Annexe A: New/Revised Course Content in OBTL+ Format

Course Overview

The sections shown on this interface are based on the templates UG OBTL+ or PG OBTL+
If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to Data Transformation Status for more information.

Expected Implementation in Academic Year	AY2023-2024
Semester/Trimester/Others (specify approx. Start/End date)	Semester 2
Course Author * Faculty proposing/revising the course	Lee-Chua Lee Hong
Course Author Email	clhlee@ntu.edu.sg
Course Title	Environmental Issues and Sustainability
Course Code	EM5109
Academic Units	3
Contact Hours	39
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

The aim of this course is to provide you with an opportunity to understand current environmental issues and practices, to appreciate the importance of developing sustainable environmental practices, and eventually build your own overall picture of environmental engineering and science with a better understanding of the contemporary environmental issues and gain an in-depth insight in making a sustainable world.

Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Identify, describe and explain major environmental issues and challenges.
ILO 2	Identify and discuss current environmental problems and practices of pollution abatement for water, land and air.
ILO 3	Discuss basic concepts in energy source, consumption and efficiency as well as pros and cons of various sustainable energy options.
ILO 4	Describe emerging contaminants, impact, and adaptation/mitigation solutions
ILO 5	List main sources of marine pollution (e.g., plastic debris, ballast water etc.) and describe their impacts on the marine environment.
ILO 6	Describe basic concepts and principles in environmental engineering system design and life cycle analysis.
ILO 7	Interpret correctly sustainability concepts and give examples of sustainability practices.
ILO 8	Provide integrated case studies as examples.

Course Content

No	Topic	Lecture (Hour)
1.	Overview of environmental issues	3
2.	Current environmental problems and practices of pollution abatement, including : • Water quality and supply • Wastewater treatment and reuse • Land contamination and remediation • Resource conservation and recovery • Air quality and control • Energy consumption and efficiency • Emerging contaminants, impact, and adaptation/mitigation solutions • Marine pollution – sources and control	24
3.	Green engineering (e.g. systems thinking) and tool (e.g. LCA)	3
4.	Sustainable concepts, technologies, and practices	6
5.	Group project and presentation	3
	Total	**39**

Reading and References (if applicable)

Beyond uploaded lecture slides, textbooks and reference materials as recommended/provided/uploaded by lecturers

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Overview of environmental issues	1		In-person	Lectures
2	Current environmental problems and practices of pollution abatement, including : · Water quality and supply · Wastewater treatment and reuse · Land contamination and remediation · Resource conservation and recovery · Air quality and control · Energy consumption and efficiency · Emerging contaminants, impact, and adaptation/mitigation solutions · Marine pollution – sources and control	2, 3, 4, 5		In-person	Lectures

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
3	Current environmental problems and practices of pollution abatement, including : · Water quality and supply · Wastewater treatment and reuse · Land contamination and remediation · Resource conservation and recovery · Air quality and control · Energy consumption and efficiency · Emerging contaminants, impact, and adaptation/mitigation solutions · Marine pollution – sources and control	2, 3, 4, 5		In-person	Lectures

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
4	Current environmental problems and practices of pollution abatement, including : · Water quality and supply · Wastewater treatment and reuse · Land contamination and remediation · Resource conservation and recovery · Air quality and control · Energy consumption and efficiency · Emerging contaminants, impact, and adaptation/mitigation solutions · Marine pollution – sources and control	2, 3, 4, 5		In-person	Lectures

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
5	Current environmental problems and practices of pollution abatement, including : · Water quality and supply · Wastewater treatment and reuse · Land contamination and remediation · Resource conservation and recovery · Air quality and control · Energy consumption and efficiency · Emerging contaminants, impact, and adaptation/mitigation solutions · Marine pollution – sources and control	2, 3, 4, 5		In-person	Lectures

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
6	Current environmental problems and practices of pollution abatement, including : · Water quality and supply · Wastewater treatment and reuse · Land contamination and remediation · Resource conservation and recovery · Air quality and control · Energy consumption and efficiency · Emerging contaminants, impact, and adaptation/mitigation solutions · Marine pollution – sources and control	2, 3, 4, 5		In-person	Lectures

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
7	Current environmental problems and practices of pollution abatement, including : · Water quality and supply · Wastewater treatment and reuse · Land contamination and remediation · Resource conservation and recovery · Air quality and control · Energy consumption and efficiency · Emerging contaminants, impact, and adaptation/mitigation solutions · Marine pollution – sources and control	2, 3, 4, 5		In-person	Lectures

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
8	Current environmental problems and practices of pollution abatement, including : · Water quality and supply · Wastewater treatment and reuse · Land contamination and remediation · Resource conservation and recovery · Air quality and control · Energy consumption and efficiency · Emerging contaminants, impact, and adaptation/mitigation solutions · Marine pollution – sources and control	2, 3, 4, 5		In-person	Lectures

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
9	Current environmental problems and practices of pollution abatement, including : · Water quality and supply · Wastewater treatment and reuse · Land contamination and remediation · Resource conservation and recovery · Air quality and control · Energy consumption and efficiency · Emerging contaminants, impact, and adaptation/mitigation solutions · Marine pollution – sources and control	2, 3, 4, 5		In-person	Lectures
10	Green engineering (e.g. systems thinking) and tool (e.g. LCA)	6		In-person	Lectures
11	Sustainable concepts, technologies and practices	7		In-person	Lectures
12	Sustainable concepts, technologies and practices	7		In-person	Lectures

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
13	Group project and presentation	8		In-person	Lectures

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lectures	Class meets once a week in lecture (3 hours) format, with in-class discussions
Group presentation	This helps you to achieve one or more of the outcomes as you need to do self-study and research. (You are organized into 4-5 students per group)

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Continuous Assessment (CA): Test/Quiz(CA1: Quiz 1)	1, 2, 4	a, b, c, d, g	10	Individual	Analytic	Multistructural
2	Continuous Assessment (CA): Test/Quiz(CA2: Quiz 2)	2, 3	a, b, c, d, g	10	Individual	Analytic	Multistructural
3	Continuous Assessment (CA): Test/Quiz(CA3: Quiz 3)	5, 6	a, b, c, d, g	10	Individual	Analytic	Multistructural
4	Continuous Assessment (CA): Project(CA4: Group Project)	7, 8	a, b, c, d, g, i, j, l	20	Team	Analytic	Multistructural
5	Summative Assessment (EXAM): Final exam(Final Examination)	1, 2, 3, 4, 5, 6, 7	a, b, c, d, g	50	Individual	Holistic	Relational

Description of Assessment Components (if applicable)

a) Engineering Knowledge Apply the knowledge of mathematics, natural science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems.

b) Problem Analysis Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural

sciences, and engineering sciences.

c) Design / Development of Solutions Design solutions for complex engineering problems and design systems, components or processes that meet the specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

d) Investigation Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

e) Modern Tool Usage Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

f) The Engineer and Society Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

g) Environment and Sustainability Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for the sustainable development.

h) Ethics Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

i) Individual and Team Work Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

j) Communication Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

k) Project Management and Finance Demonstrate knowledge and understanding of the engineering management principles and economic decision-making, and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

l) Life-long Learning Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Formative Feedback

1. Feedback will be through the dissemination of the student's performance in quizzes as well as review of the quiz questions in class.

2. Additional channel will be through individual and group-based consultation initiated by you on your learning needs.

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
Care for Environment	Advanced
Collaboration	Intermediate
Curiosity	Intermediate
Global Perspective	Intermediate

Course Policy

Policy (Academic Integrity)

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Policy (General)

Students are expected to attend all classes punctually and take all scheduled assignments. Students are expected to take responsibility to follow up with course notes, assignments, and course-related announcements. For student group projects, students are grouped into 4-5 students per group with each group doing a different topic. Group project reports are due typically 1 days before the last class during which each group make an oral presentation of 10 min duration. The project reports are required to be run through NTU's iThenticate originality checking software and corrected if needed, before submission. Both the written report and oral presentation are graded.

Policy (Absenteeism)

Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies. There will be no make-up opportunities for in-class activities.

Policy (Others, if applicable)

Last Updated Date: 25-06-2024 07:43:38

Last Updated By: Yang, En-Hua