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	SUSTAINABLE BUILT ENVIRONMENT
Course Code	CV5101
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

This course aims to equip you with up-to-date knowledge on the current and emerging environmental issues concerning sustainable built environment. During this course, you will attain an understanding of the environmental challenges facing the construction industry, and discuss building, urban planning, geotechnical, and life cycle assessment concepts from a sustainability perspective. You will also learn how to identify crucial environmental problems and develop potential suggestions to alleviate their adverse effects on the environment, which will be useful for future engineering courses and careers.

Course's Intended Learning Outcomes (ILOs)

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

ILO 1	Explain different sustainability concepts concerning sustainable built environment
ILO 2	Identify key environmental issues in the areas of building, urban planning, and geotechnical
ILO 3	Evaluate the impact of human actions on environment by using various sustainability evaluation tools, such as life cycle assessment
ILO 4	Assess the viability of potential solutions proposed for a broad range of global environmental issues
ILO 5	Develop technical solutions to reduce the impacts of different environmental problems

Course Content

No	Topic	Lecture Hours
1	Built environment and sustainability	12
2	Life Cycle Assessment	9
3	Urban planning and sustainable development	9
4	Geotechnical engineering and sustainability	6
5	Integrated civil and environmental engineering projects	3
	Total	**39**

Reading and References (if applicable)

1. Christensen, N. The Environment and You. 3rd Edition. Pearson, 2018
2. Allenby, B.R. The Theory and Practice of Sustainable Engineering. Pearson, 2012
3. Mihelcic, J.R. and Zimmerman, J.B. Environmental Engineering: Fundamentals, Sustainability, Design. 3rd Edition. Wiley, 2021

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Built environment and sustainability	1, 2, 3, 4, 5			Lectures and in-class activities
2	Built environment and sustainability	1, 2, 3, 4, 5			Lectures and in-class activities
3	Built environment and sustainability	1, 2, 3, 4, 5			Lectures and in-class activities
4	Built environment and sustainability	1, 2, 3, 4, 5			Lectures and in-class activities
5	Life Cycle Assessment	2, 3, 4, 5			Lectures and in-class activities
6	Life Cycle Assessment	2, 3, 4, 5			Lectures and in-class activities
7	Life Cycle Assessment	2, 3, 4, 5			Lectures and in-class activities
8	Urban planning and sustainable development	1, 2, 3			Lectures and in-class activities
9	Urban planning and sustainable development	1, 2, 3			Lectures and in-class activities
10	Urban planning and sustainable development	1, 2, 3			Lectures and in-class activities

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
11	Geotechnical engineering and sustainability	1, 2, 3, 4, 5			Lectures and in-class activities
12	Geotechnical engineering and sustainability	1, 2, 3, 4, 5			Lectures and in-class activities
13	Integrated civil and environmental engineering projects	2, 3, 4, 5			Lectures and in-class activities

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
LEC	Weekly lectures to provide you with the necessary knowledge to achieve the intended learning outcomes.
Team Project	Team project to enable you to collaborate in the development of sustainable solutions to pressing environmental issues.

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): Project(CA1: Team Project)	1, 2, 3, 5	c, d, g, i, j	40	Team	Analytic	Relational
2	Summative Assessment (EXAM): Final exam(Final Examination)	2, 3, 4	b, g	60	Individual	Holistic	Relational

Description of Assessment Components (if applicable)

Team component is about the quality of the team project report. Individual component includes the presentation performance for individual team members and peer review result.
To account for Individual Contribution to the team project, the Modification Factor (MF) will be applied to the team project with peer review.

EAB Graduate Attributes

a) Engineering Knowledge

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

b)

c) Problem Analysis

Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

d) 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.

e) 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.

f) 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.

g) 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.

h) 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.

i) Ethics

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

j) Individual and Team Work

Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

k) 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.

l) 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.

m) 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

You will be receiving feedback on your progress via the in-class activities, during which we will solve sample problems together. You will also get the chance to hear others' opinions on different environmental issues throughout the in-class discussions.

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	Intermediate
Communication	Intermediate
Critical Thinking	Advanced
Systems Thinking	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)

You are expected to complete all assigned readings, activities, assignments, attend all classes punctually and complete all scheduled assignments by due dates. You are expected to take responsibility to follow up with assignments and course related announcements. You are expected to participate in all project critiques, class discussions and activities.

Policy (Absenteeism)

In-class activities make up a significant portion of your course grade. Absence from class without a valid reason will affect your participation grade. 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)

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Last Updated By: Yang, En-Hua

RUBRICS OF CV5101 SUSTAINABLE BUILT ENVIRONMENT

Appendix 1: Team Project (40%)

Assessment Criteria for Group Project and Presentation by Tutors

Criteria	Good (16-20)	Ave (11-15)	Fair (6-10)	Poor (0-5)
Report – Introduction on Background, Conclusions and References (20%)	Well defined problem; clear objectives; well-supported conclusions; proper and well-formatted in-text citations	Well defined problem; clear objectives; conclusions and in-text citations are of good quality	Consistent problem definition and objective, conclusions and in-text citations are of acceptable quality	Problem not well defined; unclear objective; irrelevant conclusion and citations.
Report – Investigation methodology, Approaches or Mitigation Measures, Novelty of the project (20%)	Sound investigation methodology, well-balanced summary of approaches or measures to tackle the problem, exceptional overall novelty of the project;	Good investigation methodology, balanced summary of approaches to tackle the problem, overall novelty to certain extent.	Acceptable investigation methodology, acceptable summary of approaches to tackle the problem, somehow novelty.	Invalid investigation methodology, lack of summary of approaches to tackle the problem, No novelty.
Presentation – PPT Slide Content (20%)	Clear and concise; minimal language mistakes, informative Tables/Figures	Clear expression with minor language mistakes, appropriate tables/Figures	Understandable expression with some language mistakes, acceptable tables/Figures	Not Clear nor concise; many major language mistakes, informative Tables/Figures
Presentation – Teamwork (20%)	Excellent coordination between the team members. Excellent transitions and connections between slides	Good coordination between the team members. Good transitions and connections between slides.	Acceptable coordination between the team members. Acceptable transitions and connections between slides.	No coordination between team members; non-smooth transitions.
Presentation - Individual Contribution (20%)	Clear presentation and answer all questions well and reasonably	Good presentation and answer most of questions well and reasonably	Acceptable presentation and answer some of questions well and reasonably	Not clear presentation and cannot answer the questions well

Assessment Criteria for Peer Review

Criteria	Outstanding: 4	Good: 3	Meet expectation: 2	Below expectations: 1
Teamwork, Collaborative behaviour	Cooperative and always deliver assigned tasks on time. Take initiative to help other to ensure success of team project.	Cooperative and always deliver assigned tasks on time. Willing to assist others upon request.	Stop short at delivering assigned tasks, sometimes after reminder(s).	Non-cooperative, non-committed, always miss deadlines.
Quality of works	Quality of works higher than overall group quality, or go extra miles to assist teammate to enhance the quality of group works.	Good quality of deliverables under individual responsibility.	Acceptable quality of deliverables under individual responsibility.	Quality of works not acceptable.
Ideas & participations	Active participation and initiatives, good ideas & suggestions in enhancing the quality of group works.	Suggestions and ideas to enhance the quality of group works.	Somewhat contribution in enhancing the quality of group works.	Did not participate in group works.

Average Peer Assessment Score	MF
3.51 to 4.00	1.05
2.76 to 3.50	1.00
2.51 to 2.75	0.95
2.00 – 2.50	0.9
Below 2.00	Separate Assessment

Peer assessment exercise will be anonymous and done towards the end of the semester. For student who has average peer assessment score below 2.0, Course coordinator might contact/call up the student as well as the other team member(s) to further assess the appropriate MF. In addition, MF might be moderated by course coordinator based on the interaction during consultation and feedbacks from the team members.