

# ECE 5050: Humanitarian Engineering

## Course Description

Poverty and underdevelopment. Goal of social justice. Development strategies. Engineering for the poor, weak, and developing communities. Humanitarianism in the university and engineering enterprise.

**Transcript Abbreviation:** Humanitarian Engr

**Grading Plan:** Letter Grade

**Course Deliveries:** Classroom, 100% at a distance

**Course Levels:** Undergrad, Graduate

**Student Ranks:** Junior, Senior, Professional

**Course Offerings:** Spring

**Flex Scheduled Course:** Never

**Course Frequency:** Every Year

**Course Length:** 14 Week

**Credits:** 3.0

**Repeatable:** No

**Time Distribution:** 3.0 hr Lec

**Expected out-of-class hours per week:** 6.0

**Graded Component:** Lecture

**Credit by Examination:** No

**Admission Condition:** No

**Off Campus:** Never

**Campus Locations:** Columbus

**Prerequisites and Co-requisites:** ENGR 1182 or 1282H, or grad standing, or permission of instructor.

**Exclusions:** Not open to students with credit for ENGR 5050.

**Cross-Listings:**

**Course Rationale:** Required for new Humanitarian Engineering minor. Strong student interest from student service organizations (e.g. ECOS, EWB, ESW).

**The course is required for this unit's degrees, majors, and/or minors:** Yes

**The course is a GEC:** No

**The course is an elective (for this or other units) or is a service course for other units:** Yes

**Subject/CIP Code:** 14.9999

**Subsidy Level:** Doctoral Course

## Programs

| Abbreviation | Description            |
|--------------|------------------------|
| CpE          | Computer Engineering   |
| EE           | Electrical Engineering |

## Course Goals

|  |
|--|
| Students will have knowledge of solving problems of poverty and underdevelopment with a goal for social justice.                       |
| Students will be able to identify and characterize engineering strategies and technology for development.                              |
| Students are prepared to apply their skills to community development and humanitarianism in the university and engineering enterprise. |

## Course Topics

| Topic   | Lec | Rec | Lab | Cli | IS | Sem | FE | Wor |
|---|-----|-----|-----|-----|----|-----|----|-----|
| Introduction to challenges                                      | 3.0 |     |     |     |    |     |    |     |
| Social justice is the goal of engineering development           | 3.0 |     |     |     |    |     |    |     |
| Religious and Secular Perspectives on Social Justice            | 3.0 |     |     |     |    |     |    |     |
| Social Justice: Political Philosophy and Economics Perspectives | 3.0 |     |     |     |    |     |    |     |
| Social Justice: Economics and Engineering Ethics Perspectives   | 3.0 |     |     |     |    |     |    |     |
| Development Strategies  | 3.0 |     |     |     |    |     |    |     |
| Development Strategies and Implications for Engineering         | 3.0 |     |     |     |    |     |    |     |
| Engineering for the Poor, Weak, and Developing Communities      | 3.0 |     |     |     |    |     |    |     |
| Extreme Design Constraints and Appropriate Technology           | 3.0 |     |     |     |    |     |    |     |
| Environment and Sustainable Design                              | 3.0 |     |     |     |    |     |    |     |
| Design Implementation and the Single Field Test                 | 3.0 |     |     |     |    |     |    |     |
| Scaling Up  | 3.0 |     |     |     |    |     |    |     |
| Universities and Humanitarian Engineering                       | 3.0 |     |     |     |    |     |    |     |
| Humanitarianism Via the Engineering Enterprise                  | 3.0 |     |     |     |    |     |    |     |

## Representative Assignments

|   |
|---|
| Summarize and critique YouTube video Poor people in India, the YouTube video, Human development report, 2010, TED talk, Hans Rosling, Stats that reshape your worldview, and USAID Launch of Higher Education Solutions Network ( <a href="http://www.usaid.gov/hesn/launch">http://www.usaid.gov/hesn/launch</a> ). Read and summarize: <a href="http://en.wikipedia.org/wiki/Poverty_in_the_United_States">http://en.wikipedia.org/wiki/Poverty_in_the_United_States</a> . Book report assignment. Optional: Listen to BBC audio: Sisters in Science. Assign Midterm Project and Final Project. |
| Read the UN Universal Declaration of Human Rights ( <a href="http://www.un.org/en/documents/udhr/">http://www.un.org/en/documents/udhr/</a> ) and identify parts of it that the U.S. has not always followed (identify the cases). Summarize and critique the TED talk, Jessica Jackley, Poverty, moneyand love; identify the principles of social justice at work in her viewpoints and approaches. Identify and summarize at least two social justice movements, secular or religious (e.g., Liberation Theology)   |
| Summarize and critique the secular humanist perspective. Summarize and critique (Matthews, 2013): Discuss whether to donate your cost to perform a humanitarian engineering project or to do one.   |
| Summarize and critique a chapter in Rawls or Sen books. Critique of political platformswhich is best for social justice (invite you to consider others)?  |
| Present and defend your position on how you feel your field of engineerings code of ethics ought to treat humanitarianism (e.g., volunteerism).   |

## Grades

| Aspect          | Percent |
|-----------------|---------|
| Homework        | 45%     |
| Book Report     | 15%     |
| Midterm Project | 15%     |
| Final Project   | 25%     |

## ABET-EAC Criterion 3 Outcomes

| Course Contribution |   | College Outcome   |
|---------------------|---|---|
| *                   | 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.                                       |
| *                   | d | An ability to function on multi-disciplinary 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 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.        |

### CpE ABET-EAC Criterion 9 Program Criteria Outcomes

| Course Contribution |   | Program Outcome  |
|---------------------|---|--|
|                     | 1 | an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics  |
|                     | 2 | an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors                   |
|                     | 3 | an ability to communicate effectively with a range of audiences  |
|                     | 4 | an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts |
|                     | 5 | an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives   |
|                     | 6 | an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions  |
|                     | 7 | an ability to acquire and apply new knowledge as needed, using appropriate learning strategies   |

### EE ABET-EAC Criterion 9 Program Criteria Outcomes

| Course Contribution |   | Program Outcome  |
|---------------------|---|--|
|                     | 1 | an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics  |
|                     | 2 | an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors                   |
|                     | 3 | an ability to communicate effectively with a range of audiences  |
|                     | 4 | an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts |
|                     | 5 | an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives   |
|                     | 6 | an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions  |
|                     | 7 | an ability to acquire and apply new knowledge as needed, using appropriate learning strategies   |

### **Additional Notes or Comments**

Change number to ECE 5050, slight change in prerequisite statement, and now allow 100% on line just in case of a COVID resurge.

**Prepared by:** Kevin Passino