Engineering for Sustainability
Spring 2023
Syllabus

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Note: This syllabus is subject to change.

Course Description

This is a case-study based course designed for junior and senior students in any major to learn about engineering in the context of sustainable development. The course will cover key concepts such as sustainability, innovation, planetary energy flow, global carbon cycle, and human-nature interaction. The course will cover major sustainability-related quantitative assessment tools such as carbon footprint evaluator, life cycle analysis, and sustainable development index. Students will be evaluated on in-class participation, individual work and group work.

Course Objectives

The main objective of this course is to advance students' previous learning by connecting engineering concepts to real world applications. Students should be able to 1)develop comprehensive understanding of engineering in the rapidly changing global environment, 2) form evidence-based thinking about key concepts such as innovation and climate change, and 3)use evaluation tools to quantitatively assess the sustainability of a given engineering project.

Course credit hours: TBD

Course type

Elective

Course prerequisite

None

Weekly frequency

One lecture/week, three 45-minute sessions

Grading

Student final grade is calculated as the following:

Final grade= 20% class participation+ 10% weekly report+20% in-class quiz+20% after class assignment+30% case study project (group report)

Conversion of Numerical Grades to Final Letter Grades Follows the SCUPI Common Grade:
A=90.00 – 100.00 A 85.00 – 89.99 A-
B+ =80.00 – 84.99; B=76.00 – 79.99; B-=73.00 – 75.99
C+ =70.00 – 72.99; C=66.00 – 69.99; C- =63.00 – 65.99
D=60.00 – 62.99; F=0.00 – 59.99

Academic Integrity

We are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. Unacknowledged direct copying from the work of another person/group/source, or the close paraphrasing of such, is called plagiarism and is a serious offense, equated with cheating in examinations. This applies to copying both from other students' work and from published sources such as books, reports or journal articles. Paraphrasing, when the original statement is still identifiable and has also no acknowledgement, is plagiarism. It is not acceptable for you to put together unacknowledged passages from the same or from different sources linking these together with a few words or sentences of your own and changing a few words from the original text.

Everyone at SCUPI is expected to treat others with dignity and respect. The Code of Student Conduct allows Sichuan University to take disciplinary action if students don't follow this community expectation.

Tentative Topics & Schedule

The schedule is tentative and subject to change.

Lecture 1:

Course introduction
Student introduction and information about background in engineering
Brief history of engineering education systems around the globe

Lecture 2:

Sustainability: the concept
Brief history of sustainable development (MDGs, SDGs)
Sustainable development index

Lecture 3:

Innovation: the concept
Innovation in the context of global development and urbanization

Lecture 4:

Global development and urbanization
Consequences of global development and urbanization

Lecture 5:

Group presentation 1: case studies on innovative engineering project

Lecture 6:

Group presentation 2: case studies on innovative engineering project

Lecture 7:

All about Carbon

Lecture 8:
Climate change and global environment
Sustainable solutions: sustainable campuses

Lecture 9:
Climate change and engineering
Sustainable designs

Lecture 10:
Food production and consumption
Carbon footprint

Lecture 11:
Product and material flow
Life cycle analysis

Lecture 12:
Human-environment interaction (ecosystem)
Ecological footprint

Lecture 13:
Human-environment interaction (urban)
Risk analysis

Lecture 14:
The economics of sustainability
Cost-benefit analysis and co-benefit analysis

Lecture 15:
Interdisciplinary engineering
The Era of "Big Data"

Lecture 16:
Group project presentation: sustainable design and evaluation

Lecture 17:
Group project presentation: sustainable design and evaluation