



**University of Pittsburgh, Swanson School of Engineering
Summer 2018 Term**

Course: Engineering Design for Social Change: Africa

ENGR- 1276: Engineering Design in Africa (3 credits)

Description: This is an experiential learning course designed to provide engineering minded students (may be from any major) with an introduction to designing solutions to complex problems that impact humanity. Students will see the social consequences of engineering decisions made by companies and other organizations in Africa and discuss the rationale that led to those decisions during meetings with leaders, engineers, and other representatives from those parties. The course aims to provide students across a range of disciplines the opportunity to interact and work together to ideate and develop strategies for tackling both broad, complex problems and specific, service, and social focused challenges based on principles that are rooted in empathic engineering design. Students will contextualize what makes specific approaches for problem solving successful locally, regional, nationally, and internationally. The course will develop the students' skills to work remotely with one another to iterate through the ideation and design process of problem-solving and to appreciate the social and cultural challenges that lie within.

Instructors:

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Prerequisites: This course is open to engineering and other students with a basic knowledge and background in math and sciences (up through calculus and introductory physics).



Objectives: By the end of the course the students will:

1. Have a basic understanding of the fundamental principles of empathic design to solve complex problems;
2. Have participated in team-based observation, data collection, analysis, and ideation;
3. Develop an appreciation of the engineering and social complexities associated with the need to ideate solutions to complex problems in cultures that are different than those in which they were raised;
4. Gain experience in assessing the differences between meeting these challenges on local, regional, national, and international scales.

Contact Hours: The course will be composed of 45 contact hours, delivered as follows:

- 12.5 hours will be comprised of classroom instruction and regional field components, which will be conducted during the first week of May (5 sessions of 2.5 hours each for a total of 10 hours) prior to departure and one 2.5 hour session to present final projects.
- 32.5 hours will be comprised of the international field component of the course (conducted during the time in Africa).
- The field component will also include a number of social, historic, and tourist experiences that are not included in the 45 contact hours.
- See details under the Lectures section of this syllabus

References: References, papers, and other course materials to be provided by the instructors

Text: N/A

Lectures:	<u>Dates</u>	<u>Topics</u>
#1	Mon– May 7th	Introductions, Course Overview, Trip and South Africa History & Cultural Review (part 1), Introduction to phases of empathic engineering design.
#2	Tues – May 8th	Introduction to the companies/organizations we will be visiting. South Africa Cultural Review (Part 2).
#3	Wed – May 9th	Mandela: Long Walk to Freedom viewing and analysis



- #4 Thurs– May 10th Travel practical details- packing and safety. Journal and project requirements overview. Techniques in Sociological Observation.

- #5 Friday– May 11st Team based ideation exercises. Analysis of the cultural/societal reasons leading to failure of proposed solutions.

- #6 Friday – May 25th Final Project Presentations

Travel: Dates Location/Site/Topics

 ~May 12th– May 27th TBD



Assignments and Methods Evaluation:

Homework and other special assignments will be project-based. A final course presentation will also be assigned.

In addition to attending and participating actively in all classes, which involves engaging in discussions, responding to questions, and sharing observations and documentation from field trip work, students are required to complete the following:

- a) Expectation essay, which should include the goals the student has for the course and what each hopes to achieve/learn/advance in terms of knowledge from technical, societal, academic, and practical application perspectives. This should be 1 or 2 pages in length.
- b) Journal, documenting each site visit. This can include written information, observational drawings, and photographs relevant to class topics. Each entry should be a minimum of 1 page in length. Journals will be maintained electronically using Microsoft Yammer.
- c) Thank you letter writing. Each students needs to prepare 1-2 letters to thank our hosts and companies for their experience. These letters will be approved by all students and sent to the aforementioned parties by each group before departing Africa.
- d) Course Individual Project of a special investigation/topic. Students will choose a topic of special interest to investigate throughout the course, including materials and experiences covered in both the classroom and field components. The topic should be relevant to one of the companies/organizations that we will visit. Student will discuss their proposed ideas prior to the trip and submit a 1 page proposal for review by the professors prior to arrival in Africa. In addition to the classroom and field components, students should conduct library and internet research pertaining to the topic, collect data from the field trips relevant to the topic, and analyze the ideas involved based on the principles being learned throughout the course. Prior to leaving Africa, students will present their proposal and the findings of their research in a 7-10 minute power point presentation (including text, images, videos, data, references, etc). On return, students will review and update their individual projects and discuss any differences they observed from the proposal and the experience from the trip, and turn in 3-5 page written final course project report for grading.

Grading Policy:

<u>Item</u>	<u>% of Final Grade</u>
Class Participation	10%
Expectation Essay	10%
1 Page Proposal	15%
Program Journal	15%
Course individual project	20%
Thank you letters	10%
Final Term Presentation	20%

	100%

Course is graded on F to A grade field.