Level I Spanish Lang	3
HU 2324	Introduction to Film	3
HU 2500	Ways of Reading	3
HU 2501	American Experience in Literature	3
HU 2503	Introduction to Literature	3
HU 2505	Humanities, Science & Technology	3
HU 2510	Intro to Creative Writing	3
HU 2538	British Experience in Literature	3
HU 2548	Young Adult Literature	3
HU 2633	Fundamentals of Digital Imaging	3
HU 2645	Graphic & Information Design	3
HU 2700	Introduction to Philosophy	3
HU 2701	Logical and Critical Thinking	3
HU 2702	Ethical Theory and Moral Problems	3
HU 2810	Research & Writing in Comm	3
HU 2820	Communication and Culture	3
HU 2830	Public Speaking & Multimedia	3
HU 2840	Interpersonal Communication	3
HU 2910	Language and Mind	3
HU 2920	Language and Society	3
HU 3015	Advanced Composition	3
HU 3120	Technical and Professional Comm	3
HU 3130	Rhetoric of Science and Tech	3
HU 3150	Topics in Literacy Studies	3
HU 3151	The Rhetoric of Everyday Texts	3
HU 3241	Level II-A Less Common Lang (transfer or study abroad credit only)	var
HU 3242	Level II-B Less Common Lang (transfer or study abroad credit only)	var
HU 3261	Communicating Across Cultures	3

HUMANITIES & FINE ARTS LIST CONTINUED

HU 3262	Topics in Francophone Cultures	3
HU 3263	Topics in German-Speaking Cultur	3
HU 3264	Topics in Spanish-Speaking Culture	3
HU 3271	Level II-A French Lang & Culture	3
HU 3272	Level II-B French Lang & Culture	3
HU 3274	Level III French Literature & Culture	3
HU 3275	French for Special Purposes	3
HU 3280	Level I-C German Lang & Culture	3
HU 3281	Level II-A German Lang & Culture	3
HU 3282	Level II-B German Lang & Culture	3
HU 3283	Level II German for Special Purp	3
HU 3284	Level III German Lit & Culture	3
HU 3285	Level III German Film & Media	3
HU 3291	Level II-A Spanish Lang & Culture	3
HU 3292	Level II-B Spanish Lang & Culture	3
HU 3293	Level II-C Spanish Comp & Conv	3
HU 3294	Hispanic Literatures and Culture	3
HU 3295	Level III Advanced Spanish for Lit	3
HU 3296	Intro to Hispanic Lit & Cultures	3
HU 3326	Topics in World Cinema	3
HU 3327	Film Style and Genre	3
HU 3400	Topics in Diversity Studies	3
HU 3401	Gender and Culture	3
HU 3410	Introduction to Diversity Studies	3
HU 3502	Mythology	3
HU 3503	Special Topics in Lit & Culture	3
HU 3504	Studies in the Novel	3
HU 3505	Literary Forms, Genres, and Modes	3
HU 3506	Major Authors	3
HU 3507	Cultural Traditions in Literature	3
HU 3508	Literature and the Environment	3
HU 3509	Studies in Drama	3
HU 3513	Shakespeare	3
HU 3514	Workshop Creative Nonfiction	3
HU 3515	Workshop in Poetry	3
HU 3516	Workshop in Fiction	3
HU 3517	Literary Theory and Criticism	3
HU 3518	Workshop in Sci Fi Writing	3
HU 3519	Workshop in Nature Writing	3
HU 3545	Literature across Borders	3
HU 3554	Science Fiction	3
HU 3557	Literature and Science	3
HU 3606	Editing	3
HU 3621	Introduction to Journalism	3
HU 3693	Science Writing	3
HU 3694	Grant Writing	3
HU 3700	Philosophy of Science	3
HU 3701	Philosophy of Technology	3
HU 3702	Philosophy of Religion	3
HU 3703	Environmental Philosophy	3
HU 3710	Engineering Ethics	3
HU 3711	Biomedical Ethics	3
HU 3800	Media and Society	3
HU 3802	Media and Globalization	3
HU 3810	Technology and Culture	3
HU 3825	Environmental Communication	3
HU 3830	Creativity, Culture, & Change	3
HU 3832	Advanced Digital Presentation	3
HU 3840	Organizational Communication	3
HU 3845	Human-Machine Communication	3
HU 3850	Cultural Studies	3
HU 3852	Surveillance, Media, and Film	3

HUMANITIES & FINE ARTS LIST CONTINUED

HU 3855	Power, Activism, and Technology	3
HU 3860	Popular Culture	3
HU 3871	Media Theory	3
HU 3872	Color, Visuality, and Culture	3
HU 3882	Media Industries	3
HU 3890	Documentary	3
HU 3910	Language and Globalization	3
HU 3940	Language and Identity	3
HU 4271	Modern Lang Seminar I-French	3
HU 4272	Modern Lang Seminar II-French	3
HU 4273	Modern Lang Seminar III-French	3
HU 4281	Modern Lang Seminar I-German	3
HU 4282	Modern Lang Seminar II-German	3
HU 4283	Modern Lang Seminar III-German	3
HU 4291	Modern Lang Seminar I-Spanish	3
HU 4292	Modern Lang Seminar II-Spanish	3
HU 4293	Modern Lang Seminar III-Spanish	3
HU 4625	Risk Communication	3
HU 4701	Political Philosophy	3
HU 4725	Existentialism and Phenomenology	3
HU 4890	Topics in Communication	3
MUS 1000	Music Appreciation	3
MUS 2000	History of Classical Music	3
MUS 2001	Film Music	3
MUS 2020	History of Rock	3
MUS 2030	History of Jazz	3
MUS 2040	Music & Tradition	3
MUS 3020	Beatles & Beach Boys	3
MUS 3200	Contemporary Music	3
SND 1000	Sound in Art & Science	3
THEA 1000	Theatre Appreciation	3
THEA 1400	Beginning Acting	3
THEA 3201	Theatre History I	3
THEA 3202	Theatre History II	3
THEA 3230	Costume History	3
THEA 3330	Costume Design	3
THEA 3400	Advanced Acting	3
THEA 3490	Puppetry	3
THEA 3850	Special Topics: Theatre	var
THEA 4402	Musical Theatre Performance	3
IS 2001	Int'l Studies in situ - HU/FA (study abroad credit only)	var
IS 3001	Int'l Studies in situ - HU/FA (study abroad credit only)	var

SOCIAL AND BEHAVIORAL SCIENCE HASS LIST

Minimum of 3 credits required:

EC 2001	Principles of Economics	3
EC 3002	Microeconomic Theory	3
EC 3003	Macroeconomic Theory	3
EC 3100	International Economics	3
EC 3300	Industrial Organization	3
EC 3400	Economic Decision Analysis	3
EC 4050	Game Theory/Strategic Behav	3
EC 4400	Banking and Financial Inst	3
EC 4500	Public Sector Economics	3
EC 4620	Energy Economics	3
EC 4630	Mineral Industry Economics	3

SOCIAL & BEHAVIORAL LIST CONTINUED

EC 4640	Natural Resource Economics	3
EC 4650	Environmental Economics	3
EC 4710	Labor/Human Resource Econ	3
FW 3313	Sustainable Science	3
FW 3760	Human Dimensions of Natural…	3
GE 4630	Mineral Industry Economics	3
HF 2000	Intro to Engineering Psychology	3
HF 3850	Human Factors	3
HF 4015	Cognitive Task Analysis	3
IS 2002	Int'l Studies in situ-EC/PSY/SS (study abroad credit only)	var
IS 3002	Int'l Studies in situ-EC/PSY/SS (study abroad credit only)	var
MGT 3650	Intellectual Property Management	3
PSY 2000	Introduction to Psychology	3
PSY 2080	Special Topics in Psychology	3
PSY 2110	Educational Psychology	3
PSY 2300	Developmental Psychology	3
PSY 2400	Health Psychology	3
PSY 2600	Death and Dying	3
PSY 2900	Intro to Restorative Practices	3
PSY 3010	Theories of Personality	3
PSY 3030	Abnormal Psychology	3
PSY 3070	Cross-Cultural Psychology	3
PSY 3340	Psychology of Race	3
PSY 3720	Social Psychology	3
PSY 3800	Environmental Psychology	3
PSY 3880	Psychology of Social Media	3
PSY 4080	Topics in Psychology	3
PSY 4340	Culture and Cognition	3
SS 2100	Intro to Cultural Anthropology	3
SS 2200	Introduction to Archaeology	3
SS 2210	Community Development and…	3
SS 2300	Environment and Society	3
SS 2400	Intro to Human Geography	3
SS 2450	Intro to Sustainable Tourism	3
SS 2500	United States History to 1877	3
SS 2501	United States History since 1877	3
SS 2502	European History to 1650	3
SS 2503	European History since 1650	3
SS 2504	World History to 1500	3
SS 2505	World History since 1500	3
SS 2510	Gender and the Past	3
SS 2600	American Government & Politics	3
SS 2610	Introduction to Law and Society	3
SS 2625	Intro to American Foreign Policy	3
SS 2635	Comparative Politics	3
SS 2700	Introduction to Sociology	3
SS 2750	Racial Inequality	3
SS 3105	Native Amer & Indig Communities	3
SS 3110	Food Systems and Sustainability	3
SS 3200	Archaeology of the Modern World	3
SS 3210	Field Archaeology	var
SS 3225	Capitalism and the Modern World	3
SS 3230	Archaeology of Industry	3
SS 3240	Reading the Landscape	3
SS 3250	Biological Anthropology	3
SS 3260	Latin American Cultural History	3
SS 3280	Anthropology of Energy	3
SS 3313	Sustainability Science	3
SS 3315	Population and Environment	3
SS 3400	Contemporary Europe	3

SOCIAL & BEHAVIORAL LIST CONTINUED

SS 3420	Imaginary Worlds: Geog of Sci Fi…	3
SS 3505	Military History of the U.S.	3
SS 3510	History of American Technology	3
SS 3511	History of Science in America	3
SS 3513	History of Making Things: Craft…	3
SS 3515	History of American Architecture	3
SS 3520	U.S. Environmental History	3
SS 3530	The Automobile in America	3
SS 3535	History of Privacy	3
SS 3540	History of Michigan	3
SS 3541	The Copper Country	3
SS 3542	History of Detroit	3
SS 3552	Renaissance & Reformation	3
SS 3553	Empires in World History	3
SS 3560	History of England I	3
SS 3561	History of England II	3
SS 3580	Technology & Western Civilization	3
SS 3581	History of Science	3
SS 3612	International Relations	3
SS 3621	Public Policy & Management	3
SS 3630	Environmental Policy & Politics	3
SS 3640	Selected Topics in Cyber-Law	3
SS 3650	Intellectual Property Management	3
SS 3660	Constitutional Law	3
SS 3661	Civil Rights & Civil Liberties	3
SS 3665	Crime, Incarceration, and Policy	3
SS 3755	Sustainability & the Private Sector	3
SS 3760	Human Dimensions/NR Stew…	3
SS 3800	Energy Policy and Technology	3
SS 3801	Science, Technology, & Society	3
SS 3805	Environmental Justice	3
SS 3811	Energy Security and Justice	3
SS 3815	Energy and Society	3
SS 3910	Histories and Cultures	3
SS 3920	Topics in Anthropology/Archaeo…	3
SS 3950	Topics in American History	3
SS 3951	Topics in European History	3
SS 3952	Topics in World History	3
SS 3960	Cultural Immersion	var
SS 3961	Prep for Cross-Cultural Immersion	3
SS 3990	Topics in the Social Science	3
SS 4001	History of Social Thought	3
SS 4120	Sustainable Development	3
SS 4200	Environmental Anthropology	3
SS 4220	Archaeological Thought in Society	3
SS 4390	Seminar in Sustainability	3
SS 4040	Civic Communication	3
SS 4450	Sustainable Tourism & Planning	3
SS 4530	Deindustrialization & the Urban Env	3
SS 4700	Communities and Research	3
SS 4710	Geographies of Migrant & Nat..	3
SS 4921	Washington Experience Seminar	var

RESTRICTED HASS LIST

Optional - No more than 3 credits maximum:

BL 2001	Valuing the Great Lakes	3
BL 3970	Current Health Issues	3
ENT 2961	Teaming in the Enterprise	2
ENT 2962	Communication Contexts	1
FIN 2400	Financial Literacy	3

RESTRICTED HASS LIST CONTINUED

FW 2081	Intro to Circular Economy	3
FW 3116	Ethnobotany	3
FW 4111	Indigenous Natural Resources…	3
GE 2100	Environmental Geology	3
HON 2150	Pavlis Seminar I	1
HON 3150	Pavlis Seminar II	1
HON 3410	Culture, Language, & Project…	3
HON 4150	Pavlis Seminar III	1
KIP 2600	Introduction to Public Health	2
MA 4945	History of Mathematics	3

APPROVED TRANSFER COURSES COMMUNICATION AND COMPOSITION HASS LIST

The following courses are available ONLY by transfer:

HU 1XX5	Approved Transfer HASS Comm…	3
HU 2XX5	Approved Transfer HASS Comm…	3
HU 3XX5	Approved Transfer HASS Comm…	3
HU 4XX5	Approved Transfer HASS Comm…	3

APPROVED TRANSFER COURSES HUMANITIES AND FINE ARTS HASS LIST

The following courses are available ONLY by transfer:

ART 1XXX	Approved Transfer HASS Elective	3
ART 2XXX	Approved Transfer HASS Elective	3
ART 3XXX	Approved Transfer HASS Elective	3
ART 4XXX	Approved Transfer HASS Elective	3
HU 1XXX	Approved Transfer HASS Elective	3
HU 2XXX	Approved Transfer HASS Elective	3
HU 3XXX	Approved Transfer HASS Elective	3
HU 4XXX	Approved Transfer HASS Elective	3

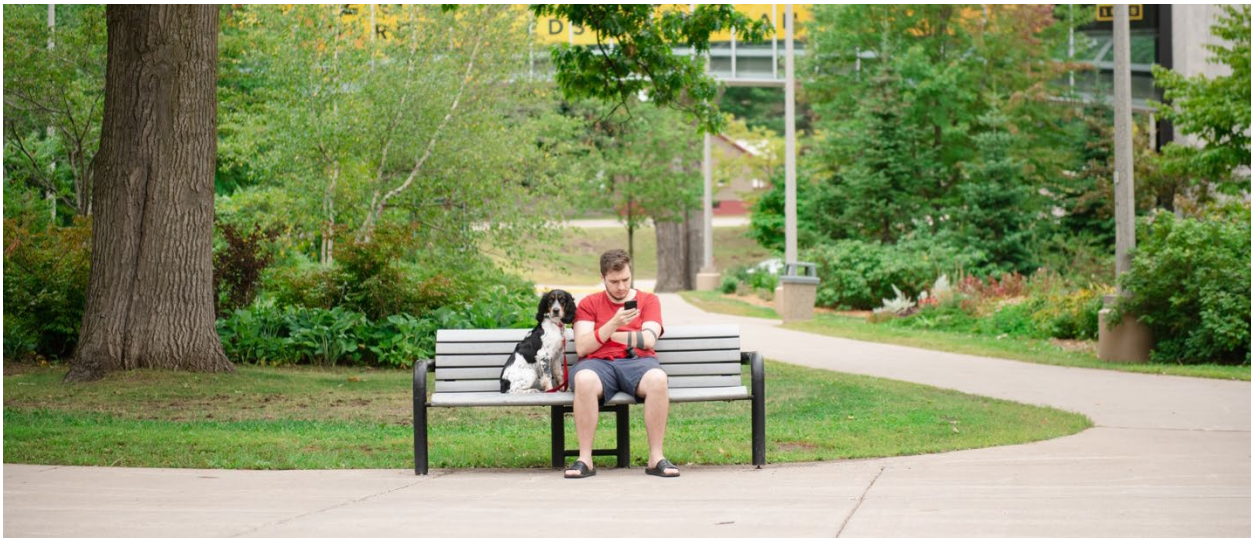
APPROVED TRANSFER COURSES HUMANITIES AND FINE ARTS CONTINUED

HU 1XX5	Approved Transfer HASS Comm…	3
HU 2XX5	Approved Transfer HASS Comm…	3
HU 3XX5	Approved Transfer HASS Comm…	3
HU 4XX5	Approved Transfer HASS Comm…	3
MUS 1XXX	Approved Transfer HAAS Elective	3
MUS 2XXX	Approved Transfer HAAS Elective	3
MUS 3XXX	Approved Transfer HAAS Elective	3
MUS 4XXX	Approved Transfer HAAS Elective	3
SND 1XXX	Approved Transfer HAAS Elective	3
SND 2XXX	Approved Transfer HAAS Elective	3
SND 3XXX	Approved Transfer HAAS Elective	3
SND 4XXX	Approved Transfer HAAS Elective	3
THEA 1XXX	Approved Transfer HAAS Elective	3
THEA 2XXX	Approved Transfer HAAS Elective	3
THEA 3XXX	Approved Transfer HAAS Elective	3
THEA 4XXX	Approved Transfer HAAS Elective	3

APPROVED TRANSFER COURSES SOCIAL AND BEHAVIORAL SCIENCES HASS LIST

The following courses are available ONLY by transfer:

EC 1XXX	Approved Transfer HASS Elective	3
EC 2XXX	Approved Transfer HASS Elective	3
EC 3XXX	Approved Transfer HASS Elective	3
EC 4XXX	Approved Transfer HASS Elective	3
PSY 1XXX	Approved Transfer HASS Elective	3
PSY 2XXX	Approved Transfer HASS Elective	3
PSY 3XXX	Approved Transfer HASS Elective	3
PSY 4XXX	Approved Transfer HASS Elective	3
SS 1XXX	Approved Transfer HASS Elective	3
SS 2XXX	Approved Transfer HASS Elective	3
SS 3XXX	Approved Transfer HASS Elective	3
SS 4XXX	Approved Transfer HASS Elective	3



GENERAL EDUCACATION CO-CURRICULAR COURSES

You must take 3 units of co-curricular courses.
Co-curricular units:

- Count toward full-time status and satisfactory progress for financial aid purposes
- Appear on the transcript with a Pass/Fail grade
- Are not included in the GPA calculation
- Are not included in the total credits required for a degree
- Do not count towards the 12 credits of gradable courses required for recognition on the dean's list or other university honors.

Repeatability for general education:

- 0.5 unit co-curricular courses may be repeated once for the general education co-curricular requirement.
- 1 unit co-curricular courses may not be repeated for the general education co-curricular requirement.

The official list of approved co-curricular courses is on the Registrar's Office, General Education webpage.

CO-CURRICULAR LIST

Minimum of 3 units required:

AF 0120	Physical Conditioning	0.5
AF 0130	Air Force Elite Forces Workout	1
AF 0230	Precision Drill Team	0.5
AF 0340	Field Training	1
AR 0340	Internship in Adv Military Lead…	3
AR 2068	Fall Military Physical Conditioning	1
AR 2069	Spring Military Physical Cond…	1
AR 3068	Physical Training Leadership I	1
AR 3069	Physical Training Leadership II	1
MUS 1510	Huskies Pep Band	1
MUS 1511	Campus Concert Band	1
MUS 1570	Private Music Instruction	0.5
PE 0101	Flag Football	0.5
PE 0103	Bait and Fly Casting	0.5
PE 0104	Ultimate Frisbee	0.5
PE 0105	Beginning Bowling I	0.5
PE 0106	Beginning Golf	0.5
PE 0107	Floor Hockey	0.5
PE 0108	Broomball	0.5
PE 0109	Aikido	0.5
PE 0113	Disc Golf	0.5
PE 0115	Beginning Swimming	0.5
PE 0116	Beginning Basketball	0.5
PE 0117	Beginning Hockey	0.5
PE 0118	Beginning Weight Training	0.5
PE 0119	Beginning Fitness Training	0.5
PE 0120	Beginning Alpine Skiing (Downhill)	0.5
PE 0121	Beginning Snowboarding	0.5
PE 0122	Softball	0.5
PE 0123	Telemark Skiing	0.5
PE 0125	Sand Volleyball	0.5
PE 0126	Beginning Volleyball	0.5
PE 0130	Water Aerobics	0.5
PE 0132	Beginning Soccer	0.5
PE 0135	Beginning Cross Country Skiing	0.5
PE 0137	Table Tennis	0.5
PE 0138	Beginning Racquetball/Squash	0.5
PE 0139	Beginning Badminton	0.5
PE 0140	Beginning Tennis	0.5
PE 0142	Introduction to Brazilian Jiu Jitsu	0.5
PE 0145	Beginning Rifle	0.5

CO-CURRICULAR LIST CONTINUED

PE 0146	Beginning Billiards	0.5
PE 0148	Beginning Skating	0.5
PE 0150	Outdoor Lifetime Activities	0.5
PE 0151	Indoor Lifetime Activities	0.5
PE 0152	Social Dance I	0.5
PE 0153	Aerobics I	0.5
PE 0155	Beginning Road Biking	0.5
PE 0156	Beginning Mountain Biking	0.5
PE 0165	Introduction to Rowing	0.5
PE 0166	Moving for Fitness	0.5
PE 0167	Beginning Yoga	0.5
PE 0169	Indoor Cycling	0.5
PE 0170	Taekwondo and Hapkido I	0.5
PE 0175	Hiking	0.5
PE 0177	Fundamentals of Laser Tag	0.5
PE 0205	Bowling II	0.5
PE 0206	Intermediate Golf	0.5
PE 0209	Intermediate Aikido	0.5
PE 0210	Special Topics in Physical Ed	0.5
PE 0215	Intermediate Swimming	0.5
PE 0216	Intermediate Basketball	0.5
PE 0217	Intermediate Hockey	0.5
PE 0218	Intermediate Weight Training	0.5
PE 0219	Intermediate Fitness Training	0.5
PE 0220	Intermediate Alpine Ski (Downhill)	0.5
PE 0221	Intermediate Snowboarding	0.5
PE 0226	Intermediate Volleyball	0.5
PE 0230	Water Polo	0.5
PE 0232	Intermediate Soccer	0.5
PE 0235	Intermediate Cross-Country Ski	0.5
PE 0237	Intermediate Table Tennis	0.5
PE 0238	Intermed Racquetball/Squash	0.5
PE 0239	Intermediate Badminton	0.5
PE 0240	Intermediate Tennis	0.5
PE 0242	Brazilian Jiu Jitsu II	0.5
PE 0245	Intermediate Rifle	0.5
PE 0246	Intermediate Billiards	0.5
PE 0248	Intermediate Skating	0.5
PE 0250	Paintball	0.5
PE 0252	Social Dance II	0.5
PE 0253	Aerobics II	0.5
PE 0256	Intermediate Mountain Biking	0.5

CO-CURRICULAR LIST CONTINUED

PE 0266	Running for Fitness	0.5
PE 0267	Intermediate Yoga	0.5
PE 0270	Cardio Taekwondo	0.5
PE 0277	Strategies of Laser Tag	0.5
PE 0315	Fitness Swimming	0.5
PE 0320	Advanced Skiing	0.5
PE 0321	Advanced Snowboarding	0.5
PE 0330	Club Sports	0.5
PE 0367	Mindful Yoga	0.5
PE 0420	Ski Instructor Training	0.5
PE 0421	Snowboard Instructor Training	0.5
PE 0425	Intramurals	0.5
PE 0430	Club Sports Leadership	0.5
PE 0451	Mountain/Road Bike Fusion	0.5
PE 0520	Alpine Skiing Fusion	0.5
PE 0521	Snowboard Fusion	0.5
PE 1000	Fitness Foundations	1
PE 1010	Active Michigan Tech	1
PE 1028	Ski Patrol (Hill)	1
PE 1101	Team Sports	1
PE 1105	Bowling	1
PE 1106	Golf	1
PE 1113	Disc Sports	1
PE 1118	Weight/Fitness Training	1
PE 1119	Conditioning	1
PE 1138	Racquet Sports	1
PE 1140	Tennis	1
PE 1169	Indoor Cycling	1
PE 1170	Taekwondo	1
PE 1210	Special Topics	1
PE 1215	Intro to Backcountry Travel	1

CO-CURRICULAR LIST CONTINUED

PE 1220	Introduction to Canoeing	1
PE 1225	Indoor Rock Climbing	1
PE 1230	Introduction to Kayaking	1
PE 1235	Introduction to Log Rolling	1
PE 1240	Snowshoeing	1
PE 1245	Wilderness First Responder	1
PE 1435	Self-Defense for Women	1
PE 1436	Self-Defense for Men	1
PE 1450	Physical Education Fusion – Full	1
PE 1470	Lifeguard Swimming	1
PE 2010	Varsity Football	1
PE 2020	Varsity Basketball	1
PE 2030	Varsity Hockey	1
PE 2040	Varsity Nordic Skiing	1
PE 2050	Varsity Soccer	1
PE 2080	Varsity Track	1
PE 2090	Varsity Tennis	1
PE 2130	Varsity Volleyball	1
PE 2140	Varsity Cross Country	1
PE 2150	Cross Training	1
PE 2160	Varsity Esports	1
PSY 1100	Skills for Health & Resilience	1

APPROVED TRANSFER COURSES CO-CURRICULAR LIST

The following courses are available ONLY by transfer:

PE 0XXX	Co-Curricular Activities	0.5
PE 1XXX	Co-Curricular Activities	1

Fall

Course	Credits
Total Credits:	

Spring

Course	Credits
Total Credits:	

Summer

Course	Credits
Total Credits:	

Fall

Course	Credits
Total Credits:	

Spring

Course	Credits
Total Credits:	

Summer

Course	Credits
Total Credits:	

Fall

Course	Credits
Total Credits:	

Spring

Course	Credits
Total Credits:	

Summer

Course	Credits
Total Credits:	

Fall

Course	Credits
Total Credits:	

Spring

Course	Credits
Total Credits:	

Summer

Course	Credits
Total Credits:	

Michigan Technological University
Chemical Engineering

1400 Townsend Drive
Chem Sci Building, Room 203
Houghton, MI 49931

Please feel free to contact us. We look forward to hearing from you!

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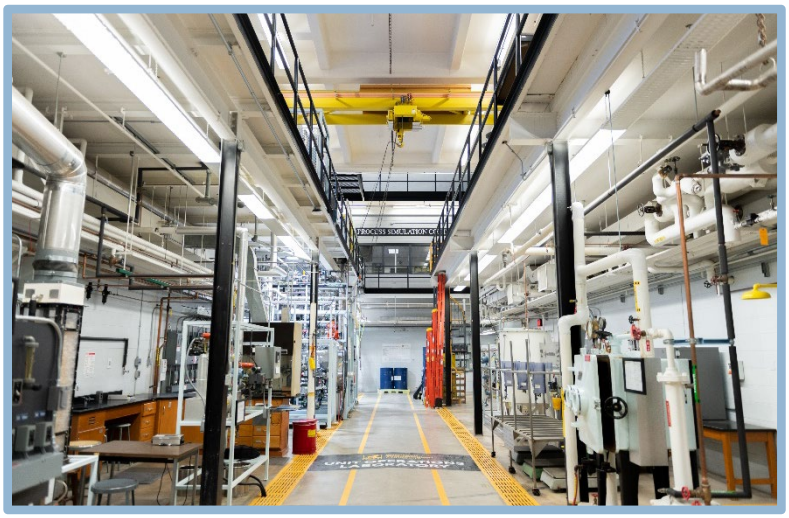
mtu.edu/chemical



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