

**ENGG1110**  
**Engineering Solutions to Grand Challenges**  
**of the 21<sup>st</sup> Century [3-0-0:3]**  
**Spring, AY 2023/24**

**Course Instructor**

Prof. Ben Chan,  
Room 6583, email: [ybchan@ust.hk](mailto:ybchan@ust.hk)

**Course Facilitators**

Mr. Ian CHONG  
Room 6583, email: [egian@ust.hk](mailto:egian@ust.hk)

Mr. Paul Lavigne  
Room 6583, Email: [egpaul@ust.hk](mailto:egpaul@ust.hk)

**Class Time and Venue** Monday and Wednesday 10:30 a.m. – 11:50 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 21<sup>st</sup> 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

## Spring Semester of 2023/24 – Class Schedule

Date (Mon)	Topic	Date (Wed)	Topic
		Jan 31	Course Introduction
Feb 05	Introduction to Two Grand Challenges	Feb 07	Course Preview – Mini-Challenge
Feb 12	3 <sup>rd</sup> day of Lunar New Year (No Class)	Feb 14	Literature Search on 1 <sup>st</sup> Challenge + Infographics
Feb 19	Expert Presentation on 1 <sup>st</sup> Challenge	Feb 21	Examining a Grand Challenge
Feb 26	Impact & Policy Analysis	Feb 28	Prioritizing Engagement
Mar 04	Team Presentation on 1 <sup>st</sup> Challenge	Mar 06	Team Presentation on 1 <sup>st</sup> Challenge
Mar 11	Feedback on 1 <sup>st</sup> Challenge Presentation Introduction to 2 <sup>nd</sup> Challenge	Mar 13	Expert Presentation on 2 <sup>nd</sup> Challenge
Mar 18	Problem Definition	Mar 20	Grand Failures
Mar 25	Stakeholder Engagement	Mar 27	Structured Controversy
Apr 01	Easter Monday	Apr 03	Midterm Break (No Class)
Apr 08	Preparation of Final Assignments	Apr 10	Draft Report of 2 <sup>nd</sup> Challenge
Apr 15	Preparation of the Presentation on 2 <sup>nd</sup> Challenge	Apr 17	Feedback on Draft Report
Apr 22	Team Presentation on 2 <sup>nd</sup> Challenge	Apr 24	Team Presentation on 2 <sup>nd</sup> Challenge
Apr 29	Feedback on 2 <sup>nd</sup> Challenge Presentation	May 01	Labor Day (No Class)
May 06	Global Perspectives	May 08	Course Wrap-Up