

Humanitarian Engineering

Description of Courses

FABE 3200/32011 - Introduction to Humanitarian and Development Innovation

An introductory course designed to expose students to innovation and possible ways to solve humanitarian and development issues both locally and globally. The course utilizes several guest lecturers who have dedicated their careers to solving development problems that talk about their paths into the field and their current work. Students will learn how variations in natural resources, ecology and culture impact human lifestyles around the world and what this means for developing appropriate solutions to local and global issues and explore the answers through videos, readings, Q&As and lectures. Students will engage in self-reflection practices to better equip themselves to integrate knowledge from cross-cultural experiences into problem solving.

FABE 3200 - Engineering for Community Development in Ohio

This service-learning course will explore contemporary issues related to poverty and food insecurity in Central Ohio towards understanding the societal impacts of science, technology, and engineering. Students will work closely with local organizations to identify needs and opportunities related to alleviating poverty and hunger. Students will play a central role in identifying, formulating and solving real-world engineering design problems. Through interaction with the partners and fellow students, they will learn to communicate effectively, adapt to constraints, and work efficiently in teams. Engagement with the partners will occur throughout spring semester and class time will be given to research and develop projects.

ECE 5050 – Technology for Social Justice – formerly HE 5050

Poverty and underdevelopment. Goal of social justice. Development strategies. Engineering for the poor, weak, and developing communities. Humanitarianism in the university and engineering enterprise. No actual humanitarianism (e.g., service to people who are poor), local or international, is required for this course. This course prepares you to be a professional humanitarian engineer for local or international service by studying the principles.

FABE 5200 - Appropriate Technology for Developing Countries

A course designed to provide students with applied knowledge of Appropriate Technology (AT) product development for people in developing countries. Commercializing products helps to ensure long-term sustainability, and this course will focus on such market driven solutions for community development. The course introduces AT product development and business-related topics necessary for commercialization. Topics include methodologies on gathering requirements, brainstorming ideas,

managing interdisciplinary teams, designing with extreme constraints, testing prototypes, conducting pilot programs, managing cross-cultural partnerships, planning production, gaining funding, marketing and communications, and legal structures.

ENGR 5797.21- Sustainable and Resilient Community – Maji Marwa

A preparatory course for students traveling to Tanzania as part of the CEGE Sustainable Resilient Tanzanian Community program. This course will provide civil engineering students with the skills necessary to be successful in communicating and implementing the designs they generate as part of their capstone courses in the communities they were developed for. The course is a bridge course between the disciplines of engineering and international development.

CIVILEN 5610.01 – Sustainable WaSH Infrastructure for Developing Rural Communities

Working effectively with developing rural communities to identify and acquire their basic water, sanitation, and hygiene (WaSH) infrastructure needs demands a combination of community development and engineering expertise. At an introductory level this course will bridge the gap between these two disciplines. It will provide the engineer with the knowledge of how to design sustainable WaSH infrastructure systems in the context of a community's need, and it will provide the community development worker with basic engineering knowledge of WaSH systems to assist their work with communities to meet their infrastructure needs.

CIVILEN 5610.02 – Safe Water on Tap

This course offering within Humanitarian Engineering will focus on focuses on major water quality challenges both nationally and internationally. Human and context driven design principles are applied to drinking water contaminants with global public health impact. We develop design algorithms from principles whenever possible and explore novel solutions. Students work in teams to design water treatment systems using Python and open-source design tools. These water systems will be designed in a manner that is appropriate in context for working effectively with developing rural communities to identify and address their issues related to providing a safe source of drinking water. This course will provide the engineer with the knowledge of how to design sustainable water treatment systems for rural developing communities with emphasis on gravity fed water treatment systems. Students will learn about the AguaClara gravity treatment system.

CIVILEN / FABE 4011/4012 Global Design Capstone

The global engineering capstone design course sequence is designed to give the students "real world" engineering experience in a global development context. Whether students ultimately work for the public sector, industry, a consulting firm or academia, they will need to apply the skills and knowledge you have gained through your coursework and experiential learning opportunities at The Ohio State University to solve problems, propose solutions and create designs. Often the issues are complex with multiple solutions, all of which have varying costs and benefits. In addition, the issues you need to

address are often outside of your current knowledge and comfort zone, requiring you to do some research and/or reach out to others for help. Each team will work together on a project throughout the two semesters and will ultimately present a solution for their topic by means of an oral presentation, written report and engineering drawings. The first semester (Capstone 1) will be focused on evaluating design alternatives based on stakeholder needs, developing designs (building on previous work if appropriate), preparing a detailed technical report, preparing professional drawings, and preparing a detailed project work plan for the second semester (Capstone 2). The second semester (Capstone 2) will be focused on advancing designs for the projects based on input from all stakeholders and preparing final documents.