Technical Electives
2017-18 Academic Year
For catalog years 201608 through 201805
B.S. in Chemical Engineering

Michigan Tech
Chemical Engineering

Technical electives must **total to 14 credits**. Additional credits may be used towards free electives.

Plan ahead. Some electives are offered once every other year and most have prerequisites.

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

5-8 credits of Core Engineering Electives

CM 1000	Intro to Chemical Engineering	1
CM 2200	Intro Minerals and Materials	3
CM 3450	Computer-Aided Problem Solving	3
CM 3825	Sampling, Stats, and Instrumentation	2
CM 3830	Mineral Processing and Extraction Lab	1
CM/ENT 3974	Fuel Cell Fundamentals	1
CM/ENT 3979	Alternative Energy Tech & Processes	1
CM 4125	Bioprocess Engineering Laboratory	1
CM 4505	Particle Technology	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

CM 5200	Advanced CM Thermodynamics	3
CM 5300	Advanced Transport Phenomena	3
CM 5400	Advanced Reactive Systems Analysis	3
EE 3010	Circuits and Instrumentation	3
ENG 2120	Statics-Strength of Materials	4
GE 4610	Formation Eval and Petroleum Engg	3
MEEM 2110	Statics	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
CM 4080	UG Research in Biofuels Engg	1-3

2-6 credits of additional Technical Electives

BE 2110	Statistical Methods for Biomed Eng	3
BE 2400	Cellular and Molecular Biology	3
BE 4300	Polymeric Biomaterials	3
BL 1010	General Biology I	4
or BL 1020	General Biology II	4
or BL 1040	Principles of Biology	4
BL 2010	Anatomy & Physiology I	3
BL 2011	Anatomy & Physiology I Lab	1
BL 2020	Anatomy & Physiology II	3
BL 2021	Anatomy & Physiology II Lab	1
BL 2100	Principles of Biochemistry	3
BL 2200	Genetics	3
BL 2210	Genetics Laboratory	1
BL 3210	General Microbiology	4
BL 3310	Environmental Microbiology	3
BL 3640	General Immunology	3
BL 4010	Biochemistry I	3
BL 4020	Biochemistry II	3
BL 4030	Molecular Biology	3
BL 4220	Applied and Industrial Microbiology	3
BL 4380	Cardiopulmonary Physiology	3
BL 4820	Biochem Lab Techniques I	2
BL 4840	Molecular Biology Techniques	3
CH 2212	Quantitative Analysis	5
CH 2420	Organic Chemistry II	3

CH 2421	Organic Chemistry Lab II	2
CH 3520	Physical Chemistry II – Mol Structure	3
CH 3521	Physical Chemistry Lab II	2
CH 4110	Pharm Chem: Drug Action	3
CH 4120	Pharm Chem: Drug Design	3
CH 4140	Intro to Pharmaceutical Analysis	3
CH 4212	Instrumental Analysis	5
CH 4222	Bioanalytical Chemistry	5
CH 4310	Inorganic Chemistry I	3
CH 4311	Inorganic Chemistry Lab	2
CH 4320	Inorganic Chemistry II	3
CH 4412	Spectroscopy of Organic Chem.	3
CH 4430	Intermediate Organic Chemistry	3
CH 4510	Intermediate Physical Chemistry	3
CH 4710	Biomolecular Chemistry I	3
CH 4720	Biomolecular Chemistry II	3
CM 1000	Intro to Chemical Engineering	1
CM 2200	Intro Minerals and Materials	3
CM 3450	Computer-Aided Problem Solving	3
CM 3825	Sampling, Stats, and Instrumentation	2
CM 3830	Mineral Processing and Extraction Lab	1
CM/ENT 3974	Fuel Cell Fundamentals	1
CM/ENT 3979	Alternative Energy Tech & Processes	1
CM 4125	Bioprocess Engineering Laboratory	1
CM 4505	Particle Technology	3

CM/CH 4610	Introduction to Polymer Science	3
CM/CH 4620	Polymer Chemistry	3
CM/CH 4631	Polymer Science Laboratory	2
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
CM 5200	Advanced CM Thermodynamics	3
CM 5300	Advanced Transport Phenomena	3
CM 5400	Advanced Reactive Systems Analysis	3
CMU 8950U	CM Technical Elective	var
CS 1111	Intro to Programming in C/C++	3
CS 1121	Intro to Programming I	3
CS 1131	Accelerated Intro to Programming	5
EE 2174	Digital Logic and Lab	4
EE 3010	Circuits and Instrumentation	3
EE 3120	Electric Energy Systems	3
EE 3140	Electromagnetics	3
EET 3373	Intro to Programmable Controllers	3
ENG 2120	Statics-Strength of Materials	4
ENG 4510	Sustainable Futures I	3
ENG 5520	Sustainable Futures II	3
ENT 2950	Enterprise Project Work I	1
ENT 2960	Enterprise Project Work II	1
ENT 3950	Enterprise Project Work III	1
ENT 3960	Enterprise Project Work IV	1
ENT 3980	Pre-Capstone Enterprise Project Work	1
ENT 4950	Enterprise Project Work V Capstone	2
ENT 4960	Enterprise Project Work VI Capstone	2
ENT 4961	Enterprise Project Work VII	1
ENVE 3502	Envir Monitoring and Meas Analysis	3
ENVE 3503	Environmental Engineering	3
ENVE 4501	Envir Eng Chemical Processes	4
FW 1035	Wood Anatomy and Properties	4
FW 3098	Wood Processing and Manufacture	2
GE 2020	Intro to Mining Eng and Mining Meth	4
GE 2300	Mineral Science	3
GE 2310	Introduction to Petrology	3
GE 2640	Atmos Observations and Meteorology	3
GE 3400	Drilling and Blasting	3
GE 4360	Material Handling	3
GE 4610	Formation Eval and Petroleum Engr	3
MA 2600	Scientific Computing	3
MA 2710	Introduction to Statistical Analysis	3
MA 2720	Statistical Methods	4
MA 3210	Introduction to Combinatorics	3
MA 3310	Introduction to Abstract Algebra	3
MA 3450	Introduction to Real Analysis	3
MA 3710	Engineering Statistics	3
MA 3740	Statistical Programming & Analysis	3
MA 3924	College Geometry with Technology	3
MA 4330	Linear Algebra	3
MA 4515	Intro to Partial Differential Eqns	3

MA 4525	Applied Vector and Tensor Math	3
MA 4620	Numerical Methods for PDEs	3
MA 4760	Mathematical Statistics I	3
MA 4770	Mathematical Statistics II	3
MA 4908	Theory of Numbers with Technology	3
MEEM 2110	Statics	3
MEEM 2150	Mechanics of Materials	3
MEEM 2700	Dynamics	3
MEEM 4170	Failure of Materials in Mechanics	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
MEEM 4405	Intro to the Finite Element Method	3
MEEM 4635	Design with Plastics	3
MEEM 4650	Quality Engineering	3
MEEM 5170	Finite Elem and Var Meth in Engg	3
MEEM 5240	Comp Fluid Dynamics for Engg	3
MY 2100	Intro to Materials Sci and Eng	3
MY 2110	Intro to Materials Sci and Eng II	3
MY 3100	Materials Processing I	4
MY 3200	Materials Characterization I	4
MY 4130	Principles of Metal Casting	3
MY 4155	Composite Materials	3
MY 4164	Fundamentals of Corrosion	1
MY 4165	Corrosion and Environmental Effects	3
MY 4600	Introduction to Polymer Eng	3
OSM 4650	Six Sigma Fundamentals	3
PH 2230	Electronics for Scientists	4
PH 2300	Univ Physics III – Fluids and Thermo	2
PH 2400	Univ Physics IV – Waves and Mod Phy	3
UN 2600	Fund of Nanoscale Sci and Eng	2
UN 3002	Undergrad Cooperative Ed I	1-2
UN 3003	Undergrad Cooperative Ed II	1-2
UN 3004	Undergrad Cooperative Ed III	1-2
UN 3005	Undergrad Cooperative Ed IV	1-2

Enterprise Module Courses
No more than 3 credits from the following:

ENT 3953	Ignite: Ideate, Innovate, Create!	2
ENT 3954	Enterprise Market Principles	1
ENT 3958	Ethics in Eng Des and Impl	1
ENT 3959	Fundamentals of Six Sigma I	1
ENT 3961	Enterprise Strategic Leadership	1
ENT 3962	Communication Strategies	1
ENT 3963	Deliver: Explore, Develop, Exceute!	1
ENT 3964	Project Management	1
ENT 3966	Design for Manufacturing	1
ENT 3967	Six Sigma II	1
ENT 3971	Seven Habits of Highly Effective Peop	1
ENT 3976	Personal Brand Management	1
ENT 3982	Contin Improv Using Lean Principles	1
ENT 3983	Culture of Continuous Improvement	1
ENT 4951	Business Plans and Budging in the Ent	1
ENT 4954	Global Competition	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.