

**Bachelor of Science in Engineering  
Degree Program**

**Student Guide**

**prepared by**

**Department of Engineering Fundamentals  
College of Engineering  
Michigan Technological University  
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# **Bachelors of Science in Engineering**

## **Michigan Technological University**

### **A. EDUCATIONAL PHILOSOPHY OF THE BSE PROGRAM**

The Bachelor of Science in Engineering (BSE) degree program is an engineering degree path that has the flexibility to offer programs in niche or emerging areas, or to tailor a program to fit your specific career goals when they do not fit within one of Michigan Tech's disciplinary engineering programs. Your courses are uniquely combined to provide you with the specialized engineering education you desire or need to meet your goals. The curriculum includes an Engineering Fundamentals Core, a Technical Emphasis, and a set of Directed Electives, along with the required courses in math and basic sciences, Michigan Tech's General Education program, and free electives. Courses for the Technical Emphasis are taken from one or more of the departments within the College of Engineering, and occasionally from other academic units. These courses, when blended with courses for the Directed Electives, allow student choices and options for a minimum of 35 credits. And, choices for the General Education electives and free electives offer even more flexibility. The BSE undergraduate degree program is accredited by the Engineering Accreditation Commission of ABET, 415 North Charles Street, Baltimore, MD 21202, telephone: (410) 347-7700.

### **B. EDUCATIONAL OBJECTIVES OF THE BSE PROGRAM**

The educational objectives of the BSE program are broader than those of the other engineering programs offered at Michigan Tech. The post-degree opportunities in employment and education are varied due to the flexible nature of the BSE curriculum. While some paths are defined (Geospatial Engineering, Systems Engineering, and Mining Engineering), the program offers you the ability to tailor your courses (under the guidance of an academic advisor and with required approval of the BSE Governance Committee) to meet specific career or preparatory goals. The educational objectives for the program are listed below in Table 1.

Table 1. The Educational Objectives of the Bachelor of Science in Engineering Degree program.

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Bachelor of Science in Engineering graduates are prepared to accomplish the following objectives:

1. Join, or break ground in establishing, a workforce in an emerging or blended discipline of engineering; and
  2. Secure employment in a profession or field for which an undergraduate engineering education is an asset; or
  3. Gain admission to and successfully complete a graduate program in an engineering discipline or in another field for which an engineering undergraduate degree is recognized as appropriate preparation for graduate work.
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### C. EDUCATIONAL OUTCOMES OF THE BSE PROGRAM

In order to ensure that you, as a graduate of this program, will be able to attain the objectives in Table 1, the BSE curriculum has program outcomes that all students will, before they graduate, attain. These outcomes are provided in Table 2.

Table 2. Program Outcomes for BSE students. Taken from 2017-2018 ABET Criterion 3 a-k (<http://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2017-2018/#outcomes> accessed on May 5, 2017).

a	An ability to apply knowledge of mathematics, science, and engineering
b	An ability to design and conduct experiments, as well as to analyze and interpret data
c	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d	An ability to function on multidisciplinary teams
e	An ability to identify, formulate, and solve engineering problems
f	An understanding of professional and ethical responsibility
g	An ability to communicate effectively
h	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i	A recognition of the need for, and an ability to engage in life-long learning
j	A knowledge of contemporary issues
k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

## D. CURRICULAR STRUCTURE OF THE BSE PROGRAM

The basic curriculum of the BSE degree program is provided in Table 3. It consists of five structured components: General Education, Mathematics and Basic Sciences, an Engineering Fundamentals Core, a Technical Emphasis, and an approved set of Directed Electives. In Table 3, the total number of credits (127) reflects a minimum requirement of credits for the BSE degree. The five structured curricular components and their credit distributions are discussed in the subsections that follow.

Table 3. The basic curricular structure of the BSE degree program.

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General Education credits (requirements: University 24, BSE 3)	27
Mathematics and Basic Sciences credits	32 - 33
Engineering Fundamentals Core credits*	26 - 27
Technical Emphasis credits*	22 - 23
Directed Electives credits	12 - 13
Free Electives credits	3 - 6
Total = 127 credits (minimum)	

\* A minimum of 48 engineering credits is required from the combined Engineering Fundamentals Core and Technical Emphasis.

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The flexibility of the BSE program is provided through choices (41 credits minimum) in Technical Emphasis credits, Directed Electives credits, and Free Electives. It is balanced by required courses in the Engineering Fundamentals Core, mathematics, and basic sciences (a combined 61 credits minimum) to ensure that the fundamental essence of an engineering education is provided, and to ensure that you will be able to successfully navigate the upper-level courses that are part of your Technical Emphasis and Directed Electives. Additionally, the General Education requirement contains two core courses (6 credits), one humanities or fine arts core elective (3 credits), one social or behavioral sciences core elective (3 credits), and selections from a list of approved humanities, arts, and social sciences (HASS) courses (12 credits). The core electives and HASS classes can be chosen to edify the focus of your curricular path.

### 1. General Education as defined by the University

The General Education program is required for all baccalaureate degrees at Michigan Tech and has four components. It begins with two common core courses and two elective core courses designed to broaden your appreciation of diverse ways of thinking about problems, cultures, and behaviors,

as well as to provide a forum within which communication skills can be enhanced. These core courses are followed by HASS courses. In addition to the General Education required courses, BSE students must take either EC2001 (Principals of Economics) or EC3400 (Economic Decision Analysis). Though EC2001 and EC3400 are on the General Education Core and HASS lists, they are not counted toward General Education requirements for BSE students; rather, one of the two is required for BSE students as part of the Engineering Fundamentals Core. The third General Education component is a STEM (science, technology, engineering, and math) component. All aspects of this component are met within the required math and science courses for the BSE degree. The fourth component of General Education is a co-curricular activity requirement that is usually satisfied by physical education activities, but it also includes some ROTC activities and some musical performance groups as options. These activities are often taken in half-unit increments to meet the three-unit requirement. The units earned do not count in the overall degree-credit requirements nor in GPA calculations since they are not “credits.” Taking all this into account, the courses added to the BSE degree by the General Education program are listed below.

<i>General Education Common Core Courses:</i>	
UN1015 Composition	3
UN1025 Global Issues	3
<i>General Education Core Elective Courses:</i>	
Humanities or Fine Arts Elective	3
Social or Behavioral Sciences Elective	3
<i>Humanities, Arts, and Social Sciences (HASS) Courses*:</i>	
HASS Communication and Composition Course	3
HASS Humanities and Fine Arts (HU/FA)	3
HASS Social and Behavioral Sciences (EC/PSY/SS)	3
HASS Course from any list	3
<i>Co-Curricular Activities:</i>	
3 units (not counted in credit totals)	
<b>Subtotal</b>	<b>24 credits</b>

\* One or more General Education requirement courses may be specified within a minor area. BSE students must take either EC2001 or EC3400 as an Engineering Fundamentals Core degree requirement which cannot be double counted toward General Education. If a student chooses to take both, the additional class may be counted toward General Education Core or HASS. Restrictions apply.

## 2. Basic Mathematics and Science Requirements

The BSE program requires a minimum of 25% of the total degree requirements to be categorized as mathematics and basic sciences, which ensures fulfillment of the associated ABET accreditation stipulation. The BSE program requires a mathematics core of 17 credits and a science core of 8 credits. The remaining 7 mathematics and basic science credits are selected by you (i.e., electives) to satisfy prerequisite requirements for your Technical Emphasis and Directed Electives, *with some*

*restrictions.* The elective math credits must come from math (MA) courses that list a BSE Mathematics Core course as a prerequisite or from courses receiving BSE Governance approval. The elective science credits must come from the following disciplines with the indicated restrictions on course level: Chemistry (CH) with a course number above 1150; Biology (BL) with a course number of 1010, 1020, 1040, or above 2000; or Physics (PH) with a course number of 1200 or above 1250. The use of other courses to satisfy science elective credits requires BSE Governance approval. Please note that courses found on the HASS lists will not count as math or science electives.

*Mathematics Core:*

MA1160	Calculus with Technology I	4
MA2160	Calculus with Technology II	4
MA2320	Elementary Linear Algebra	2
MA3160	Multivariable Calculus	4
MA3710	Engineering Statistics	3

*Science Core:*

CH1150	University Chemistry 1	3
CH1151	University Chemistry 1 Laboratory	1
PH1100	Physics by Inquiry I (Laboratory)	1
PH2100	University Physics I - Mechanics	3

*Mathematics and/or Science Electives:\** 7

**Subtotal**                      **32 credits**

\* Mathematics and Science electives are to be chosen to satisfy prerequisite requirements for the Technical Emphasis and/or the choice of minor or approved Directed Electives. Restrictions apply.

**3. Engineering Fundamentals Core**

A core of courses (29 to 30 credits, see below) that impart a fundamental knowledge base for engineering is required for the BSE degree. These fundamental topics include problem solving, ethics, computer use and analysis, teaming, statics, strength of materials, engineering materials, basic circuits and instrumentation, thermodynamics, fluid mechanics, and economic decision making. In addition, students must complete one of the possible design implementation options and a minimum of one semester of a senior design project. The design implementation courses expose students to the many facets of executing typical engineering projects. Note that EC2001 Principles of Economics or EC3400 Economic Decision Analysis (3 credits) is included in the Engineering Fundamentals Core and may not be double counted as a General Education Core or HASS elective.

*Engineering Fundamentals Core:*

ENG1101	Engineering Analysis & Prob. Solving	3
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	ENG1102	Engineering Modeling & Design	3
	ENG2120	Statics & Strength of Materials	4
	MY2100*	Intro to Materials Science & Engineering	3
or	CEE3101	Civil Engineering Materials	3
or	CS1121	Intro to Programming I	3
or	GE2320	Mining Methods and Systems	3
	EE3010	Circuits and Instrumentation	3
	ENG3200	Thermodynamics & Fluid Mechanics	4
	XXYYYY	Design Implementation (see options below)	3-4
	ENG4905**	Multidisciplinary Senior Design Project I	3
	EC2001***	Principals of Economics	3
or	EC3400***	Economic Decision Analysis	3
<b>Subtotal</b>			<b>29-30 credits</b>
<b>Engineering Content</b>			<b>25-27 credits</b>

\* MY2100 is a three-credit course that has 2 credits of engineering content (as noted above) and 1 credit of science content, which can be applied to the math and science electives.

\*\* Department-specific senior design projects may be used to satisfy this requirement but must be taken in their entirety (i.e., both semesters must be taken if the selected department project comprises two semesters of effort). Enterprise engineering efforts (ENT4950/4960) may also be used to fulfill this requirement. If a department-specific or enterprise senior design is taken, ENG3830 Engineering Professionalism (1 credit) must also be taken.

\*\*\* EC2001 or EC3400 does not count as engineering content but is a core engineering requirement.

Choice in the design implementation course is available to BSE students, and your selection of a Technical Emphasis and senior design project will determine which design implementation option is most appropriate in providing the necessary background. Completion of one of the following options will satisfy the design implementation requirement.

*Design Implementation Options:*

	MEEM3600	Introduction to Manufacturing	3
or	CEE3332	Fundamentals of Construction Engineering	3
or	GE2020	Intro to Mining Engineering and Mining Methods	4
or	_____	BSE Governance approved course(s)	3 or more

**4. Technical Emphasis:**

The Technical Emphasis area consists of **22 or more credits** that are usually taken within one or more of the engineering departments. The purpose of a Technical Emphasis is to define a sequence of related courses that establish a coherent engineering program of study. The specific courses within the Technical Emphasis should also serve as adequate preparation for graduate coursework in engineering, thereby enabling you to meet one of the BSE program's educational objectives. The Technical Emphasis courses must include at least one engineering laboratory experience. In

addition, between the Technical Emphasis and the Engineering Fundamental Core courses, each approved BSE path must include at least 48 credits of engineering content.

### **5. Directed Electives:**

Within the BSE program, **12 to 13 credits** are reserved for Directed Electives. This provides additional flexibility for you to pursue your interests. The courses must create a direction of study that compliments the Technical Emphasis area. This can be accomplished by taking courses toward a university recognized Minor, or by taking an individualized set of courses. Again, to individualize your set of directed electives, you will work with the BSE academic advisor to generate the set of directed electives that best incorporates your interests and compliments your Technical Emphasis. Then, as a whole, your degree plan will be submitted to the BSE Governance Committee (see Section E.1) for approval. Though not required, there is an advantage to completing a minor because the added credentials are designated on your degree transcript and on your diploma. Individualized Directed Electives will not be so designated. Lists of available Minors are provided in Appendix B, but the most current information is found on-line at <http://www.mtu.edu/registrar/students/major-degree/minors/>.

## **E. BSE PATHWAYS**

The basic curricular template for the BSE degree program is provided in Appendix C. Currently there are four pathways in the BSE program: an individualized path and three pre-approved paths leading to defined specializations. The pre-approved paths are 1) Geospatial Engineering, 2) Systems Engineering, and 3) Mining Engineering. Complete lists of the Technical Emphasis and Directed Electives combinations for these pre-approved pathways are provided in Appendix A. Note that the Technical Emphasis and Directed Electives of each pre-approved path are approved as a combined set but not as individual curricular components (i.e., the Technical Emphasis or the Directed Electives set taken alone is not *pre-approved*).

### **1. Individualized Pathways**

There are many possible individualized paths through the BSE degree program. The philosophy behind the degree is to have a base of courses that are fundamental to engineering (math, basic sciences, and core topics such as statics, strength of materials, thermodynamics, fluid mechanics, and economics) and couple it with a sequence of additional courses in a Technical Emphasis and with a set of Directed Electives. These additional courses will provide a unique specialization



either for employment or for graduate studies—unique in the sense that the specialization could not be attained in a discipline degree program at Michigan Tech. Thus the BSE program can provide you with a great deal of flexibility (and assistance) in creating your own educational program. Approval by the BSE Governance Committee ensures that you have a coherent program of study that meets all engineering accreditation requirements.

## **2. Geospatial Engineering**

At the request of the Surveying Program, a pathway was defined to study geospatial concepts that include measurements, modeling, data collection and acquisition techniques, maps and mapping technologies, data and metadata formats, and visualization. The approved plan reflects state-of-the-art geospatial research and technologies, and it includes courses from Surveying Engineering (in the School of Technology), Computer Science, Physics, and Business. See Appendix A for the list of pre-approved courses.

## **3. Systems Engineering**

Systems engineers apply low-fidelity modeling to understand, design, and manage complex systems over their life cycles. As management leaders, systems engineers utilize systems thinking and interdisciplinary skills from across all areas of engineering and management. At Michigan Tech, you will complete courses in the systems engineering core, as well as in a diverse range of engineering, science, and business topics. Threaded through the entire program is an emphasis on a systems dynamics approach to understanding complex, multi-disciplinary systems, and systems of systems. The goal of the Systems Engineering Program is to develop graduates who can cross disciplinary boundaries, learn new topics quickly, and manage complex, engineered networks that are embedded in social and natural systems. If you have an interest in both engineering and business, Systems Engineering may be for you. See Appendix A for the list of pre-approved courses.

## **4. Mining Engineering**

Mining engineers design, plan, and supervise surface and underground mines to unearth minerals economically and safely for further processing and human utilization. Mining engineers design layouts for surface and underground mines, prepare short and long range mine plans, schedule equipment, design blast patterns for rock fragmentation and excavation, design ventilation plans for underground mines, monitor safety of personnel and equipment, and optimize processes. Mining projects utilize the world's largest trucks and excavation equipment, and mining engineers design mine layouts to use the equipment effectively. Courses for the Mining Engineering pathway

are offered through Geological Engineering, Civil Engineering, Surveying, Chemical Engineering, and Mechanical Engineering. See Appendix A for the list of pre-approved courses.

## **F. BSE GOVERNANCE COMMITTEE**

The BSE Governance Committee oversees the BSE program and approves individualized paths, ensuring that students earn a high quality engineering degree that meets all accreditation requirements.

### *Members of the BSE Governance Committee*

The membership of the Governance Committee will include the following people:

1. Chair of the Department of Engineering Fundamentals (who will also serve as chair of the committee)
2. Associate Dean for Academic Affairs, College of Engineering
3. Senior Academic Advisor in the Department of Engineering Fundamentals

## **G. STUDENT ADVISING FOR THE BSE PROGRAM**

Student advising is a key element to the success of any degree program. Although the BSE program is simple in its overall structure, there are complexities that are best conveyed through discussion with your advisor to avoid complications as you progress through the program. Academic and career advising takes place at several fronts to ensure that you are well informed about your course options and various career opportunities.

### **1. Academic Advising**

Your academic advisor is in the Department of Engineering Fundamentals (EF). The EF academic advising staff provides information about the overall BSE program, how it is structured, and all of your available opportunities and options. You will have, at a minimum, one general and one individual meeting each academic year. The scope of these meetings encompasses discussion of the program, notification of pending or implemented program changes, and clarification of degree requirements. If you are a first-year student with more than one unsatisfactory (UN) mid-term grade, or any level student on probation, you will meet individually with your academic advisor to discuss your academic plan and what you can do to improve your grades. The EF advisor also ensures that all paperwork pertaining to graduation, the declaration of minors, any petitions to alter degree requirements, and any petitions for exceptions is processed in accordance with established University policies and guidelines.

The academic advisor will assist you with the planning and implementation of your BSE curriculum pathway. All paths require approval from the BSE Governance Committee, but there are three pre-approved pathways: 1) Geospatial Engineering, 2) Systems Engineering, and 3) Mining Engineering. Any variations from these pre-approved paths and all individualized pathways will be submitted to the BSE Governance Committee for review and approval. The senior-most EF academic advisor is seated on the BSE Governance Committee. If you wish to propose your own plan of study, you will meet with your advisor several times to clarify your career goals. You will work with your advisor to establish an appropriate blending of study areas that provides the knowledge base for your career goals, and to populate a graduation plan with courses that will meet both BSE and University requirements.

## **2. Career Advising**

Career advising resides in the college as a whole and, in fact, in all academic units of the university, as it depends on your career goals and the areas of study that you are blending to prepare for those goals. Your first advising contact is through the academic advising staff in EF. The advisor will direct you to the appropriate faculty within the College/University who can assist in career decisions and questions. If your target job blends two or more areas of study, you will be directed to the career advisors for each of them. The BSE academic advisor will facilitate communication with and among the career advisors, assist you in synthesizing the advice, and guide you in acting on it. For the pre-approved BSE paths (Geospatial Engineering, Systems Engineering, and Mining Engineering), there are faculty identified in each area to provide career advice.

# APPENDIX A

## Pre-Approved BSE Pathways

The BSE pathways that are defined in this appendix by the Technical Emphasis, Directed Electives, and BSE Core modifications listed below are pre-approved when taken with the following BSE curricular components: Engineering Fundamentals Core credits (as per listed modifications), the Mathematics and Basic Sciences credits, General Education credits, and Free Electives. Please note that each full pathway is a pre-approved entity, but the individual curricular components (i.e., any Technical Emphasis or set of Directed Electives) taken alone are NOT pre-approved. Any variation from a given pathway as it is herein defined requires approval from the BSE Governance Committee. Note that pre-approved math and science electives may be listed for these pathways, and that such courses may be pre-requisites to pathway-required courses.

## A. Geospatial Engineering

### Technical Emphasis (22 credits):

SU2000	Introduction to Surveying	2
SU2050	Plane Surveying	3
SU2220	Route and Construction Surveying	3
SU3540	Geo. Info Tech w/Elements of Field Cartography	4
SU3600	Surveying Computations and Adjustments	4
SU4140	Photogrammetry	3
Technical Elective (take one of the following):		<u>3</u>
SU4010	Geospatial Concepts, Technologies, and Data	
SU4045	Geospatial Data Fusion	
SU4480	Geospatial Sci & Tech to Support Land Cadastre	

### Engineering Fundamentals Core Modifications:

1. Engineering Materials: CS1121 (Introduction to Programming I)
2. Design Implementation: CEE3332 (Fundamentals of Construction Engineering)
3. Economics: EC3400 (Economic Decision Analysis)
4. Engineering Professionalism: ENG3830 (Engineering Professional Practice)

### Directed Electives (16 credits):

SU4060	Geodesy	3
Take 13 credits from among the following:		
ACC2000	Accounting Principles I	3
BUS2200	Business Law I	3
CS1122	Introduction to Programming II	3
CS2321	Data Structures	3
FW4540	Remote Sensing of the Environment	3
GE3250	Computational Geosciences	3
PH1600	Introductory Astronomy	2
PH1610	Introductory Astronomy Lab	1
PH1200	Physics by Inquiry II	1
PH2200	University Physics II – Elec. and Magnetism	3
SU3110	Surveying Field Practice	4
SU3180	Boundary Surveying Principles	3
SU4045	Geospatial Data Fusion	3
SU4100	Geodetic Positioning	3
SU4142	Terrestrial LIDAR Scanning	3
SU4990	Professional Practice Seminar	3
UN3002	Undergraduate Co-op Education Laboratory	1-2
UN4000	Remote Sensing Seminar	1

### Pre-Approved Math and Science Electives (7 credits):

MA3520/21	Differential Equations	2
Math/Science Electives (that may be needed as prerequisites)		5

## B. Systems Engineering

Technical Emphasis (32 credits):

	BE2700	Biomedical Signals & Systems	3
	CEE3501	Environmental Engineering Fundamentals	3
or	CEE3503	Environmental Engineering	3
	CEE4506	App of Sustainability Principles to Eng Practice	3
	ENG1505	Introduction to Systems Engineering	1
	ENG2505	Low Fidelity Systems Modeling	3
	ENG3505	Modeling Laboratory for Sustainable Systems	1
	ENG4300	Engineering Project Management	3
	ENG4505	Systems Analysis, Modeling, and Design	3
	ENG4510	Sustainable Futures I	3
		Systems Engineering Electives Core	<u>9</u>

Engineering Fundamentals Core Modifications:

1. Engineering Materials: MY2100 (Intro to Materials Science and Engineering)
2. Design Implementation: CEE3332 (Fundamentals of Construction Engineering)
3. Economics: EC2001 (Principals of Economics) or EC3400 (Economic Decision Analysis)
4. Engineering Professionalism: included in ENG4905 (Multidisciplinary Senior Design)
5. Mathematics/Statistics: MA3710 (Engineering Statistics) or CEE3710 (Uncertainty Analysis in Engineering)

Directed Electives (12 credits):

Select one of the following options:

**Enterprise:**

Project work:	ENT3950/60 & ENT4950/60	6
Teaming:	ENT2961	2
Communication:	ENG2962	1
Lean Six Sigma:	ENT3984	
	or (ENT3959 & ENT3967 & ENT3982)	3

**Minor:** Select 12 credits in a coherent plan of study as partial fulfillment of a university minor, with BSE program approval.

Pre-Approved Math and Science Electives (6 credits):

	BE2400	Cellular and Molecular Biology	3
or	BL1010&BL1020	General Biology I & II	8
	FW3410	Conservation Biology	3
or	FW4260	Population Ecology	3

## C. Mining Engineering

Technical Emphasis (25 credits):

CEE3810	Soil Mechanics for Engineers	4
CM2200	Introduction to Minerals & Materials	3
GE3400	Drilling & Blasting	3
GE3860	Engineering Geology and Geoinformatics	3
GE4360	Materials Handling	3
MEEM2700	Dynamics	3
	Mining Technical Electives	<u>6</u>

Engineering Fundamentals Core Modifications:

1. Engineering Materials: GE2320 (Mining Methods and Systems)
2. Design Implementation: GE2020 (Intro to Mining Eng and Mining Methods)
3. Economics: EC3400 (Economic Decision Analysis)
4. Engineering Professionalism: ENG3830 (Engineering Professional Practice)

Directed Electives (13 credits):

Take all of the following:

GE1100	Geological Engineering & Science Orientation	1
GE3430	Geomechanics Laboratory	1
GE3870	Resource & Reserve Estimation	3
GE3880	Mine Planning and Design	3
GE4290	Mine Ventilation, Health, and Safety Eng	3
SU2000	Introduction to Surveying	<u>2</u>

Pre-Approved Math and Science Electives (8 credits):

GE2000	Understanding the Earth	3
GE2300	Introduction to Mineralogy	3
MA3520/21	Differential Equations	2

## **APPENDIX B**

**Michigan Tech Listing of Approved Minors**

**available at**

**<http://www.mtu.edu/registrar/students/major-degree/minors/>**

**Accessed May 5, 2017**

Please access the given URL for the current list of University approved minors.



### **School of Business and Economics (PDF)**

- [Economics \(BECM\)](#)
- [Global Business \(BGBM\)](#)

### **College of Engineering (PDF)**

- [Aerospace Engineering \(EMAE\)](#)
- [Applied Geophysics \(EAGM\)](#)
- [Earth Sciences \(EGLM\)](#)
- [Electrical Engineering \(EDEM\)](#)
- [Electronic Materials \(MSEM\)](#)
- [Geological Engineering \(EGEM\)](#)
- [Manufacturing \(EMMF\)](#)
- [Mineral Processing \(CMMP\)](#)
- [Mining \(EMGM\)](#)
- [Municipal Engineering \(ECEM\)](#)
- [Polymer Science and Engineering \(ECMM\)](#)
- [Rail Transportation \(ECRM\)](#)
- [Structural Materials \(MSSM\)](#)

### **Interdisciplinary Minors (PDF)**

- [Alternative Energy Technology \(IMAE\)](#)
- [Bioprocess Engineering \(IMBE\)](#)
- [Ecology \(IMEC\)](#)
- [Enterprise \(ENTM\)](#)
- [Global Community Development Partnerships \(IMGC\)](#)
- [Leadership \(IMLE\)](#)
- [Nanoscale Science and Engineering \(Nanotechnology\) \(IMNT\)](#)
- [Plant Biotechnology \(IMPB\)](#)
- [Plant Sciences \(IMPS\)](#)

### **College of Sciences and Arts (PDF)**

- [Aerospace Studies \(AFAS\)](#)
- [American Studies \(SSAS\)](#)
- [Art \(FAAR\)](#)
- [Astrophysics \(SPHA\)](#)
- [Biochemistry \(BLBC\)](#)
- [Biological Sciences \(SBLM\)](#)
- [Chemistry \(SCHM\)](#)
- [Coaching Fundamentals \(PECF\)](#)
- [Communication Studies \(HUCS\)](#)
- [Computer Science \(SCSM\)](#)
- [Diversity Studies \(HUDS\)](#)
- [Environmental Studies \(SSES\)](#)
- [Ethics and Philosophy \(HUEP\)](#)
- [Fish Biology \(BLFB\)](#)
- [French \(HUF\)](#)
- [French International \(HUIF\)](#)
- [German \(HUG\)](#)

- [German International \(HUIG\)](#)
- [Historical Studies \(SSHS\)](#)
- [International Studies \(SSIS\)](#)
- [Journalism \(HUJN\)](#)
- [Law and Society \(SSLS\)](#)
- [Mathematical Sciences \(SMAM\)](#)
- [Media Production \(HUME\)](#)
- [Microbiology \(BLMB\)](#)
- [Military Arts and Science \(AMAS\)](#)
- [Music \(FAMU\)](#)
- [Music Composition \(FAMC\)](#)
- [Music Performance \(FAMP\)](#)
- [Pharmaceutical Chemistry \(CHPM\)](#)
- [Physics \(SPHM\)](#)
- [Psychology \(PSYM\)](#)
- [Social and Behavioral Studies \(SSBH\)](#)
- [Spanish \(HUS\)](#)
- [Spanish International \(HUIS\)](#)
- [Statistics \(SSTM\)](#)
- [Teaching English to Speakers of Other Languages \(HUTE\)](#)
- [Technical Theatre \(FATT\)](#)
- [Theatre Arts \(FATA\)](#)
- [Writing \(HUW\)](#)

**School of Technology Minor Audits (PDF)**

- [Data Acquisition and Industrial Control \(TDAC\)](#)
- [Surveying \(TSUM\)](#)

## **APPENDIX C**

### **Basic Curriculum of the BSE Degree Program**

Table D1. Basic Curriculum for the Bachelor of Science in Engineering

Year; Semester	Course (Department, Number, Title)	Category (Credit Hours)			
		Math & Basic Sciences	Engineering Topics <i>Check if Contains Significant Design(X)</i>	General Education	Other
Year 1 Fall	MA1160 Calculus with Technology I	4			
	CH1150 University Chemistry 1	3			
	CH1151 University Chemistry 1 Laboratory	1			
	PH1100 Physics by Inquiry I	1			
	ENG1101 Engineering Analysis & Problem Solving		3 (X)		
	UN1015 Composition <sup>1</sup>			3	
Year 1 Spring	MA2160 Calculus with Technology II	4			
	PH2100 University Physics I - Mechanics	3			
	ENG1102 Engineering Modeling & Design		3 (X)		
	UN1025 Global Issues <sup>1</sup>			3	
	Math/Science Elective	1			
Year 2 Fall	MA3160 Multivariable Calculus	4			
	MA2320/1 <sup>3</sup> Elementary Linear Algebra	2			
	Engineering Materials Elective <sup>5</sup>		3		
	GenEd Core: Critical & Creative Thinking <sup>1</sup>			3	
	HASS <sup>2</sup> Course			3	
	Math/Science Elective	2			
Year 2 Spring	MA3710 Engineering Statistics	3			
	ENG2120 Statics and Strength of Materials		4		
	GenEd Core: Social Responsibility & Ethical Reasoning <sup>1</sup>			3	
	Technical Emphasis		3		
	HASS <sup>2</sup> Course			3	
Year 3 Fall	EE3010 Circuits & Instrumentation		3		
	Technical Emphasis		3-4		
	Directed Elective (Minor)				3-4
	HASS <sup>2</sup> Course			3	
	Design Implementation		3-4 (X)		
Year3 Spring	ENG3200 Thermodynamics & Fluid Mechanics		4		
	Technical Emphasis		6		
	EC2001 Principals of Economics or EC3400 Economic Decision Analysis <sup>5</sup>			3	
	Directed Elective (Minor)				3

Year 4 Fall	ENG4905 Senior Design		3(X)		
	HASS <sup>2</sup> Course			3	
	Senior-level (4000) Technical Electives		7		
	Directed Elective (Minor)				3
Year 4 Spring	Math/Science Elective	4			
	Directed Elective (Minor)				3
	Senior-level (4000) Technical Elective		3		
	Free Electives				6
TOTALS – ABET BASIC-LEVEL REQUIREMENTS		32	48-49	27	18-19
OVERALL TOTAL FOR DEGREE	127 credit hours				
PERCENT OF TOTAL		25.2%	37.8-38.6%	21.3%	14.2-15.7%
Totals must satisfy one set	Minimum semester credit hours	32 hrs	48 hrs		
	Minimum percentage	25%	37.5%		

<sup>1</sup>Required core General Education are two UN courses in this table are the two core courses and one course from each of the two core lists.

<sup>2</sup>HASS Courses are selected from an approved list of courses in the Humanities, Arts, and Social Sciences. Additional requirements on selections made from this list are provided o.

<sup>3</sup> MA2321 and MA3521 are accelerated versions of MA2320 and 3520; the accelerated versions may be taken in the same semester with MA2321 in the first half and MA3521 in the second as Linear Algebra is prerequisite of Differential Equations. If MA2320 and MA3520 (regular pace) are taken, MA2320 must precede MA3520.

<sup>4</sup> If MY2100 is selected for the Materials Engineering Elective, it is a 3 credit course with 2 credits of engineering science content and 1 credit of science content.

<sup>5</sup> Either EC2001 or EC3400 is a BSE required course and may not be double counted as General Education Core or HASS. If both EC2001 and EC3400 are taken, one can be count toward General Education Core or HASS.