



Michigan Technological University Chemical Engineering



UNDERGRADUATE ADVISING

FOR CHEMICAL ENGINEERING STUDENTS STARTING AT
MICHIGAN TECH IN THE 2026-27 ACADEMIC YEAR

CATALOG YEAR: 202608, 202701, AND 202705

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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



Patrick Pinhero
Department Chair



Brooke Forseth
Undergraduate
Academic Advisor



Robert Handler
Assistant Professor



Julia King
Professor Emerita



Gerard Caneba
Professor



Aytug Gencoglu
Assistant Professor



Caryn Heldt
Professor



Daniel Kulas
Assistant Research
Professor



Jeana Collins
Teaching Professor



Maria Gencoglu
Assistant Professor



Jon Herlevich Jr.
Professor of Practice



Wei Liu
Research Associate



Tim Eisele
Associate Professor



Kyle Griffin
Associate Teaching
Professor



Tyson Kauppinen
Laboratory Technician



Yixin Liu
Associate Professor



Lynn Manchester
Laboratory Technician



Kristi Pieti
Department Coordinator



David Shonnard
Research Professor
Professor Emeritus



Michael Mullins
Professor



John Sandell
Associate Professor



Shelby Stubenrach
Administrative Aide



Rebecca Ong
Associate Professor



Kiernan Seagers
Assistant Research
Scientist



Len Switzer
Professor of Practice



Lei Pan
Associate Professor



Vaishali Sharma
Postdoctoral Scholar



Stefan Wisniewski
Lab Manager

ACADEMIC ADVISING

We are 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.



Bridgette Bottineau



Shaney Czyzio



Wyatt Pershing



Klarissa Peters



Katie White



Scan to go to the Peer Mentors webpage

CAREER ADVISORS

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



Kyle Griffin



Jon Herlevich



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 is 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 have 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, talking with an advisor is always a good place to start.

CAREER AND PERSONAL DEVELOPMENT

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 Experience.** Are all 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.**
 - o [Chemical Engineering advising webpage](#)
 - o [Registrar's Office](#)
 - o [Undergraduate Catalog](#)
 - o [Dean of Students Office](#)
 - o [Library](#)
 - o [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:
 - o The [academic advisor for other majors](#) you are considering, or
 - o The [general sciences/arts undeclared advisor](#), or
 - o The [general/undecided engineering advisor](#), or
 - o 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; and Last day to drop full-semester courses without a grade.
Week 3		
Week 4		
Week 5		
Week 6		
Week 7	Monday	Mid-term grades available on Experience 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 11	all week	Third week of the initial registration period. Registration closes for everyone at the end of the week.
Week 12	Wednesday Friday	Registration reopens and stays open until the next semester starts. Last day to drop full-semester courses with a 'W'
Week 13		
Week 14		
Finals Week		

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



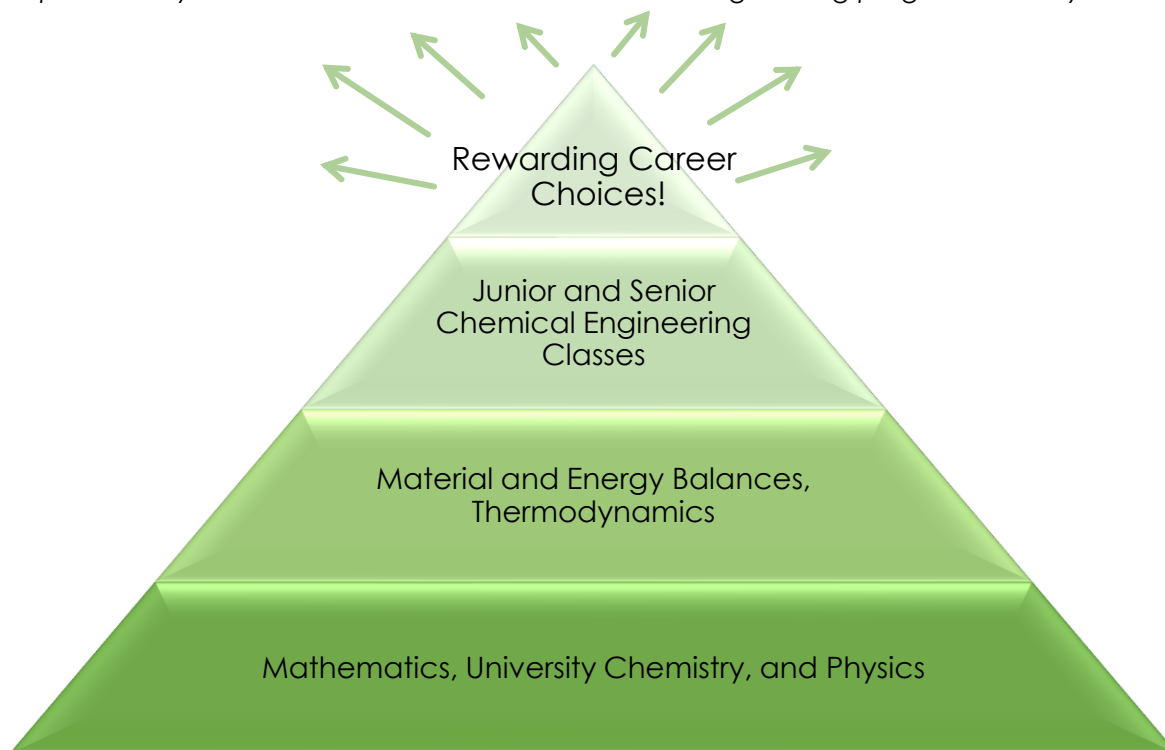
TIP! Add these events to your Google calendar by adding the "Michigan Tech Academic Calendar".

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 always replaces the prior grade.

For better or worse. 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.

CHEMICAL ENGINEERING LEARNING COMMONS

The Chemical Engineering Department helps support student success with the Chemical Engineering Learning Commons (CMLC). The CMLC is open to all chemical engineering students and provides a welcoming space for studying, working on coursework and connecting with peers.



CMLC COACHES

Coaches are available to help with core sophomore and junior level chemical engineering courses Monday-Thursday from 6-8pm. The coaches are looking to add expanded hours, Monday-Friday from noon–5pm, to accommodate questions during the day. Stay tuned for more information!



Kelty Blastic



Caroline Bocock



Jane Johnston



Madeline McRoberts



Daniel Reynolds



Hossack Sweeney



Harry Wilson



Kaitlynn Zimmerman

CHEMICAL ENGINEERING MINORS

A minor allows undergraduate students to specialize in a secondary discipline. Many chemical engineering students find that a minor fits well within their degree plan. Students interested in adding a chemical engineering minor should speak with the chemical engineering academic advisor to discuss options and degree requirements.



APPLIED PROCESS CONTROL

Gain hands-on experience with distributed control systems (DCS), including process automation, control logic, alarm management, and human-machine interface (HMI) design using industry-standard tools such as DeltaV.

MINERAL PROCESSING

Help to sustainably manage the Earth's resources. Graduates combine their knowledge of chemical engineering and minerals processing to extract and refine valuable minerals, while at the same time protecting and restoring the landscape.

POLYMER SCIENCE AND ENGINEERING

Meet the demand for chemical engineers who understand the chemical and mechanical properties of polymers, plastics, and composites. Some of the largest chemical companies in the world, several of which are based in Michigan, pursue Tech graduates with this training.

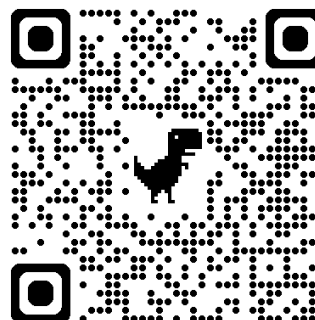
ALTERNATIVE ENERGY TECHNOLOGY

The interdisciplinary minor in alternative energy prepares students for careers in energy and related fields. A growing area of research and development is currently occurring in hydrogen fuel cells, biofuels, and solar cells.

BIOPROCESS ENGINEERING

Work to develop lifesaving medicines and improve the food supply for a hungry world. Graduates in this field provide expertise on biological processes to major chemical, pharmaceutical, and food manufacturers.

Find out more here:



SCHEDULE PLANNING

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

[ChE Advising webpage](#)



[Registrar's Office webpage](#)



[Experience \(your student records\)](#)



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

ONLINE DEGREE AUDITS

Go to Experience to run your interactive online degree audit. Run it every time you register for a class or change your schedule. New students can 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 Experience 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.

ESSENTIAL EDUCATION FIRST YEAR EXPERIENCE REQUIREMENTS: 16 CREDITS

- Michigan Tech Seminar: 1 credit (completed with major requirements)
- Math: 3 credits (completed with major requirements)
- Natural and Physical Science: 3 credits (completed with major requirements)
- STEM: 3 credits (completed with major requirements)
- UN 1015 College Writing, Reading and Research: 3 credits
- Foundations of the Human World: 3 credits



ESSENTIAL EDUCATION PATHWAY REQUIREMENTS: 18 CREDITS

You will choose between:

THE ESSENTIAL EDUCATION MINOR PATHWAY

- Communication Intensive: 3 credits
- Intercultural Competency: 3 credits
- SHAPE: 3 credits
- SHAPE: 3 credits
- Unrestricted: 3 credits
- Essential Education Experience or SHAPE (3000-4000 level): 3 credits

THE DISTRIBUTION PATHWAY

- Communication Intensive: 3 credits
- Intercultural Competency: 3 credits
- Arts and Culture: 3 credits
- STEM: 3 credits (completed with major requirements)
- SHAPE: 3 credits
- Essential Education Experience: 3 credits

If you choose the Distribution Pathway, we suggest taking EC 3400: Economic Design Analysis prior or during fall senior year because it helps with process design senior year. It is a SHAPE course.

ACTIVITIES FOR WELL-BEING AND SUCCESS REQUIREMENTS: 3 CREDITS

These options support students' personal development, health, and well-being. Types of courses include physical well-being, creative expression, mental/emotional well-being, and success.

FREE ELECTIVE REQUIREMENT: 3 CREDITS

Free electives are any course 1000-level or higher.

TOTAL CREDITS FOR GRADUATION: 131 CREDITS



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) Summer (online)
2	CM 3230	Thermodynamics for ChE	MA 2160 & PH 2100 & CM 2110	Fall (in-person or online) 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 Engineering	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 rule

SEMESTER PLAN OUTLINES

Four Year Outline for Students Starting in Calculus

Five Year Outline with a Co-op for Students Starting in Calculus

Five Year Outline for Students Starting in Precalculus

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.
- 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
MA 3710	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/ENT3979	Alternative Energy Tech	1
CM/MSE4740	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
ENG 4525	Systems Analysis for Sustain & Res	3
ENT 2950	Enterprise Project Work I	1
GE 2300	Mineral Science	3
MA 3710	Engineering Statistics	3
ME 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
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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
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THE LONG LIST CONTINUED

Chemistry

CH 2000+	2000-level or higher courses	var
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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
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Electrical Engineering

EE 2000+	2000-level or higher courses	var
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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
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Enterprise

ENT 2000+	2000-level or higher courses	var
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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
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Mathematical Sciences

MA 1600	Intro to Scientific Simulation	3
MA 2000+	2000-level or higher courses	var

Mechanical Engineering

ME 2000+	2000-level or higher courses	var
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Management Information Systems

MIS 2000+	2000-level or higher courses	var
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Materials Science and Engineering

MSE 2000+	2000-level or higher courses	var
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Operation and Supply Chain Management

OSM 2000+	2000-level or higher courses	var
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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
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University Wide

UN 2000+	2000-level or higher courses	var
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TECHNICAL ELECTIVES BY FOCUS AREAS

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
ME 4200	Principles of Energy Conversion	3
ME 4220	Internal Combustion Engines I	3
ME 4240	Combustion and Air Pollution	3
ME 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
ME 2110	Statics	3
ME 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 in 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 by the time you have three semesters remaining on campus. You can join as early as your second semester. Each enterprise group has a unique section number for registration time, and the course numbers correspond 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. 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 be approved by the department. 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.

ESSENTIAL EDUCATION

In fall 2025, the Essential Education program replaced Michigan Tech's general education requirements in support of the University's Tech Forward Initiatives.

Essential Education is Michigan Technological University's **forward-thinking, student-centered core education curriculum** structured around four learning goals and 12 Essential Abilities—the critical skills that tomorrow's workforce needs. The program lets Huskies take ownership of their learning and prepare for success after Michigan Tech, both personally and professionally.

THE CURRICULUM

The Essential Education curriculum includes 13 requirements, divided into three segments: the first-year experience, the pathway, and activities for well-being and success. Additionally, students will complete an ePortfolio to integrate their learning within Essential Education, their major, and their extracurricular activities.

FIRST-YEAR EXPERIENCE (16 CREDITS)

The first-year experience encourages critical thinking through a variety of disciplinary lenses. Students will build on their major with the following academic elements.

- Michigan Tech Seminar (completed with major requirements)
- Math (completed with major requirements)
- Natural and Physical Science (completed with major requirements)
- STEM (completed with major requirements)
- College Writing, Reading, and Research: UN1015
- Foundations in the Human World

THE PATHWAY (18 CREDITS)

Students may choose one of two pathways, The Minor Pathway or the Distribution Pathway, based on their individual needs and goals.

The Minor Pathway

This is the primary pathway for Essential Education, allowing students to earn a secondary credential alongside their undergraduate degree as a part of their current course of study. This option is encouraged for most students.

Essential Education minors are currently in development. Among the first batch of available options will be minors related to the following themes, with more to be developed soon:

Diversity	Public Health	Law and Policy
Leadership	Life Centered Design	Entrepreneurship
Sustainability	Global Cultures	
Markets and Society	Creativity and Expression	

THE PATHWAY CONT.

Distribution Pathway

This flexible pathway allows for a more customizable experience within the Essential Education curriculum. This option may be more suitable for students who have a substantial number of AP and/or transfer credits.

Communication Intensive

Intercultural Competency

Arts and Culture

STEM (completed with major requirements)

SHAPE

Essential Education Experience

ACTIVITIES FOR WELL-BEING AND SUCCESS (3 CREDITS)

These options support students' personal development, health, and well-being. Types of courses include physical well-being, creative expression, mental/emotional well-being, and success.



FIRST YEAR EXPERIENCE COURSES

You must take 16 credits of first year experience courses meeting the following requirements. Note that some requirements are completed with classes taken for your major.

- One credit from the Michigan Tech Seminar list (completed with major requirements)
- Three credits from the Math list (completed with major requirements)
- Three credits from the Natural and Physical Science list (completed with major requirements)
- Three credits from the STEM list (completed with major requirements)
- Three credits from UN1015 College Writing, Reading and Research
- Three credits from the Foundations in the Human World list

Courses on more than one list can only satisfy one requirement.

The official list of approved First Year Experience courses is on the Registrar's Office, Essential Education webpage.

FOUNDATIONS IN THE HUMAN WORLD LIST

Required: 3 credits

ART 1000	Art Appreciation	3
EC 2001	Principles of Economics	3
FIN 2400	Financial Literacy	3
HF 2000	Introduction to Engineering Psych.	3
HF 2300	Intro to Human-Centered Design	3
HON 2300	Intro to Human-Centered Design	3
HU 2130	Introduction to Rhetoric	3
HU 2200	Introduction to World Cultures	3
HU 2241	Level I-A Less Common Lang	var
	(transfer or study abroad credit only)	
HU 2242	Level I-B Less Common Lang	var
	(transfer or study abroad credit only)	
HU 2271	Level I-A French Lang & Culture	3
	(transfer or study abroad credit only)	
HU 2272	Level I-B French Lang & Culture	3
	(transfer or study abroad credit only)	
HU 2273	Transitional Level I French Lang...	3
	(transfer or study abroad credit only)	
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 2400	Convers. on Culture and Diversity	3
HU 2503	Introduction to Literature	3
HU 2505	Humanities, Science, and Tech.	3
HU 2700	Introduction to Philosophy	3
HU 2701	Logical and Critical Thinking	3

FOUNDATIONS IN THE HUMAN WORLD LIST CONT.

HU 2702	Ethical Theory and Moral Problems	3
HU 2820	Communication and Culture	3
HU 2825	Technology and Media	3
MUS 1000	Music Appreciation	3
MUS 1140	Popular Songwriting	3
PSY 2000	Introduction to Psychology	3
SAT 1700	Cyber Ethics	3
SND 1000	Sound in Art and Science	3
SS 1500	Introduction to History	3
SS 2100	Intro to Cultural Anthropology	3
SS 2200	Introduction to Archaeology	3
SS 2210	Community Dev and Planning	3
SS 2300	Environment and Society	3
SS 2400	Introduction to Human Geography	3
SS 2450	Introduction to Sustainable Tourism	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 Gov and 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
THEA 1000	Theatre Appreciation	3
THEA 1140	Found. of Entertainment Design	3
THEA 1400	Acting I	3

DISTRIBUTION PATHWAY COURSES

If you choose the Distribution Pathway, you must take 18 credits meeting the requirements below. Note that some requirements are completed with classes from your major.

- Three credits from the [Communication Intensive](#) list
- Three credits from the [Intercultural Competency](#) list
- Three credits from the [Arts and Culture](#) list
- Three credits from the [STEM](#) list (completed with major requirements)
- Three credits from the [SHAPE](#) list
- Three credits from the [Essential Education Experience](#) list

Courses on more than one list can only satisfy one requirement.

The official list of approved Distribution Pathway courses is on the [Registrar's Office, Essential Education webpage](#).

If you choose the Minor Pathway, follow the audit for your chosen minor.

COMMUNICATION INTENSIVE LIST

Required: 3 credits

AF 3001	Leading People and Eff. Comm.	3
CH 3124	Comm. For the Chemical Sci.	3
HU 2500	Writing About Literature	3
HU 2510	Intro to Creative Writing	3
HU 2810	Research & Writing in Comm.	3
HU 2830	Public Speaking & Multimedia	3
HU 2840	Interpersonal Comm. And Tech.	3
HU 3015	Advanced Composition	3
HU 3105	Writing about Numbers	3
HU 3120	Technical and Professional Comm.	3
HU 3130	Rhetoric of Science and Tech.	3
HU 3140	Rhetoric of Health and Medicine	3
HU 3151	The Rhetoric of Everyday Texts	3
HU 3160	Rhetoric and Culture of Games	3
HU 3282	Level II-B German Lang & Culture	3
HU 3283	German Comp. and Conv.	3
HU 3293	Level II-C Spanish Comp & Conv.	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 3606	Editing	3
HU 3692	Writing for Scientific Audiences	3
HU 3693	Science Writing for Public	3
HU 3694	Grant Writing	3
HU 3698	Writing for Health/Med. Audiences	3
HU 3699	Health/Medical Writing for Public	3
HU 3832	Virtual Encounters	3
HU 3845	Human-Machine Communication	3
HU 4625	Risk Communication	3
MA 4945	History of Mathematics	3
SND 4120	Transducer Theory	3
SS 3240	Reading the Landscape	3
SS 3420	Imaginary Worlds: Geographies of Science Fiction and Fantasy	3

COMMUNICATION INTENSIVE LIST CONT.

SS 3501	Making History	3
SS 3520	U.S. Environmental History	3
SS 3535	History of Privacy	3
SS 3552	Renaissance & Reformation	3
SS 3950	Topics in American History	3
SS 3951	Topics in European History	3
SS 3952	Topics in World History	3
SS 4001	History of Social Thought	3
SS 4040	Civic Communications	3
SS 4540	Global Environmental History	3
SS 4550	History of Technology	3
THEA 1170	Voice and Movement	3
THEA 2310	Drafting for the Entertainment Ind	3
THEA 2470	Voice Acting Fundamentals	3
THEA 3320	Lighting Design	3

INTERCULTURAL COMPETENCY LIST

Required: 3 credits

ART 3180	Color and Creativity: Exploring the Power of Color	3
ART 3420	World Sculpture Traditions	3
BL 3090	Spirituality in Healthcare	3
BL 3970	Current Health Issues	3
EC 3100	International Economics	3
EC 4710	Labor/Human Resource Econ	3
FW 4111	Indigenous Natural Resources Management	3
HU 3135	Power and Bias in Tech Design	3
HU 3261	Communicating Across Cultures	3
HU 3262	Topics in Francophone Cultures	3
HU 3263	Topics in German-Speaking Culture	3
HU 3264	Topics in Spanish-Speaking Culture	3
HU 3284	Level III German Lit. & Culture	3
HU 3294	Hispanic Literatures and Culture	3
HU 3296	Survey of Hispanic Lit. and Cultures	3
HU 3326	Topics in World Cinema	3

INTERCULTURAL COMPETENCY LIST CONT.

HU 3400	Topics in Diversity Studies	3
HU 3401	Gender and Culture	3
HU 3502	Mythology	3
HU 3507	Cultural Traditions in Literature	3
HU 3508	Literature and the Environment	3
HU 3545	Literature across Borders	3
HU 3554	Science Fiction	3
HU 3628	User Research	3
HU 3710	Engineering Ethics	3
HU 3800	Media and Society	3
HU 3830	Creativity, Culture, & Change	3
HU 3850	Automated Culture: Critical Approaches to AI	3
HU 3855	Power, Activism, and Technology	3
HU 3860	Cultural Theory and Popular Culture	3
HU 3871	Media Theory	3
HU 3950	Sound and Culture	3
HU 4271	Modern Lang Seminar I-French	3
HU 4272	Modern Lang Seminar II-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 4725	Existentialism and Phenomenology	3
MGT 3000	Organizational Behavior	3
MGT 4100	International Management	3
MKT 4300	Global Marketing	3
PSY 3340	Psychology of Race	3
PSY 3720	Social Psychology	3
PSY 4340	Culture and Cognition	3
SS 3105	Native American and Indigenous Communities	3
SS 3110	Food Systems and Sustainability	3
SS 3225	Capitalism and the Modern World	3
SS 3260	Latin American Cultural History	3
SS 3542	History of Detroit	3
SS 3612	International Relations	3
SS 3640	Selected Topics in Cyber-Law	3
SS 3660	Constitutional Law	3
SS 3661	Civil Rights & Civil Liberties	3
SS 3750	Social Inequality	3
SS 3805	Environmental Justice	3
SS 3811	Energy Security and Justice	3
SS 3920	Topics in Anthropology/Archaeology	3
SS 3961	Preparing for Cross-Cultural Immersion Experiences	3
SS 4211	Ethnographic Methods	3
SS 4420	Memory and Heritage	3
SS 4450	Sustainable Tourism and Planning	3
SS 4710	Geographies of Migrant and National Communities	3
THEA 3201	Theatre History	3
THEA 3230	Costume History	3
THEA 3330	Costume Design	3

ARTS AND CULTURE LIST

Required: 3 credits

ART 1000	Art Appreciation	3
ART 1100	Drawing I	3
ART 1110	Art + Design Studio	3
ART 2100	Drawing II	3
ART 2110	Art on Site	3
ART 2140	Ceramics I	3
ART 2145	Beginning Wheel Throwing	3
ART 2170	Fiber Arts	3
ART 2195	Art and Flora	3
ART 2350	Scenic Art & Scenic Illustration	3
ART 2950	Creative Campus: Local Arts Immersion	3
ART 3130	Creative Drawing II	3
ART 3140	Creative Ceramics	3
ART 3145	Ceramic Sculpture	3
ART 3410	Contemporary Sculpture Studio	3
ART 3850	Special Topics: Art	var
ART 4410	Advanced Sculpture Studio	3
ART 4440	Advanced Ceramics	3
ART 4450	Adv Creative Drawing & Painting	3
HU 2200	Introduction to World Cultures	3
HU 2400	Convers. on Culture and Diversity	3
HU 2501	American Experience in Literature	3
HU 2503	Intro to Literature	3
HU 2538	British Experience in Literature	3
HU 2548	Young Adult Literature	3
HU 2633	Fundamentals of Digital Imaging	3
HU 2645	Graphic and Information Design	3
HU 2820	Communication and Culture	3
HU 3241	Level II-A Less Comm Lang	var
	(transfer or study abroad credit only)	
HU 3242	Level II-B Less Comm Lang	var
	(transfer or study abroad credit only)	
HU 3281	Level II-A German Lang & Culture	3
HU 3282	Level II-B German Lang & 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 3327	Film Style and Genre	3
HU 3503	Special Topics in Lit and Culture	3
HU 3504	Studies in the Novel	3
HU 3505	Special Topics Literary Forms	3
HU 3506	Major Authors	3
HU 3509	Studies in Drama	3
HU 3513	Shakespeare	3
HU 3557	Literature and Science	3
HU 3630	Publication and Info Management	3
HU 3700	Philosophy of Science	3
HU 3701	Philosophy of Technology	3
HU 3702	Philosophy of Religion	3
HU 3704	Ethics of Artificial Intelligence	3
HU 3705	Media and Communication Ethics	3
HU 3711	Biomedical Ethics	3
HU 3802	Media and Globalization	3
HU 3852	See and Be Seen: Data, Surveillance & Society	3

ARTS AND CULTURE LIST CONT.

HU 3872	Machines in the Mist: Visuality and Culture	3
HU 3882	Media Industries	3
HU 4327	Multimedia Storytelling	3
HU 4370	Documentary Workshop	3
HU 4642	Advanced Topics in Media	3
HU 4701	Political Philosophy	3
MUS 1000	Music Appreciation	3
MUS 1100	Western Music Fundamentals	3
MUS 1140	Popular Songwriting	3
MUS 1580	Group Voice	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 and Tradition	3
MUS 2103	Jazz Theory and Aural Skills	3
MUS 3020	Beatles and Beach Boys	3
MUS 3130	Jazz Improvisation	3
MUS 3210	Electronic Music: History and Practice	3
MUS 3850	Special Topics: Music	var
MUS 4130	Jazz Arranging	3
PSY 2082	Psychology of Friendship	3
PSY 2083	Psychology of Happiness	3
PSY 2600	Death and Dying	3
PSY 3880	Psychology of Social Media	3
SND 1101	Introduction to Music Mixing	3
SND 1102	Intro to Audio Production	3
SND 3850	Special Topics: Sound	var
SS 2100	Intro to Cultural Anthropology	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 2630	Culture and Society	3
SS 3513	History of Making Things: Craft and Industry in America	3
SS 3530	The Automobile in America	3
SS 3540	History of Michigan	3
SS 3580	Technology and Society in History	3
SS 3581	History of Science	3
SS 4200	Environmental Anthropology	3
SS 4220	Archaeological Thought in Society	3
SS 4552	Historical Archaeology	3
SS 4553	Material Culture Studies	3
SS 4600	Indus & Historical Archaeology	3
SS 4990	Directed Study in Anthropology	var
THEA 1000	Theatre Appreciation	3
THEA 3400	Acting II	3
THEA 3850	Special Topics: Theatre	var
THEA 4400	Acting: Shakespeare	3
THEA 4402	Musical Theatre Performance	3

SHAPE ELECTIVE LIST

Required: 3 credits

All	Foundations Courses list courses	
All	Arts and Culture Courses list courses	
All	Comm Intensive Courses list courses	
All	Intercultural Comp Courses list courses	
AF 1340	Field Training	1
AF 2001	Team and Leadership Fund I	1
AF 2002	Team and Leadership Fund II	1
AF 3001	Leading People and Effective Communication I	3
AF 3002	Leading People and Effective Communication II	3
AF 4001	Nat'l Security/Leadership Resp/Commissioning Prep I	3
AF 4002	Nat'l Security/Leadership Resp/Commissioning Prep II	3
AR 2001	Leadership and Ethics w/ Lab	2
AR 2002	Army Doctrine and Decision Making w/ Lab	2
BL 2001	Valuing the Great Lakes	3
BUS 2200	Business Law	3
CS 3000	Ethical and Social Aspects of Computing	3
EC 3002	Microeconomic Theory	3
EC 3003	Macroeconomic Theory	3
EC 3300	Industrial Organization	3
EC 3400	Economic Decision Analysis	3
EC 4050	Game Theory/Strategic Behavior	3
EC 4400	Banking and Financial Institutions	3
EC 4500	Public Sector Economics	3
EC 4620	Energy Economics	3
EC 4630	Mineral Industry Economics	3
EC 4640	Natural Resource Economics	3
EC 4650	Environmental Economics	3
ENG 2060	Facilitating Group Learning	1
ENG 3060	Developing Mentoring Skills	1
ENG 4060	Leadership in Group Environments	1
ENT 2961	Teaming in the Enterprise	2
ENT 2962	Communication Contexts	1
ENT 3958	Ethics in Engineering	1
FIN 4300	Personal Financial Planning	3
FW 2801	Intro to Global Climate Change	3
FW 3313	Sustainable Science	3
GE 2100	Environmental Geology	3
HF 3850	Human Factors	3
HF 4015	Cognitive Task Analysis	3
HON 2150	Know Yourself	1
HON 3150	Pavlis Seminar II	1
HON 3350	Navigate Your World	3
HON 4150	Pavlis Seminar III	1
HON 4350	Tell Your Story	3
HU 2600	Introduction to Writing in Science and Technology	3
HU 2646	Writing with Web Technologies	3
HU 3121	Advanced Technical Writing	3
HU 3295	Level III Adv Spanish for Literacies	3
HU 4628	Usability Evaluation and Testing	3
HU 4635	Principles of User Experience Design	3

SHAPE ELECTIVE LIST CONT.

HU 4890	Topics in Communication	3
IS 2002	International Studies in situ – Social & Behavioral Science	var
KIP 2600	Introduction to Public Health	3
KIP 3700	Lifetime Fitness	3
MGT 2000	Team Dynamics	3
MGT 3100	Leadership Development	3
MGT 3650	Intellectual Property Management	3
MGT 3800	Entrepreneurship	3
MGT 4300	Dev Entrepreneurial Ventures	3
MGT 4600	Management of Tech and Innovation	3
MGT 4650	Commercialization of Adv Tech	3
MKT 3000	Principles of Marketing	3
MKT 3200	Consumer Behavior and Culture	3
MKT 4100	Sales and Sales Management	3
PSY 2010	Wellness and Resilience for College and Beyond	3
PSY 2080	Special Topics in Psychology	var
PSY 2081	Psychology of Video Games	3
PSY 2110	Educational Psychology	3
PSY 2400	Health Psychology	3
PSY 2800	Critical Thinking for Social and Behavioral Sciences	3
PSY 2900	An Intro to Restorative Practices	3
PSY 3010	Theories of Personality	3
PSY 3030	Abnormal Psychology	3
PSY 3200	Motivation and Emotion	3
PSY 3400	Developmental Psychology	3
PSY 3600	Cognitive Psychology	3
PSY 3700	Industrial/Organizational Psych	3
PSY 3800	Environmental Psychology	3
PSY 4080	Topics in Psychology	var
PSY4750	Judgment and Decision Making	3
SS 2001	Intro to Social Science Research	3
SS 2620	Introduction to Public Policy	3
SS 3200	Archaeology of the Modern World	3
SS 3230	Archaeology of Industry	3
SS 3280	Anthropology of Energy	3
SS 3315	Population and Environment	3
SS 3505	Military History of the U.S.	3
SS 3515	History of American Architecture	3
SS 3621	Non-Profit Management	3
SS 3625	Policy Analysis	3
SS 3630	Environmental Policy & Politics	3
SS 3650	Intellectual Property Management	3
SS 3755	Sustain and the Private Sector	3
SS 3801	Science, Technology, & Society	3
SS 3815	Energy and Society	3
SS 3990	Topics in the Social Sciences	var
SS 4009	Survey Methods	3
SS 4120	Sustainable Development	3
SS 4230	Archaeological Analysis and Interpretation	3
SS 4313	Sustainability Science	3
SS 4390	Seminar in Sustainability	3
SS 4400	Environmental Sociology	3
SS 4554	Global Industrial History	3
SS 4995	Topics in the Social Sciences	var

SHAPE ELECTIVE LIST CONT.

THEA 1110	Entertainment Technology I	3
THEA 1120	Lighting Technology I	3
THEA 1130	Costume Technology I	3
THEA 3340	Scenic Design	3

ESSENTIAL EDUCATION EXPERIENCE LIST

Minimum of 3 credits required:

ART 3190	Art, Nature, and Contemplative Photography	3
ART 3900	Study Away: Reg Arts Immersion	var
ART 3950	International Arts Immersion	var
ENG 4070	Peer Mentoring Practicum	3
FW 3111	Wild Foods: northern Forests	
FW 3114	Reading the Forest	3
FW 3760	Human Dimensions in Natural Resources Stewardship	3
FW 3766	Maple Syrup, Mgmt & Culture	3
HON 3999	Experiential Community Engage	3
HON 4070	Leadership Practicum	var
HON 4400	Makerspace Operations	3
HU 3000	Humanities Experience: Community-engaged learning	3
HU 3289	HU Experience: German Abroad	3
HU 3298	Experience Spanish Language & Culture thru Teaching	3
HU 3299	Exploring a Hispanic City by Analyzing its Film Production	3
HU 3370	The Documentary Experience	3
HU 3442	Humanities Exp in Public Writing	3
HU 3621	HU Experience in Journalism	3
HU 3703	HU Experience in Environmental Philosophy	3
HU 3810	HU Experience in Technology & Critical Making	3
HU 3825	HU Experience in Env Comm	3
HU 4041	HU Experience in Comm for Sustain	3
IS 3002	International Studies in situ – Social & Behavioral Science	var
MUS 3700	Visual and Performing Arts Tour	var
PSY 3510	Peer Support Communities	3
PSY 3511	Teaching Digital Newcomers	3
PSY 3512	Sparkling Curiosity – SYP	3
SS 3210	Field Archaeology	var
SS 3235	A Wasted Path: World of Goods	3
SS 3541	The Copper Country	3
SS 3626	STEM Policy Lab at MTU	3
SS 3665	Crime, Incarceration, & Policy	3
SS 3760	Human Dimensions in Natural Resources Stewardship	3
SS 3915	Experiencing Museums	3
SS 3918	Community-Engaged Experiences	3
SS 3960	Cultural Immersion	var
SS 3962	Experiencing Cross-Cultural Immer	3
SS 4050	Advanced GIS Methods	3
SS 4530	Deindustrialization and the Urban Environment	3
SS 4551	Industrial Communities	3
SS 4700	Communities and Research	3

ESSENTIAL EDUCATION EXPERIENCE LIST CONT.

SS 4915	Effective Social Action	3
THEA 4190	Directing for Theatre	3
UN 3013	Interdisciplinary Experience	var
UN 3950	Enterprise Experience I	1
UN 3960	Enterprise Experience II	2

APPROVED TRANSFER COURSES COMMUNICATION INTENSIVE LIST

HU 1XX5	Approved Transfer Comm Int...
HU 2XX5	Approved Transfer Comm Int...
HU 3XX5	Approved Transfer Comm Int...
HU 4XX5	Approved Transfer Comm Int...
CMIN 1XXX	Approved Transfer Comm Int...
CMIN 2XXX	Approved Transfer Comm Int...
CMIN 3XXX	Approved Transfer Comm Int...
CMIN 4XXX	Approved Transfer Comm Int...

APPROVED TRANSFER COURSES INTERCULTURAL COMPETENCY LIST

INCU 3XXX	Approved Transfer Inter Comp...
INCU 4XXX	Approved Transfer Inter Comp...

APPROVED TRANSFER COURSES ARTS AND CULTURE LIST

ARCU 1XXX	Approved Transfer Arts and Culture
ARCU 2XXX	Approved Transfer Arts and Culture
ARCU 3XXX	Approved Transfer Arts and Culture
ARCU 4XXX	Approved Transfer Arts and Culture
ART 1XXX	Approved Transfer Arts and Culture
ART 2XXX	Approved Transfer Arts and Culture
ART 3XXX	Approved Transfer Arts and Culture
ART 4XXX	Approved Transfer Arts and Culture
MUS 1XXX	Approved Transfer Arts and Culture
MUS 2XXX	Approved Transfer Arts and Culture
MUS 3XXX	Approved Transfer Arts and Culture
MUS 4XXX	Approved Transfer Arts and Culture

APPROVED TRANSFER COURSES SHAPE LIST

ART 1XXX	Approved Shape Elective
ART 2XXX	Approved Shape Elective
ART 3XXX	Approved Shape Elective
ART 4XXX	Approved Shape Elective
EC 1XXX	Approved Shape Elective
EC 2XXX	Approved Shape Elective
EC 3XXX	Approved Shape Elective
EC 4XXX	Approved Shape Elective
HF 1XXX	Approved Shape Elective
HF 2XXX	Approved Shape Elective
HF 3XXX	Approved Shape Elective
HF 4XXX	Approved Shape Elective
HU 1XXX	Approved Shape Elective

APPROVED TRANSFER COURSES

SHAPE LIST CONT.

HU 2XXX	Approved Shape Elective
HU 3XXX	Approved Shape Elective
HU 4XXX	Approved Shape Elective
MUS 1XXX	Approved Shape Elective
MUS 2XXX	Approved Shape Elective
MUS 3XXX	Approved Shape Elective
MUS 4XXX	Approved Shape Elective
PSY 1XXX	Approved Shape Elective
PSY 2XXX	Approved Shape Elective
PSY 3XXX	Approved Shape Elective
PSY 4XXX	Approved Shape Elective
SND 1XXX	Approved Shape Elective
SND 2XXX	Approved Shape Elective
SND 3XXX	Approved Shape Elective
SND 4XXX	Approved Shape Elective
SS 1XXX	Approved Shape Elective
SS 2XXX	Approved Shape Elective
SS 3XXX	Approved Shape Elective
SS 4XXX	Approved Shape Elective
THEA 1XXX	Approved Shape Elective
THEA 2XXX	Approved Shape Elective
THEA 3XXX	Approved Shape Elective
THEA 4XXX	Approved Shape Elective

ACTIVITIES FOR WELL-BEING AND SUCCESS

You must take 3 credits of activities for well-being and success.

Activities for well-being and success credits:

- Count toward full-time status and satisfactory progress for financial aid purposes
- Are not included in the overall GPA calculation
- Can be repeated multiple times

ACTIVITIES FOR WELL-BEING AND SUCCESS LIST

Required: 3 credits

AF 1120	Physical Conditioning	1
AR 1001	Introduction to the Army w/ Lab	1
AR 1003	Foundations of Leadership w/ Lab	1
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
ART 1850	Special Arts Activities for Well...	1
ART 1855	Special Arts Workshop for Well...	0.5
ENT 3953	Ignite: Ideate, Innovate, Create!	1
ENT 3959	Fundamentals of Six Sigma	1
ENT 3961	Building and Leading Teams	1
ENT 3963	Deliver: Explore, Develop, Execute!	1
ENT 3964	Project Management	1
ENT 3971	7 Habits of Highly Effective People	1
ENT 3982	Cont. Improvement Using Lean...	1
ENT 3983	The Culture of Continuous Improv	1
FW 3620	Field Ornithology	1
HON 1150	Launch Your Journey	1
KIP 1900	Student Athlete 101	1
MUS 1510	Huskies Pep Band	1
MUS 1511	Campus Concert Band	1
MUS 1530	Workshop Brass Band	1
MUS 1570	Private Music Instruction	1
MUS 2530	R & D Jazz Band	1
MUS 2580	Concert Choir	1
MUS 3500	Keweenaw Symphony Orchestra	1
MUS 3510	Superior Wind Symphony	1
MUS 3530	Jazz Lab Band	1
MUS 3580	Chamber Choir	1
MUS 4510	Chamber Music Ensemble	1
MUS 4530	Jazz Combo	var
PE 1000	Fitness Foundations	1
PE 1010	Active Michigan Tech	1
PE 1028	Ski Patrol (Hill)	1
PE 1101	Team Sports	1
PE 1102	Hockey	1
PE 1103	Bait and Fly Casting	1
PE 1105	Bowling	1
PE 1106	Golf	1
PE 1108	Broomball	1

ACTIVITIES FOR WELL-BEING AND SUCCESS LIST CONT.

PE 1109	Aikido	1
PE 1113	Disc Sports	1
PE 1115	Beginning Swimming	1
PE 1116	Intermediate Swimming	1
PE 1117	Fitness Swimming	1
PE 1118	Weight/Fitness Training	1
PE 1119	Conditioning	1
PE 1120	Beginning Alpine Skiing (Downhill)	1
PE 1121	Beginning Snowboarding	1
PE 1123	Telemark Skiing	1
PE 1124	Intermed Alpine Skiing (Downhill)	1
PE 1125	Intermediate Snowboarding	1
PE 1126	Advanced Skiing	1
PE 1127	Advanced Snowboarding	1
PE 1128	Alpine Skiing Fusion	1
PE 1129	Snowboard Fusion	1
PE 1135	Cross Country Skiing	1
PE 1138	Racquet Sports	1
PE 1140	Tennis	1
PE 1142	Introduction to Brazilian Jiu Jitsu	1
PE 1145	Rifle Marksmanship	1
PE 1146	Billiards	1
PE 1148	Skating	1
PE 1150	Lifetime Activities	1
PE 1153	Social Dance	1
PE 1153	Zumba	1
PE 1154	Aerobics	1
PE 1155	Road Biking	1
PE 1156	Mountain Biking	1
PE 1165	Rowing	1
PE 1167	Beginning Yoga	1
PE 1169	Indoor Cycling	1
PE 1170	TaeKwonDo	1
PE 1175	Hiking	1
PE 1177	Fundamentals of Laser Tag	1
PE 1205	Special Topics	0.5
PE 1209	Intermediate Aikido	1
PE 1210	Special Topics	1
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

ACTIVITIES FOR WELL-BEING AND SUCCESS LIST CONT.

PE 1240	Snowshoeing	1
PE 1242	Brazilian Jiu Jitsu II	1
PE 1245	Wilderness First Responder	1
PE 1250	Paintball	1
PE 1267	Intermediate Yoga	1
PE 1270	Cardio TaeKwonDo	1
PE 1277	Strategies of Laser Tag	1
PE 1330	Club Sports	1
PE 1342	Intro to Kickboxing	1
PE 1367	Mindful Yoga	1
PE 1425	Intramurals	1
PE 1430	Club Sports Leadership	1
PE 1435	Self-Defense for Women	1
PE 1436	Self-Defense for Men	1
PE 1442	Kickboxing II	1
PE 1450	Physical Education Fusion-Full	1
PE 1451	Mountain/Road Bike Fusion	1
PE 1470	Lifeguard Swimming	1
PE 1480	Water Safety Instructor	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 2210	Special Topics in Phys Education	1
PE 2130	Varsity Volleyball	1
PE 2140	Varsity Cross Country	1
PE 2150	Cross Training	1
PE 2160	Varsity Esports	1

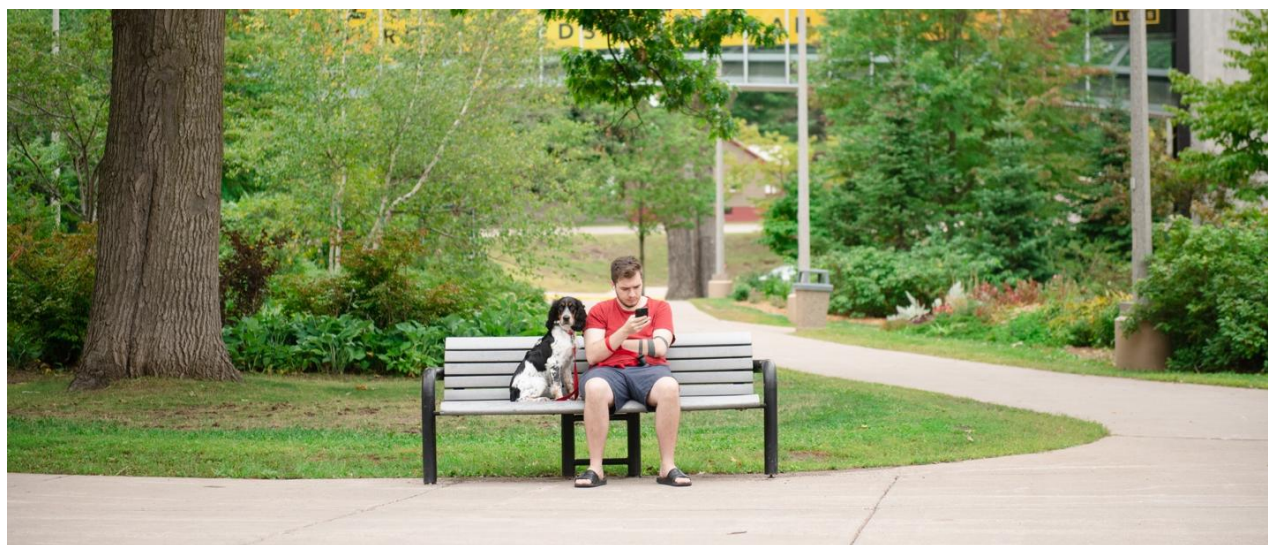
ACTIVITIES FOR WELL-BEING AND SUCCESS LIST CONT.

PSY 1100	Building Emotional Resilience	1
PSY 1101	Enhanced Performance through Biofeedback/MSPE	1
PSY 1102	Practical Approaches for Emot...	1
PSY 1103	Mindfulness Based Stress Red...	1
PSY 1104	Motivation through Self-Comp...	1
PSY 1105	Foundations of Well-being	1
SA 1000	Exploring Majors	1
SND 1570	Private Mixing Lessons	0.5
SND 2663	Career Development	1
SND 2664	Career Development: AES Nat.	1
SND 2665	Career Development: AES Stu...	1
THEA 2600	Career Development: AES Nat.	1
THEA 2610	Entertainment Tech Practicum	var
THEA 2663	Career Development	1
THEA 3650	Portfolio Development	1
UN 1000	Frameworks for Success for ExSEL	1
UN 1010	Creating Your Success...	1
UN 1011	Strategies for Success	1
UN 1020	Husky Connect Success	1
UN 3023	Advanced Portfolio for Ess Ed	1
All	0-level courses taken for the General Education Co-curricular requirement	

APPROVED TRANSFER COURSES

ACTIVITIES FOR WELL-BEING AND SUCCESS LIST

PE 1XXX	Approved Activities elective	1
PE 2XXX	Approved Activities elective	1
ACTV 1XXX	Approved Activities elective	1
ACTV 2XXX	Approved Activities elective	1



ACADEMIC PLANNING WORKSHEET

Fall		Spring		Summer	
Course	Credits	Course	Credits	Course	Credits
Total Credits:		Total Credits:		Total Credits:	



Michigan Technological University

Chemical Engineering

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

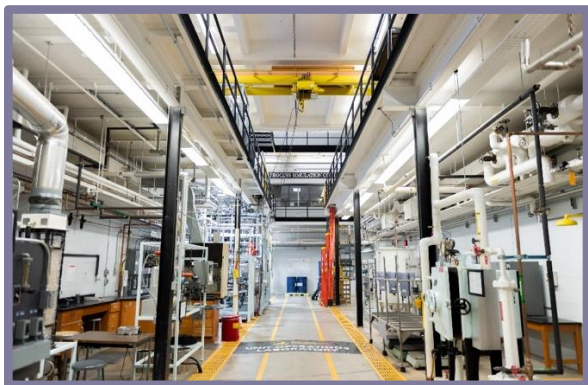
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