

B.S. in Chemical Engineering

2015-2016 Academic Year

Four-year Academic Plan for students starting in Calculus**Michigan Tech**Michigan Technological University
Department of Chemical Engineering

This suggested schedule includes a second semester of organic chemistry. Two semesters of organic chemistry are recommended to all chemical engineering students and is especially encouraged to those planning to minor *Polymer Science and Engineering*, *Bioprocess Engineering*, or *Mineral Processing*.

Freshman Year**Fall Semester**

Course	Title	Cr
CH 1150	University Chemistry I	3
CH 1151	University Chemistry Lab I	1
CH 1153	University Chemistry Rec I	1
CM 1000	Introduction to Chemical Engg	1
ENG 1101	Engg Analysis and Prob Solv	3
MA 1160	Calculus with Technology I	4
PH 1100	Physics by Inquiry I	1
UN 1015	Compositions	3
Co-Curricular (1 cr)*		
Total		18

Spring Semester

Course	Title	Cr
CH 1160	University Chemistry II	3
CH 1161	University Chemistry Lab II	1
ENG 1102	Engg Modeling and Design	3
MA 2160	Calculus with Technology II	4
PH 2100	University Physics I	3
UN 1025	Global Issues**	3
Co-Curricular (1 cr)*		
Total		18

Sophomore Year**Fall Semester**

Course	Title	Cr
CH 2410	Organic Chemistry I	3
CH 2411	Organic Chemistry Lab I	1
CM 2110	Fundamentals of ChE I	3
MA 3160	Multivariable Calc with Techn	4
PH 1200	Physics by Inquiry II	1
	Critical & Creat Think Course*	3
Co-Curricular (1 cr)*		
Total		16

Spring Semester

Course	Title	Cr
CH 2420	Organic Chemistry II*	3
CM 2120	Fundamentals of ChE II	3
MA 2321	Elementary Linear Algebra	2
MA 3521	Elem Differential Equations	2
PH 2200	University Physics II	3
	Social Resp & Eth Reas Course*	3
Total		16

Can often be transferred in from another institution, except for CM2110, CM2120, which are offered in the summer, along with CM3410.

Junior Year**Fall Semester**

Course	Title	Cr
CH 3510	Physical Chemistry I	3
CH 3511	Physical Chemistry Lab I	2
CM 3110	Transport/Unit Operations I	3
CM 3215	Transport Laboratory	2
CM 3410	Tech Comm for ChE	3
	HASS Course*	3
Total		16

Spring Semester

Course	Title	Cr
CM 3120	Transport/Unit Operations II	3
CM 3230	Thermodynamics for ChE	4
CM 3310	Process Control	3
CM 3510	Chemical Reaction Engg	3
	HASS Course*	3
Total		16

Senior Year**Fall Semester**

Course	Title	Cr
CM 4110	Unit Operations Lab	3
CM 4310	Chemical Process Safety/Env	3
CM 4855	ChE Proc Analysis & Design I	3
	Technical Elective*	3
	Technical Elective*	3
	HASS Course* (3000+ lev)	3
Total		18

Spring Semester

Course	Title	Cr
CM 4120	Chemical Plant Operations Lab	3
CM 4860	ChE Proc Analysis & Design II	2
CM 4861	ChE Design Laboratory II	1
	Core Engineering Elective*	4
	HASS Course* (3000+ lev)	3
	Free Elective*	3
Total		16

* See back for description.

** A 3000-level or higher modern language course may be used in place of UN 1025 Global Issues.

This is not an official list of degree requirements. Adjustments may be required due to curriculum changes.

Updated 4/17/2015

6 credits of HASS must be at 3000 level and there are pre-reqs to these classes

Elective Worksheet - 4 year plan

Major Requirements - Technical Electives (13 credits total)

3-4 credits of Organic Chemistry II or sub

4-6 credits of Core Engineering Elective

3-6 credits of additional Technical Electives

BL2100 (fa, 3cr) and CM4740 (sp, 4cr)
substitute for CH2420 (sp, su, 3cr)

Elective courses must total to at least 13 credits.
Credits above 13 may be used towards free electives.

The list of approved elective courses is available on the
department's advising webpage:
www.mtu.edu/chemical/undergraduate/advising

General Education Requirements (24 credits total)

Core Courses (12 credits)

Compositions

UN 1015 _____ 3 cr

Global Issues

UN 1025 or 3000+ level language _____ 3 cr

Critical and Creative Thinking List

_____ 3 cr

Social Resp. & Ethical Reasoning List

_____ 3 cr

HASS Courses (12 credits)

Communication/Composition List

_____ 3 cr

Humanities/Fine Arts List

_____ 3 cr

Social and Behavioral Science List

_____ 3 cr

Any List above or HASS Restricted List

_____ 3 cr

Recommended HASS course: EC 3400 Economic Decision Analysis, taken prior or during fall senior year classes. This course is on the Social and Behavioral Science List and is an upper-division course.

Upper Division Check:

At least 6 credits of HASS must be at the upper division 3000-4000 level. UN 1025 (or 3000+ level language course) and UN 1015 are prerequisites for all upper division HASS courses.

_____ 3 cr

_____ 3 cr

Co-Curricular Activities (3 credits total)

Co-curricular courses count for financial aid and full-time student status; however they are not included in GPA calculations or in the 131 credits total required for graduation.

Co-curricular courses can only be used once for this requirement, except PE 0210 Special Topics and PE 0425 Intramurals, which may be used twice.

Free Elective Requirement (3 credits total)

Free electives are any class, 1000-level or higher that are not co-curricular courses. They may be taken pass/fail, unless the course is being used for a minor.

OPTIONAL - Minor (6 credits not double counting)

(3000+ lev) _____

(3000+ lev) _____

Each minor must include at least 6 credits of 3000-level or higher courses that are not counting elsewhere for your degree (required courses, technical electives, HASS courses, etc.), EXCEPT these credits can count toward your free elective requirement.

Easy to
schedule
1st year;
increasingly
hard to
enroll as
class
standing
rises.

Take one per
semester; can
be
transferred in
if needed;
intramurals
can count
(PE0425)

Technical Elective Courses B.S. in Chemical Engineering 2015-16 Academic Year

Technical electives must total to 13 credits. Additional credits may be used towards free electives.

Note that many of the courses listed below are not offered every semester or every year and most have prerequisites. It is best to plan out your technical electives ahead of time.

3-4 credits of Organic Chemistry II or substitute

CH 2420	Organic Chemistry II	3
BL 2100	Principles of Biochemistry	3
CM 4740	Hydrometallurgy/Pyrometallurgy	4

4-6 credits of Core Engineering Electives

CM 2200	Intro Minerals and Materials	3	CM 5200	Advanced CM Thermodynamics	3
CM 3450	Computer-Aided Problem Solving	3	CM 5300	Advanced Transport Phenomena	3
CM 3820	Sampling Stats and Instrumentation	3	CM 5400	Advanced Reactive Systems Analysis	3
CM/ENT 3974	Fuel Cell Fundamentals	1	EE 3010	Circuits and Instrumentation	3
CM 4125	Bioprocess Engineering Laboratory	1	ENG 2120	Statics-Strength of Materials	4
CM 4500	Particle Technology	4	GE 4610	Formation Eval and Petroleum Engg	3
CM 4550	Industrial Chemical Production	3	MEEM 2110	Statics	3
CM 4650	Polymer Rheology	3			
CM 4655	Polymer Rheology Laboratory	1			
CM 4710	Biochemical Processes	3			
CM/MY 4740	Hydrometallurgy/Pyrometallurgy	4			
CM 4770	Analytical Microdevice Technologies	3			
CM 4780	Biomanufacturing and Biosafety	3			
CM 5100	Applied Mathematics for CM	3			

Undergraduate Research Courses (repeatable)

No more than 6 credits from the following:

CM 4000	Chemical Engineering Research	1-3
CM 4020	UG Research in Mineral Proc Engg	1-3
CM 4040	UG Research in Biological Engg	1-3
CM 4060	UG Research in Polymer Engg	1-3

3-6 credits of additional Technical Electives

BE 2110	Statistical Methods for Biomed Eng	3	CH 4120	Pharm Chem: Drug Design	3
BE 2400	Cellular and Molecular Biology	3	CH 4212	Instrumental Analysis	5
BE 4300	Polymeric Biomaterials	3	CH 4222	Bioanalytical Chemistry	5
BL 1040	Principles of Biology	4	CH 4310	Inorganic Chemistry I	3
BL 2010	Anatomy & Physiology I	3	CH 4311	Inorganic Chemistry Lab	2
BL 2011	Anatomy & Physiology I Lab	1	CH 4320	Inorganic Chemistry II	3
BL 2020	Anatomy & Physiology II	3	CH 4412	Spectroscopy of Organic Chem.	3
BL 2021	Anatomy & Physiology II Lab	1	CH 4430	Intermediate Organic Chemistry	3
BL 2100	Principles of Biochemistry	3	CH 4510	Intermediate Physical Chemistry	3
BL 2200	Genetics	3	CH 4710	Biomolecular Chemistry I	3
BL 2210	Genetics Laboratory	1	CH 4720	Biomolecular Chemistry II	3
BL 3210	General Microbiology	4	CM 2200	Intro Minerals and Materials	3
BL 3310	Environmental Microbiology	3	CM 3450	Computer-Aided Problem Solving	3
BL 3640	General Immunology	3	CM 3820	Sampling Stats and Instrumentation	3
BL 4010	Biochemistry I	3	CM/ENT 3974	Fuel Cell Fundamentals	1
BL 4020	Biochemistry II	3	CM 4125	Bioprocess Engineering Laboratory	1
BL 4030	Molecular Biology	3	CM 4500	Particle Technology	4
BL 4220	Applied and Industrial Microbiology	3	CM 4550	Industrial Chemical Production	3
BL 4380	Cardiopulmonary Physiology	3	CM/CH 4610	Introduction to Polymer Science	3
BL 4820	Biochem Lab Techniques I	2	CM/CH 4620	Polymer Chemistry	3
BL 4840	Molecular Biology Techniques	3	CM/CH 4631	Polymer Science Laboratory	2
CH 2212	Quantitative Analysis	5	CM 4650	Polymer Rheology	3
CH 2420	Organic Chemistry II	3	CM 4655	Polymer Rheology Laboratory	1
CH 2421	Organic Chemistry Lab II	2	CM 4710	Biochemical Processes	3
CH 3520	Physical Chemistry II – Mol Structure	3	CM/MY 4740	Hydrometallurgy/Pyrometallurgy	4
CH 3521	Physical Chemistry Lab II	2	CM 4770	Analytical Microdevice Technologies	3
CH 4110	Pharm Chem: Drug Action	3	CM 4780	Biomanufacturing and Biosafety	3

Enterprise Module Courses

ENT 3954 Enterprise Market Principles 1

Additional higher-level engineering, mathematics, science or applied business course may be approved on a case-by-case basis. Email your request to cmadvise@mtu.edu. Courses that are on the general education HASS lists are not approved for technical electives. Courses on the core engineering list are ABET engineering courses.