ENGG1110
Engineering Solutions to Grand Challenges
of the 21st Century [3-0-0:3]
Summer, AY 2023/24

Course Instructor

Prof. Ben Chan,
Room 6583, email: ybchan@ust.hk

Course Facilitators

Mr. Ian CHONG
Room 6583, email: egian@ust.hk

Mr. Paul Lavigne
Room 6583, Email: egpaul@ust.hk

Class Time and Venue   Monday, Wednesday, and Friday 10:00 a.m. – 12:50 a.m., Room 6581

Course Description

Throughout human history, engineering has driven the advance of civilization. In the past century engineering has recorded its greatest accomplishments, but for all these accomplishments the century ahead poses formidable problems sustaining civilization advancement. This course will broaden and raise students' awareness of challenges faced by coming generations such as climate change, clean water and healthcare. Students will work in small groups in a collaborative learning environment to explore in details and in multiple dimensions the key issues around selected major challenges with experts in the areas. Suggested and proposed engineering solutions based on advances in science and technology will be explored and discussed. Students will be encouraged to develop and present their own innovative engineering approaches to address these major challenges.

Prerequisite(s)

Course is open to all students. No prerequisite.

Course Objectives/Learning Outcomes

Students who take this course will be exposed to examples of the major challenges of the 21st century and the issues involved. By working in teams, they will explore various approaches that are or have been proposed around the world to address or attempt to tackle these problems. By completing the course, students will be able to:

1. Identify the key issues involved in two real-world engineering problems by obtaining information from experts and the literature. (Intended Learning Outcome, ILO, #1)
2. Analyze these problems from multiple dimensions and angles including feasibility, scalability, and sustainability. (ILO #2)
3. Suggest and evaluate solutions to these problems by working collaboratively. (ILO #3)
4. Present and defend their solutions orally and in writing. (ILO #4)

Course Delivery and Syllabus

The course will consist of several components and delivery mechanisms. Lectures and tutorials will be used in a collaborative learning format, with students working in teams.

Two engineering grand challenges will be presented by two experts in the relevant field. Resources will be provided to the teams to assist them in the learning environment and in the technical details.

Tutorials will be conducted in a manner to guide the student teams in exploring the engineering solutions to the challenges presented. Resources will be provided to the teams to assist them in the learning environment and in the technical details.

Each team will submit a project report to one of the challenges.

Assessment

Assessment serves the dual purpose of promoting students' learning and providing evidence of that learning. Students will be assessed in relation to the intended learning outcomes as follows:

Assignment	% weighting	ILOs
Team Breakout Findings	15%	#1, #2, #3, #4
Presentation on the 1st challenge	20%	#1, #2, #3, #4
Presentation on the 2nd challenge	20%	#1, #2, #3, #4
Documentation on the 2nd challenge (Presentation File and Appendix)	20%	#1, #2, #3, #4
Role Play on Global Perspectives	10%	#1, #2, #3, #4
Teamwork / Individual Contributions	5%	#3, #4
Portfolio/Reflection	10%	#1, #2, #3, #4

Summer Term of 2023/24 – Class Schedule

Dates and Topics		
Monday July 15 Course Introduction Mini- Challenge	**Wednesday July 17** Impact & Policy Analysis Examining a Grand Challenge	**Friday July 19** Research Competency Expert Analysis Prioritizing Engagement
July 22 Areas of Need and Improvement Preparation for Presentations	**July 24** 1st Challenge Presentations	**July 26** 2nd Challenge Introduction Role of New Technologies
July 29 Innovation Future Vision Grand Failures	**July 31** Prioritizing Engagement Developing Alternatives	**Aug 2** Critical Analysis SMART Plans Timeline Planning
Aug. 5 Roadmap Planning Preparation for Presentations	**Aug. 7** 2nd Challenge Presentations	**Aug. 9** Grand Challenge Competencies Role Play Course Wrap-Up