The University Senate of Michigan Technological University

Proposal 36-20
(Voting Units: Academic)

"Minor in Humanitarian Engineering"

1. March 6, 2020

2. <u>Proposer Contact Information:</u>
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3. <u>Introduction</u>
The Department of Civil and Environmental Engineering proposes a new minor called "Humanitarian Engineering." The minor is designed for students wishing to develop the skills necessary to partner effectively with underserved communities on the co-development of engineering-based solutions to improve human welfare, specifically through improved access to basic human needs (e.g., water, energy, sanitation, health care), an improved quality of life (e.g., mobility), or improved community resilience (e.g. disaster mitigation). Students who complete the minor will gain competencies in intercultural sensitivity, community engagement, and development work; they will also complete a community-based capstone design project that aligns with their chosen engineering field. This program will be offered as an interdisciplinary minor and administered by the Department of Civil and Environmental Engineering. A designated faculty member of the Department of Civil and Environmental Engineering will serve as the advisor for this minor. An advisory committee will support and review the program. The advisory committee will consist of the advisor for the minor, faculty and staff who support the program through teaching required and elective classes, and those who teach community-based capstone design courses. The committee will consist of 5 individuals, each serving 3-year terms.

4. <u>Rationale</u>
The introduction of this minor helps to meet an important academic demand of engineering students with interests in the sustainable development of underserved communities. With the elimination of the Certificate in International Sustainable Development Engineering (ISDE), students who might have completed this certificate can now complete the Humanitarian Engineering Minor, incorporating their iDesign (i.e., CEE 4915/4916), Enterprise, Engineers Without Borders, or other community-based capstone design credits and experience. In addition, this minor closely aligns with the newly developed Peace

Corps Prep Program and Global Community Development Partnerships Minor administered by the Pavlis Honors College. Students completing the Humanitarian Engineering minor will satisfy all coursework requirements for the Peace Corps Prep certificate, provided their coursework and capstone project align with a Peace Corps sector (e.g., health, environment, or economic development).

5. <u>Details:</u>

    I.   Title of Minor: Humanitarian Engineering

    II. Catalog Description:
        This minor focuses on building competencies in intercultural sensitivity, community engagement, and a prominent sector of development work in order to collaborate effectively with communities in the co-development of engineering solutions. Students must complete a community-based capstone design project that aligns with their chosen engineering field. The minor places a strong emphasis on working in cross-cultural and diverse communities, which directly aligns with the University's undergraduate student learning goals for global literacy and social responsibility.

    III. List of Courses: include course numbers, titles, and credits

International and Community Development Engineering (9 credits)

Required Core Course (choose 1 or 2 of the following) (3-6 credits):

CEE 4993 Engineering with Developing Communities (3 cr.)
HON 3300 Innovation through Human Centered Design (3 cr.)

Required Engineering Capstone Design/Enterprise Experience (3 credits):

Complete 3 credits of capstone design experience, under the appropriate capstone course number for the student's degree program, that align with a prominent sector of international and community development work (e.g., health, environment, or economic development). The capstone experience must be approved by the minor advisory committee to ensure it involves collaboration with an underserved community, or at least extensive and documented consideration of the needs, resources, and constraints of such communities. Does not include CEE 4915.

Elective Engineering Courses (choose 0 or 1 of the following) (0-3 credits):

CEE 4915 International Engineering Field Experience (3 cr.)
GE 4150 Natural Hazards (3 cr.)
MEEM 4630 Human Factors (3 cr.)
MSE 4777/EE 4777 Open-Source 3-D Printing (3 cr.)

Intercultural Sensitivity and Community Engagement (9 credits)

Required Core Course (choose 1-3 of the following) (3 credits):

SS 3961 Preparing for Cross-Cultural Immersion Experiences (3 cr.)
SS 4120 Anthropology of International Development (3 cr.)
SS 4700 Communities and Research (3 cr.)

And choose 0-2 additional electives from these below:

GE 2100 Environmental Geology (3 cr.)
HON 3410 Culture, Language and Project Development (3 cr.)
HON 4060 International Leadership Practicum (3 cr.)
HU 2820 Communication & Culture (3 cr.)
HU 3261 Communicating across Cultures (3 cr.)
HU 3262 Topics Francophone Cultures (3 cr.)
HU 3264 Topics Spanish-Speaking Cultures (3 cr.)
HU 3265 Topics East Asian Cultures (3 cr.)
HU 3294 Hispanic Literatures and Cultures (3 cr.)
HU 4625 Risk Communication (3 cr.)
SS 2100 Intro to Cultural Anthropology (3 cr.)
SS 2300 Environment and Society (3 cr.)
SS 2400 Intro to Human Geography (3 cr.)
SS 2700 Introduction to Sociology (3 cr.)
SS 3105 Native American and Indigenous Communities
SS 3110 Food Systems and Sustainability
SS 3260 Latin American Cultural History (3 cr.)
SS 3280 Anthropology of Energy
SS 3313 Sustainability Science (3 cr.)
SS 3410 World Resources and Development (3 cr.)
SS 3750 Social Inequality (3 cr.)
SS 3760 Human Dimensions of Natural Sciences
SS 3805 Environmental Justice (3 cr.)
SS 3960 Cultural Immersion (3 cr.)
SS 4200 Environmental Anthropology (3 cr.)

TOTAL REQUIREMENTS: 18 credits
(9 credits must be at the 3000-level or higher)

IV. Prerequisites not listed in the Minor

CEE 4993 Engineering with Developing Communities has prerequisites of (ENG 2120 or MEEM 2150) and (BE 3350 or CM 2120 or ENG 3200 or MEEM 3201).

HON 4060 International Leadership Practicum has a prerequisite of HON 3410.

GE 4150 has a prerequisite of GE 2000 or GE 2100.

Community-Based Capstone Design Project: Students will work with their major advisor, who may consult with the minor advisory committee, to find appropriate capstone design experiences aligned with their major to be submitted to the minor advisory committee for approval. The prerequisites will depend on the students' backgrounds.

Intercultural Sensitivity and Community Engagement: With the exception of modern language courses, the only prerequisites for courses on the Intercultural Sensitivity and Community Engagement list that are not included in the minor are UN 1015 and UN 1025. A student may use a modern language class at any level for the minor, but the prerequisites for that course must be met to enroll.

V. Student Learning Objectives

Upon completion of this Minor students will be able to:

1. Explain how cultural, economic, environmental, and societal context affect the appropriateness and sustainability of engineering solutions;

2. Design an engineering solution that addresses the needs of an underserved community within realistic constraints such as economic, environmental, social, political, ethical, health and safety, and sustainability.

6. New Course Descriptions:
No new courses are being proposed for this minor. However, CEE 4993 Engineering with Developing Communities needs to be modified to be a 3-credit class and to have prerequisites appropriate for all engineering majors. The course is currently 2 credit hours.

7. Estimated Costs:
Advising support from the minor advisor would assist in recruiting and monitoring student progress of minor and accreditation activities. As such, assistance is requested; however, a new staff position is not requested at this time.

8. Planned Implementation Date:
Fall Semester 2020