2019-20 BSE with Systems Engineering

KEY
XX#### = Prerequisite
XX#### (C) = prereq that can be taken concurrently
XX#### (cr) NAME Semester Offered
F = Fall, S = Spring, Su = Summer
E Systems Elective Core
M Draft Systems Minor

Updated May 2019

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

See back of academic plan for more information on requirements for elective courses.

CO-REQS

Year 1

Fall

MA1160 (4) or MA1161 (5) CALCULUS I F, S, Su

PH1100 (1) PHYSICS LAB I F, S, Su

CH1150 (3) UNIVERSITY CHEMISTRY F, S, Su

co-req

CH1151 (1) CHEMISTRY LAB F, S, Su

ENG1101 (3) or ENG1001 (2) & ENG1100 (2) ENG. ANALYSIS & PROB. SOLVING F, S, Su

ENG1002 (C) or test score

UN1015 (3) COMPOSITION F, S, Su

Spring

MA2160 (4) CALCULUS II F, S, Su

(C)

PH2100 (3) PHYSICS LECTURE I F, S, Su

(C)

ENG1001or ENG1101

ENG1505 (1) M INTRO TO SYSTEMS ENG S

MA1160

ENG1102 (3) ENG. MODELING & DESIGN F, S, Su

ENG1002 or test score

* ONE SEMESTER OF 3000 LEVEL OR HIGHER FOREIGN LANGUAGE MAY SUBSTITUTE FOR UN1025.

***UN1025 (3)** GLOBAL ISSUES F, S, Su

UN1015 or UN1025 MAY BE TAKEN IN EITHER ORDER IN THE FIRST YEAR.

15

Co-cur Unit F, S, Su

14

Co-cur Unit F, S, Su

Year 2

Fall

MA3160 (4) CALCULUS III F, S, Su

MA1160/1

EC2001 (3) PRINCIPLES OF ECONOMICS F,S,Su

CH1150 MA1160/1

BE2400 (3) CELLULAR & MOLECULAR BIO F

CH1150 CH1151

MSE2100 (3) INTRO TO MATERIAL SCI/ENG F,S,Su

_____ (3) **CRITICAL & CREATIVE THINKING Elective from List

** 2ND-YEAR CORE MAY BE TAKEN IN EITHER ORDER IN THE SECOND YEAR.

16

Co-cur Unit F, S, Su

Spring

MA1160/1

MA2320 (2) LINEAR ALGEBRA F,S,Su

ACC2000 (3) E ACCOUNTING PRINCIPLES I F,S,Su

ENG1505 (C) MA2160 & (ENG1102 or CS1121 or CS1131)

ENG2505 (3) M LOW FIDELITY SYSTEM MODELING S

ENG1102 MA2160 PH2100

ENG2120 (4) STATICS-STRENGTH MAT'LS S

CH1150 CH1151 MA2160

CEE3503 or CEE3501 (3) M ENVIRON ENG F,S

_____ (3) **SOCIAL RES. & ETHICAL REASONING Elective from List

18

Co-cur Unit F, S, Su

Year 3

Fall

MA2160

CEE3710 or MA3710 (3) M UNCERTAINTY ALANLYSIS or ENG STATISTICS F

CH1150* ENG1102 MA2160* PH2100*
* 'C' or better required

BE2700 (3) BIOMED SIGNALS & SYSTEMS F

ENG1505 ENG2505

ENG3505 (1) M MODELING LAB: SUSTAINABLE SYS F

co-req

Not Fresh or Soph

ENG4510 (3) M SUSTAINABLE FUTURES ! F

M COURSES MARKED WITH AN '**M**' ARE PART OF THE SYSTEMS ENGINEERING MINOR.

ENG1102 MA2160 PH2100 CH1150

ENG3200 (4) THERMO/FLUIDS F,S

CEE3501 or CEE3503

CEE4506 (3) M APP OF SUSTAIN PRINCIPLES S

EE3010 (3) CIRCUITS & INSTRUMENTATION F,S,Su (on-line)

_____ (3) COMMUNICATION/ COMPOSITON *** HASS

_____ (3) HU/FA *** HASS

16

Co-cur Unit F, S, Su

Spring

MA1160/1 MA3710 or CEE3710

OSM3000 (3) E OPERATIONS MANAGEMENT F,S,Su

CEE3332 (3) M FUND OF CONSTRUCTION F, S, Su

16

Co-cur Unit F, S, Su

Summer

3/0

on-line

***** HASS Requirement**
- 6 credits must be upper division 3000-4000 level
- UN1015 & UN1025 are prerequisites for all upper division HASS courses
- HASS course may be taken in any order.

Year 4

Fall

_____ (3) DIRECTED ELECTIVE i.e., OSM3600 F

MKT3000 (3) E PRINCIPLES OF MARKETING F,S,Su

_____ (3) DIRECTED ELECTIVE i.e., OSM3150 F

ENG3505 ENG4510

ENG4505 (3) M SYSTEMS ANALYSIS MODELING & DESIGN F

CEE3710 or MA3710

ENG4300 (3) M PROJECT MANAGEMENT F, S, Su (on-line)

FW4260 (3) or FW3410 (3) POPULATION ECO OR CONCERVATION BIO F,S

_____ (3) EC/PSY/SS *** HASS (EC3400 recommended)

18

Co-cur Unit F, S, Su

Spring

_____ (3) DIRECTED ELECTIVE i.e., OSM4650 S

_____ (3) DIRECTED ELECTIVE i.e., OSM4700 S

SR DESIGN READY SEE #1 ON BACK

ENG4905 (3) SR DESIGN F,S

OR

CEE3710 or MA3710

ENG4300 (3) M PROJECT MANAGEMENT F, S, Su (on-line)

_____ (3) FREE ELECTIVE

_____ (3) ANY LIST *** HASS

15/18

Co-cur Unit F, S, Su

BSE Systems Emphasis 2019-20
(minimum of 131 credits)

Academic questions: E-mail **efadvise@mtu.edu**

1 Senior Design Ready:

a. Senior Design Prerequisite courses:
EE3010, ENG1101, ENG1102, ENG2120, ENG2505, ENG3200, ENG4505.

b. Core Competency Check test - Take and pass the test; test topics include all ENG4905 prerequisite courses except ENG4505.

2 General Education Requirements (24 credits + 3 PE units):

I. Core Courses (12 credits)

___ UN1015 Composition

___ UN1025 Global Issues or 3000+ Modern Language_____

___ Critical/Creative Think List _____

___ Social Resp./Ethical Reason List_____

II. HASS Courses Requirements (12 credits)

(www.admin.mtu.edu/em/documents/HASS Distribution List.pdf)

- *6 credits upper level (3000- 4999)*
- *3 credits from each listed below*

___ *Communication/Composition* _____

___ *Humanities/Fine Arts List (HU/FA)* _____

___ *Social & Behavioral Science List (EC/PSY/SS)* _____

___ *3 credits from any list* _____

* Either **EC2001 or EC3400** is required by the degree, if both are taken only **ONE** may be counted as a Social Resp./ Ethical Reason or HASS course. If one is taken it may **NOT** be counted as a Social Resp./ Ethical Reason or HASS course.

III. Co-curricular activities (3 units)

In the co-curricular requirement, the three semester units will be physical education activities. These units are required for graduation, but are not included in the calculation of the GPA, nor in the overall degree-credit requirement. Note: most physical education activities will last for 7 ½ weeks or ½ semester. A student would need **six** of these ½-semester units to fulfill the 3-semester unit co-curricular requirement.

PE_____ PE_____ PE_____

PE_____ PE_____ PE_____

3 *Systems Engineering Minor Requirements (20 credits):*

Required courses *(14 credits)*

_X_ ENG1505 (1) Introduction to Systems Engineering
_X_ ENG2505 (3) Low Fidelity Systems Modeling
_X_ ENG3505 (1) Modeling Laboratory for Sustainable Systems
_X_ ENG4300 (3) Engineering Project Management
_X_ ENG4505 (3) Systems Analysis, Modeling, and Design
_X_ ENG4510 (3) Sustainable Futures I

Select 6 credits from one of the following groups *(6 credits)*

A. Environmental Engineering and Sustainability
   _X_ (CEE3501 OR CEE3503])AND CEE4506
B. Supply Chain, Logistics, Procurement, and Management
   ___ (OSM3150 OR OSM4700) AND OSM3600
C. Design, LEAN, and Six Sigma
   ___ MEEM4650 OR OSM4650 OR (ENT3959, ENT3967, & ENT3982) AND
   ___ HON3300 OR (3 of: ENT3953, ENT3958, ENT3963, ENT3983)

4 Systems (*Focus*) Directed Electives (12 credits):

Select 12 credits from one of the following groups.

Enterprise *(12 credits)*

___ ENT3950 (1) Enterprise Project Work III
___ ENT3960 (1) Enterprise Project Work IV
___ ENT4950 (2) Enterprise Project Work V Capstone
___ ENT4960 (2) Enterprise Project Work VI Capstone
___ ENT2961 (2) Teaming in the Enterprise
___ ENT2962 (1) Communication Contexts
___ ENT3984 (3) Lean Six Sigma Principles OR
   ___ ENT3959 (1) Fundamentals of Six Sigma I AND
   ___ ENT3967 (1) Design for Six Sigma AND
   ___ ENT3982 (1) Continuous Improvement Using Lean Principles

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

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