

MDE Concentration Guideline - *Humanitarian Engineering*

Semester 1			Semester 2		
CHM 11500	GENERAL CHEMISTRY	4	ENGR 13200	TRANS IDEAS TO INNOV II	2
ENGR 13100	TRANS IDEAS TO INNOV I	2	GEN ED	GEN ED (Found Outcome OC) ²	3
GEN ED	GEN ED (Found Outcome WC) ¹	3	MA 16600	PL ANLY GEO CALC II	4
MA 16500	PL ANLY GEO CALC I	4	PHYS 17200	MODERN MECHANICS	4
			SCI SEL	FYE SCIENCE SELECTIVE	3
	Total	13		Total	16
Semester 3			Semester 4		
MFET 16300	GRAPH COM & SPAT ANLY ³	2	AREA	AREA ELECTIVE ⁷	3
IDE 30100	PROF PREP IN IDE SEMINAR	1	AREA	AREA ELECTIVE ⁷	3
MA 26100	MULTIVARIATE CALCULUS	4	ECE 20001	ELEC ENGR FUND I	3
ME 20000	THERMODYNAMICS ⁴	3	ECE 20007	ELEC ENGR FUND I LAB ⁸	1
ME 27000	BASIC MECHANICS I ⁵	3	MA 26200	LIN ALG AND DIF EQU ⁹	4
PHYS 24100	ELECTRICITY & OPTICS ⁶	3	ME 27400	BASIC MECHANICS II ¹⁰	3
	Total	16		Total	17
Semester 5			Semester 6		
CE 34000	HYDRAULICS ¹¹	3	ENGR 50000	GLOBAL DESIGN TEAM	3
CE 34300	HYDRAULICS LAB ⁸	1	EPCS 30200	JR PART IN EPICS (Found Outcome STS&Design Sel) ^{12,13}	2
ENGR 31000	ENGR IN GLOBAL CONTEXT	3	GEN ED	GEN ED (Found Outcome BSS) ¹⁶	3
EPCS 30100	JR PART IN EPICS (Found Outcome STS&Design Sel) ^{12,13}	1	GEN ED	GEN ED(300+ level or non intro) ¹⁷	3
GEN ED	GEN ED (Found Outcome H) ¹⁴	3	IDE 36000	MDE STATISTICS ¹⁸	3
NUCL 27300	MECHANICS OF MATERIALS ¹⁵	3			
	Total	14		Total	14
Semester 7			Semester 8		
AREA	AREA ELECTIVE ³	3	AREA	AREA ELECTIVE ³	3
ENGR SELECTIVE	ENGINEERING SELECTIVE ¹⁹	3	AREA	AREA ELECTIVE ³	3
GEN ED	GEN ED ¹⁷	3	ENGR SELECTIVE	ENGINEERING SELECTIVE ¹⁹	3
GEN ED	GEN ED ¹⁷	3	GEN ED	GEN ED (300 level or non intro) ¹⁷	3
IDE 48300	MDE ENGR ANALYSIS/DECISION ²⁰	1	IDE 48500	MDE ENGR DESIGN PROJ ²¹	3
IDE 48400	MDE DESIGN METHODOLOGY	1			
IDE 48700	MDE SENIOR DEVELOPMENT	1			
	Total	15		Total	15

¹Written Communication University foundational outcome. Courses can be found at:
<http://www.purdue.edu/provost/students/s-initiatives/curriculum/courses.html>

²Oral Communication University foundational outcome. Courses can be found at:
<http://www.purdue.edu/provost/students/s-initiatives/curriculum/courses.html>

³other options include CM 16400; THTR 25400, 55400.

⁴other options include ABE 20100, ABE 21000, CE 21101, CHE 21100, MSE 26000

⁵other options include CE 29700, AAE 20300

⁶sophomore science selective. Other options include PHYS 27200 or BIOL 11000, 20300, 22100, 23000 23100 or CHM 11600, 25500, 25700, 26100, 32100 or EAPS 10400, 10500, 10900, 11100, 11200, 11300, 11600, 11700, 12000, 13800, 17100 (May not be the same course used as FYE Science Selective.)

⁷Area classes are chosen based on a student's educational objectives. These courses should be focused toward HUMANITARIAN interests. The objective of the AREA coursework (plus the general education courses) is to either refine or broaden your understanding of languages, anthropology, cultures, geo political policy, religions, health and wellness, and/or aspects of military or medical aid. Additional engineering courses can also be used in the AREA. Please see footnote 12 for recommended engineering courses. Strongly consider using AREA classes to complete the minors/certificates such as Global Engineering Studies minor, Global Studies minor, and Medical Humanities Certificate.

⁸hands on (not computer) engineering lab; other options include 1 credit engineering lab class (AAE 20401, AAE 33301, CE 34300, ME 30801 etc.); 1 credit from a 2 credit engineering lab class (BME 30600, NUCL 20500, etc.); 1 credit from a 3 credit engineering class that includes a lab (ABE 30500, CE 23100, IE 38600, MSE 23500, etc.); 1 credit from a 4 credit engineering class that includes a lab (CE 20300, CHE 37700, ECE 27000 etc.). Consult academic advisor for list of engineering lab courses.

⁹other option MA 26500 + MA 26600

¹⁰other option CE 29800

¹¹other options include AAE 33300, ME 30800, CHE 37700, MSE 34000

¹²Science Technology and Society University foundational outcome. Courses can be found at:
<http://www.purdue.edu/provost/students/s-initiatives/curriculum/courses.html> If EPCS is used to satisfy this outcome, 3 credits of EPCS (30000+ level) must be taken, and an additional general education elective is required.

¹³EPCS 30000+ level is highly recommended as the design selective for this concentration. Consult academic advisor for other options.

¹⁴Humanities University foundational outcome. Courses can be found at:
<http://www.purdue.edu/provost/students/s-initiatives/curriculum/courses.html> Although other general education courses can be used, a foreign language (either Spanish or French are recommended) is very desirable for the Humanitarian Engineering concentration. A foreign language course (levels 1-4)

will satisfy the Humanities University foundational outcome. Students are encouraged to obtain at least 12 credits of a foreign language.

¹⁵other “materials course” options include MSE 23000, AAE 20400, ABE 30500, CHE 33000, ME 32300 (CODO from ME only)

¹⁶Behavioral/Social Sciences University foundational outcome. Courses can be found at:
<http://www.purdue.edu/provost/students/s-initiatives/curriculum/courses.html>

¹⁷Although other general education courses can be used, a foreign language it is very desirable for the Humanitarian Engineering concentration. Students are encouraged to obtain at least 12 credits of a foreign language. General education courses can be taken from the College of Liberal Arts, the Krannert School of Management, and/or the Honors College, etc. provided such courses are not focused primarily on engineering, technology, the natural sciences, or mathematics. Consult with academic advisor for acceptable general education courses.

¹⁸other options include IE 23000, IE 33000

¹⁹Choose engineering selective courses from any one subtopic:

Water

ABE 32500 Soil and Water Resource Engineering

ABE 52500 Irrigation Management and Design

CE 44200 Introduction to Hydrology

Agriculture

ABE 30500 Physical Properties of Biological Materials

EEE 35500/CE 35500 Environmental Engineering Sustainability

Sanitation

EEE 35000/CE 35000 Intro to Environmental and Ecological Engineering

CE 45600 Wastewater Treatment Processes

Habitat

CE 22200/CEM 20100 Life Cycle Engineering and Management

Energy

ME 41500 Energy Systems

ME 43000 Power Engineering

ME 51400 Wind Energy

Health

ME 59700 Adv Mech Engr Proj I (example: “Healthcare Product Design”)

IE 49000 Special Topics in IE (examples: “Gnd Challenges and Accesibility”, “Ergonomics and Healthcare”)

IE 59000 Topics in Indust Engr (examples: “Human Factors & Medical Devices”)

**Note: This list is not exhaustive ; alternate engineering courses considered with PRIOR program approval*

²⁰other option IE 34300

²¹other capstone design option instead of IDE 48400 + IDE 48500 is EPCS 41200 + EPCS 41200. Consult with academic advisor.

Additional Requirements:

A course listed on the Concentration Guideline *is not a guarantee that the course will be accessible/made available to a student*. Lack of availability could be due to any number of circumstances beyond the control of either student or program.

A student in the Humanitarian Engineering concentration must identify a University faculty/mentor with experience in the engineering area topic of choice.

At least one study abroad experience, EPICS course or global design engineering course (ENE 500) is required for this concentration.

Engineering credits: A minimum 45 credits at 200+ level, of which at least 18 credits are at 300+ level and 6 credits of the 18 must be at 400+ level. Maximum number of credits in any engineering discipline is 24. It is the student's responsibility to see that all prerequisites are met for selected courses.

30 credits must be Math and Basic Science (MA, BIOL, CHM, PHYS, EAPS, SLHS are some examples)

32 credits at 300+ level (any courses) must be taken at Purdue West Lafayette.

3 credits of "hands-on" (not computer lab) required. 2 credits must be engineering (See footnote 6). The third credit may be engineering on non-engineering. A non-engineering lab credit would be included in an AREA class. Some examples are BIOL, CHM, or PHYS lab classes or THTR and AD classes that include a studio component. Consult academic advisor for details.

Multidisciplinary Engineering Major: *Humanitarian Concentration OVERVIEW*

Humanitarianism, and efforts toward integrating the range of definitions of humanitarianism with engineering abound and have deep historic roots going back to the 1800's. These applied definitions range from the specific enunciation of "responsibility to lead ethical lives of personal fulfillment that aspire to the greater good of humanity" (Humanitarian Engineering p12) to political and practice related orientations that may involve concepts of volunteerism, human equity, theology, medical/disaster relief, global outreach, cultural awareness/sensitivity, and economic development.

As with most IDES and MDE programs, the nature of Humanitarian Engineering cannot be contained in a single engineering or non-engineering domain of study, making it both reasonable and viable for our student population and the School of Engineering Education at large. Further, as a domain space, the qualities, competencies, and quantities needed in the larger workplace/economy, are still still emergent, another characteristic of novel MDE innovation space for concentration areas.

Students should be aware of and remain sensitive to the nascent state of this new engineering concentration; this includes heightened awareness of the following non-exhaustive list of possible career and professional constraints and requirements:

- **Reduced formal career support** from Purdue CCO and other related organizations, and the need for an aggressive and proactive personal effort to gain employment.
- **Limited career options** in international NGO's /non-profits and national governments, with fewer career options to apply this concentration in traditional industrial organizations.
- **Reduced first-role compensation rates**, when compared to "traditional" industrial organizations and roles in engineering.
- **Geographic relocation and travel a likely occupational attribute.**
- **Exposure to foreign cultures, religions, geo-political unrest/danger, and living conditions** that vary with local norms, constraints, health/wellness limitations and conflicts.

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