



University of Pittsburgh, Swanson School of Engineering
Summer 2021 Term

Course: Socially Impactful Engineering Design in a Virtual Space: South Africa

ENGR- ???? (3 credits)

Description: Engineers are trained to work in teams. For generations, this meant working to develop a solution with like-minded people that regularly share the same physical space. If we learned anything from 2020, it is that the world is filled with tremendous diversity of thought and ideas. In addition, the world's sudden ability to engage with one another online allows individuals to work together when their physical locations could be thousands of miles apart. This is changing our definition of "team". We no longer must share the same physical space to engage, so the likelihood that we will work together on multicultural teams is higher than ever before and will likely be the norm of the future. With that said, the problems that engineers solve will never stop having an impact on humanity. We often do not discuss the social impact of engineering decisions, but nearly everything that we interact with on a daily basis has been designed by an engineer or team of engineers. The mobile phone impacts how we communicate; transportation impacts where we go and what we can access; manufacturing and distribution impact cost, which ultimately impacts who can afford a product. The social impact of these few examples are going to be different for people of different societies, demographic groups within societies, and ultimately individuals based on their unique set of circumstances. Thus, the importance of developing cultural competency has never been higher-- not just for the self-growth of an individual, but also for a company's bottom-line. How do you engineer for people in a country that you have never been to? How do you work within multicultural teams when you have never shared the same physical space? How do you assess the impact of your work when you are not physically present? This course aims to develop cultural competency skills in engineering design by challenging students to analyze the social consequences of engineering decisions made by companies and other organizations in Africa and discuss the rationale that led to those decisions during virtual interactions with leaders, engineers, and other representatives from those parties. Social and cultural virtual experiences will be utilized to help students contextualize engineering decisions and multicultural team-based work will enable students to develop skills to navigate online working relationships. 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 in a virtual environment;
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 42 contact hours, delivered twice a week for 6 weeks (approx. 3.5 hours per session).

- This will include cultural experiences, social activities, and company interviews/discussions provided by EDU Africa
- 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	Tues– May 11th	Introductions, Course Overview, South Africa History & Cultural Review (part 1), Introduction to phases of empathic engineering design. Introduction to the companies/organizations we will be visiting.
#2	Thurs– May 13th	South Africa Cultural Review (Part 2). Techniques in Sociological Observation. Team based ideation exercises and research. Analysis of the cultural/societal reasons leading to failure of proposed solutions.
#3	Tues – May 18th	Mandela: Long Walk to Freedom viewing and analysis. Project requirements overview.
#4	Thurs– May 20 th	Introduction to South African Language and Culture. Cape Town City Design & Gentrification. Graffiti task
#5	Tues– May 25 th	What is intercultural Competence and what is its relevance to the workplace? Meet with Engineering Company 1. Language review.
#6	Thurs– May 27 th	Critical viewing of Johannesburg through street art. Ethical Service learning and community engagement. Language review.
#7	Tues– June 1 st	Panel Discussion: Engineering for Social Change in SA contexts. Cape Maylay Cooking experience. Language review.
#8	Thurs– June 3 rd	Meet with Engineering Company 2. Langa Township Jazz Concert. Language review.
#9	Tues– June 8 th	Meet with Engineering Company 3. Robben Island overview and discussion with political prisoner & artist, Lionel Davis. Language review.
#10	Thurs– June 10 th	Meet with Engineering Company 4. Comparing/Contrasting SA to the United States. Language review.
#11	Tues– June 15 th	SWOT analysis How-to. Group presentations discussion on American history and culture for South African students
#12	Thurs– June 17 th	Final Project Presentations



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, 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) Initial Company research presentations (team-based): 5-10 minutes in length identifying the social impacts of the assigned company and questions that the group plans to ask to collect more information. Students should conduct library and internet research pertaining to the company, collect data from South African contacts, and analyze the ideas involved based on the principles being learned
- c) Cultural Reflections (3 throughout the semester). This can include written information, observational drawings, and photographs that communicate about cultural similarities and differences that have been identified. Each entry should be a minimum of 1 page in length.
- d) Thank you letter writing. Each team needs to prepare a letter to thank our companies for their experience. These letters will be approved by all students and sent to the aforementioned parties.
- e) Team Based United States History and Cultural Presentation. Teams will develop a 10 minute presentation defining the most important aspects of American History and Culture that they wish to communicate to South African students. What is it like to live and work in the United States?
- f) Course Team Project. Students will perform a SWOT analysis on one of the companies/organizations that we meet. Students will provide a 3-5 page written final course project report and a 10-minute power point presentation that identifies the strengths, weaknesses, opportunities, and threats to the company and their product(s) in terms of their social impact. Students should also propose alternative solutions/designs that might improve upon the social impact. Aside from the in-class meetings with companies, this assignment is to be completed outside of class. It is expected that teams will meet for 6-12 hours per week outside of class engaging with this project.

Grading Policy:

<u>Item</u>	<u>% of Final Grade</u>
Class Participation	10%
Expectation Essay	10%
Cultural Reflections	15%
US History/Culture Prestation	15%
Thank you letters	10%
Final Term Presentation	20%
Final Term Written Analysis	20%

100% Course is graded on F to A grade field