Michigan Technological University
Department of Chemical Engineering

Technical Electives

2013-2014 Academic Year

To fulfill your departmental requirements, you must take 10 credits of approved technical electives. With these 10 credits, you must take:

- A minimum of three credits from the chemical engineering list (Traditional Chemistry Option).

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- A minimum of two credits from the chemical engineering list (Applied Chemistry Option).

Also, the following restriction applies:

- A maximum of four credits may be used from the Math, Science, and Applied Business (MSAB) list. Students are not required to take courses from the MSAB list.

Note that many of the courses listed below are not offered every semester and most have prerequisites. **A "*" indicates courses that do not require additional prerequisites** other than classes ChE majors must already take. It is best to plan out your technical electives ahead of time.

Chemical Engineering List (2-3 credits minimum)

CM 2200	Intro Minerals and Materials*	3	CM 4655	Polymer Rheology Laboratory	1
CM 3450	Computer-Aided Problem Solving*	3	CM 4710	Biochemical Processes*	3
CM 3820	Sampling Statistics and Instrumentation*	3	CM/MY 4740	Hydrometallurgy/Pyrometallurgy*	4
CM/ENT 3974	Fuel Cell Fundamentals*	1	CM 4770	Analytical Microdevice Technology*	3
CM 4000	Chemical Engineering Research*[1]	va	CM 4780	Biomanufacturing and Biosafety	3
CM 4125	Bioprocess Engineering Laboratory	1	CM 5100	Applied Mathematics for Chem Eng*[2]	3
CM 4500	Particle Technology*	4	CM 5200	Advanced CM Thermodynamics*	3
CM 4550	Industrial Chemical Production*	3	CM 5300	Advanced Transport Phenomena*[2]	3
CM/CH 4610	Introduction to Polymer Science*	3	CM 5400	Advanced Reactive Systems Analysis*[2]	3
CM/CH 4631	Polymer Science Laboratory	2	CMU 8950U	CM Technical Elective	va
CM 4650	Polymer Rheology*	3			

Engineering List

BE 2600	Introduction to Biomed Eng*	3	ENT 4950	Enterprise Project Work V[2]	2
BE 3500	Biomedical Materials	3	ENT 4960	Enterprise Project Work VI[2]	2
BE 4100	Cell and Tissue Mechanics	3	ENT 4961	Enterprise Project Work VII	1
BE 4300	Adv Polymeric Biomaterials	3	ENVE 3503	Environmental Engineering*	3
CS 1121	Intro to Programming I*	3	ENVE 4501	Envir Eng Chemical Processes	4
CS 1131	Accelerated Intro to Programming*[2]	4	GE 4610	Formation Eval and Petroleum Engg*	3
EE 2110	Electric Circuits	3	MEEM 2110	Statics*	3
EE 2150	Introduction to Signal Processing	3	MEEM 2150	Mechanics of Materials	3
EE 2173	Digital Logic	3	MEEM 2700	Dynamics	3
EE 2190	Introduction to Photonics*	3	MEEM 4170	Failure of Material in Mechanics	3
EE 3010	Circuits and Instrumentation*	3	MEEM 4403	Computer-Aided Design Methods*[2]	4
EE 3120	Electric Energy Systems	3	MEEM 4405	Intro to the Finite Element Method	3
EE 3130	Electronics	3	MEEM 4635	Design with Plastics	3
EE 3140	Electromagnetics	3	MEEM 4650	Quality Engineering	3
ENG 2120	Statics-Strength of Materials*	4	MEEM 5170	Finite Elem and Var Meth in Eng*[2]	3
ENT 2950	Enterprise Project Work I*	1	MEEM 5240	Comp Fluid Dynamics for Eng*	3
ENT 2960	Enterprise Project Work II*	1	MY 3100	Materials Processing I	4
ENT 3950	Enterprise Project Work III*	1	MY 3200	Materials Characterization I	4
ENT 3960	Enterprise Project Work IV*	1	MY 3400	Mechanical Prop of Materials	3
ENT 3966	Design for Manufacturing*	1	MY 4130	Principles of Metal Casting	3
ENT 3975	Intro to Vehicle Des and System Mod*	1	MY 4150	Composite Materials	2
ENT 3980	Pre-Capstone Enterprise Project Work[2]	1	UN 3002	Undergrad Cooperative Ed Lab*[3]	2

Math, Science, and Applied Business (MSAB) List (4 credits maximum)

BE 2110	Statistical Methods for Biomed Eng*	3
BE/BL 2400	Biology for Engineers I*	3
BL 1040	Principles of Biology*	4
BL 2100	Principles of Biochemistry	3
BL 4010	Biochemistry I	3
BL 4020	Biochemistry II	3
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 2200	Genetics	3
BL 3210	General Microbiology	4
BL 3640	General Immunology[2]	3
BL 4030	Molecular Biology	3
BL 4220	Applied and Industrial Microbiology	3
BL 4320	Histology	4
BL 4380	Cardiopulmonary Physiology	3
BL 4470	Analysis of Biological Data*	4
BL 4820	Biochem Lab Techniques I	2
BL 4840	Molecular Biology Techniques	3
CH 2212	Quantitative Analysis*[4]	5
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 I - Drug Action	3
CH 4120	Pharm Chem II - Drug Design	3
CH 4212	Instrumental Analysis	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/CH 4620	Polymer Chemistry*	3
ENG/SS 4510	Sustainable Futures I*	3
ENT 3954	Enterprise Market Principles*	1
ENT 3958	Ethics in Eng Des and Impl*	1
ENT 3959	Fundamentals of Six Sigma I*	1
ENT 3963	Technology Commercialization	1
ENT 3964	Project Management*	1
ENT 3967	Six Sigma II*	1
ENT 3971	Seven Habits of Highly Effective Peop*	1
ENT 4951	Business Plans and Budging in the Ent*	1
ENVE 3502	Envir Monitoring and Meas Analysis*	3
FW 1035	Wood Anatomy and Properties*	4
FW 3098	Wood Processing and Manufacturing	2
GE 2020	Intro to Mining Eng and Mining Meth*	4
GE 2300	Earth Materials I: Mineralogy	3
GE 2310	Earth Materials II: Rocks and Min Res	3
GE 2350	Structural Geology I*	2
GE 2640	Atmos Observations and Meteorology*	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 3924	College Geometry with Tech*	3
MA 4330	Linear Algebra*	3
MA 4515	Intro to Partial Differential Eqns*	3
MA 4525	App Vector and Tensor Math*	3
MA 4630	Numerical Methods	3
MA 4760	Mathematical Statistics I	3
MA 4908	Theory of Numbers with Tech	3
MY 2100	Intro to Materials Sci and Eng*	3
MY 4600	Introduction to Polymer Eng	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

Additional higher-level engineering, mathematics, science or applied business course may be approved by the CM advisor or CM department chair on a case-by-case basis. Courses that are on the general education list are not approved for technical electives. Courses used as a chemical engineering or engineering elective must be an ABET engineering course.

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[1] A maximum of 6 credits may be counted as chemical engineering, engineering, or technical electives.
[2] Registration is restricted. Will need special permission to take. See Banweb for more information.
[3] A maximum of 4 credits of co-op may be counted as technical elective credit.
[4] Difficult to fit into the standard CM schedule at this time.