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

Course Overview

Expected Implementation in Academic Year	2025-26
Semester/Trimester/Others (specify approx. Start/End date)	Semester 2
Course Author * Faculty proposing/revising the course	Chong Tzyy Haur (Assoc Prof)
Course Author Email	thchong@ntu.edu.sg
Course Title	Integrated Design Project
Course Code	EN4912
Academic Units	3
Contact Hours	42
Research Experience Components	Research Defined Course (at least 50% of deliverables involve practical research activities: problem identification, hypothesis forming, data collection/analysis/interpretation, result communication)

Course Requisites (if applicable)

Pre-requisites	Year 4 standing
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

The objective of this course is to give you an appreciation of the various aspects of designing environmental and civil engineering projects from conception to completion.

After successfully attending the course, you should be able to undertake basic practical design of environmental projects.

Course's Intended Learning Outcomes (ILOs)

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

ILO 1	Identify the appropriate design factors and parameters when designing environmental and civil engineering projects.
ILO 2	Apply design principles and methodologies when designing environmental and civil engineering projects.
ILO 3	Propose cost effective designs which meet client requirements.
ILO 4	Account for socio-economic and environmental sustainability in design.
ILO 5	Effectively integrate different design components in environmental and civil engineering projects.
ILO 6	Design projects that can be practically implemented.

Course Content

1. Course overview and project briefing
2. Environmental impact assessment/Sustainable green design
3. Storm drainage infrastructure/Air, noise and ground pollution
4. Water resources management/Solid waste management
5. Water treatment and supply
6. Wastewater treatment/reclamation

Reading and References (if applicable)

1. Linsley, R. K., Franzini, J.B., Freyberg, D.L., Tchobanoglous, G. (1992) "Water Resources Engineering", McGraw-Hill
2. Wanielista, M.P.(1993): “Stormwater Management: Quantity and Quality”, Ann Arbor Science
3. Chow, V.T.; Maidment, D.R.; Mays, L.W. (1988): "Applied Hydrology", McGraw-Hill
4. Wanielista M. P.,Kersten, R., Ealgin, R. (1997): “Hydrology: Water Quantity and Quality Control” John Wiley & Sons
5. Peavy, HS; Rowe, DR; Tchobanoglous, G (1987) "Environmental Engineering", International edition, McGraw-Hill Book Co.
6. McGhee, TJ (1991) “Water Supply and Sewerage”. International edition, McGraw-Hill Book Co.

Teaching faculty will provide updated reading materials when it is available.

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Course and Project Overview ; Storm Drainage Design	1, 2, 3, 4, 5, 6	Read course ppt slides	In-person	Lecture & Literature search of material for execution of design projects 4 hours will be scheduled per week
2	Water Resources Design; Water Treatment/Water Supply Design	1, 2, 3, 4, 6	Read course ppt slides	In-person	Lecture, 4 hours will be scheduled per week
3	Green Design Concepts for Clean Tech Park, Wastewater Treatment, Water Reclamation and Reuse	1, 2, 3, 4, 5. 6	Read course ppt slides	In-person	Lecture, 4 hours will be scheduled per week
4	Project Consultation	1, 2, 3, 4, 5, 6	Read course ppt slides	In-person	Consultation with project instructor, Literature search of material for execution of design projects 3 hours per week
5	Project Consultation	1, 2, 3, 4, 5, 6	Read course ppt slides	In-person	Consultation with project instructor, Literature search of material for execution of design projects 3 hours per week

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
6	Project Consultation	1, 2, 3, 4, 5, 6	Read course ppt slides	In-person	Consultation with project instructor, Literature search of material for execution of design projects 3 hours per week
7	Project Consultation	1, 2, 3, 4, 5, 6	Read course ppt slides	In-person	Consultation with project instructor, Literature search of material for execution of design projects 3 hours per week
8	Project Consultation	1, 2, 3, 4, 5, 6	Read course ppt slides	In-person	Consultation with project instructor, Literature search of material for execution of design projects 3 hours per week
9	Project Consultation	1, 2, 3, 4, 5, 6	Read course ppt slides	In-person	Consultation with project instructor, Literature search of material for execution of design projects 3 hours per week
10	Project Consultation	1, 2, 3, 4, 5, 6	Read course ppt slides	In-person	Consultation with project instructor, Literature search of material for execution of design projects 3 hours per week

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
11	Project Consultation	1. 2, 3, 4, 5, 6	Read course ppt slides	In-person	Consultation with project instructor Literature search of material for execution of design projects 3 hours per week
12	-	-	-		-
13	Group Presentation	1, 2, 3, 4, 5, 6	Review of course ppt slides	In-person	Presentation by all groups A total 6 hours will be arranged in this week

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lectures	Formal lectures on principles related to the design projects
Consultations	To allow you to seek clarifications on the concepts taught during lectures and guidance in completing the design projects
Group Design Reports	You learn to work as a team to compete the design project reports which require self-study and research and team work beyond the lecture materials

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Description of Assessment Component	Team/Individual	Rubrics	Level of Understanding
1	Continuous Assessment (CA): Report/Case study(CA1 : Interim Group Report)	1,2,5,6	a, b	20	Each group will need to submit an interim report Weightage * MF	Team	Holistic	Relational
2	Continuous Assessment (CA): Project(CA2 : Final Group Report)	1,2,3,4,5,6	a, b, c, d, f, g, i	50	A final group report will need to be submitted by each group Weightage * MF	Team	Holistic	Extended Abstract
3	Continuous Assessment (CA): Presentation(CA3 : Group Presentation)	1,2,3,4,5,6	a, b, c, d, f, g, i	30	Each group will need to do an oral presentation with questions and answer session Weightage * MF * GF	Team	Holistic	Extended Abstract

Description of Assessment Components (if applicable)

Note:
The assessment of this course is heavily reliant on you working closely as a team to complete the project. Besides, it also aims to train you to review the quality of others' group projects and to encourage active group participation. Hence, Modification Factor (MF) and Group Rating Factor (GF) will be applied to account for both the individual and group contributions to the group project work. The MF is derived from peer assessment while GF is derived from group evaluation. For more details on the MF and GF computations, please see Appendix 4 and 5, respectively.

Formative Feedback

Students are expected to work closely with team mates for the project.

You are encouraged to meet instructors to seek feedback on your project through regular consultation sessions.

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
Care for Society	Intermediate
Self-Management	Intermediate
Project Management	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)

(1) General

You are expected to complete all scheduled project assignments and reports by due dates. You are expected to take responsibility to follow up with course notes, consultations, and self-study to complete the project. You are expected to participate in all group project discussions and activities.

Policy (Absenteeism)

(2) Absenteeism

Group work requires each member to contribute to team work. 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.

Policy (Others, if applicable)

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Last Updated By: Lee-Chua Lee Hong

EN4912 INTEGRATED DESIGN PROJECT

Appendix 1 – CA1: Interim Group Report (20% x MF)

Criteria	Outstanding (80-100%)	Good (60-79%)	Average, Meet Expectation (40-59%)	Below Expectation (<40%)
Minutes of meetings (20%)	Provide a concise and clear record of minutes of meetings	Provide a good record of minutes of meetings	Provide a reasonable record of minutes of meetings	Provide a poor or no record of minutes of meetings
Drafting of project plan, identifying tasks and relevance to industrial practice (40%)	Excellent demonstration of clearly defined goals, assignment of roles, building of timeline, allocation of resources, identification of risks, creating a communication plan, ensuring regulatory compliance, cost savings and efficiency, etc.	Good demonstration of defined goals, assignment of roles, building a timeline, allocation of resources, identification risks, creating a communication plan, ensuring regulatory compliance, cost savings and efficiency, etc.	Fair demonstration of defined goals, assignment of roles, building a timeline, allocation of resources, identification of risks, creating a communication plan, ensuring regulatory compliance, cost savings and efficiency, etc.	Poorly defined goals, poorly assigned roles, un-organized timeline, poor allocation of resources, unable to identify risks, poor communication plan, fail to ensure regulatory compliance, cost savings and efficiency, etc
Discussion of progress and remaining work (40%)	In-depth discussion of work completed, progress made and provided a realistic plan for the remaining work.	Good discussion of work completed, progress made, and a sound plan for the remaining work.	Fair discussion of work completed, progress made, and a fair plan for the remaining work.	Poor discussion of work completed, progress made, and an unorganized plan for the remaining work.

<u>Appendix 2</u> – CA2: Final Group Report (50% x MF)

Criteria	Outstanding (80-100%)	Good (60-79%)	Average, Meet Expectation (40-59%)	Below Expectation (<40%)
Minutes of Meetings (10%)	Provide a concise and clear record of minutes of meetings	Provide a good record of minutes of meetings	Provide a reasonable record of minutes of meetings	Provide a poor or no record of minutes of meetings
Report Format and Structure (15%)	Format and style; grammar & spelling; quality of diagrams/tables/graphs, etc.; citations & references format; variables in equations are defined and units provided.	Format and style; grammar & spelling; quality of diagrams/tables/graphs, etc.; citations & references format; variables in equations are defined and units provided.	Format and style; grammar & spelling; quality of diagrams/tables/graphs, etc.; citations & references format; variables in equations are defined and units provided.	Format and style; grammar & spelling; quality of diagrams/tables/graphs, etc.; citations & references format; variables in equations are defined and units provided.
Introduction, background, and objectives (10%)	Clear and well-defined description of background and objectives.	Good description of background and objectives.	Fair description of background and objectives.	Poor description of background and objectives.
Methodology, data collection, analysis, and discussion (50%)	Excellent demonstration of application of best available or/and innovative approach; excellent quality of data collected and used; excellent demonstration of incorporation techno-economic analysis, sustainability assessment, and practicality evaluation; in-depth and thorough analysis and discussion of topics.	Good demonstration of application of best available or/and innovative approach; good quality of data collected and used; good demonstration of incorporation of techno-economic analysis, sustainability assessment, and practicality evaluation; good analysis and discussion of topics.	Fair demonstration of application of best available or/and innovative approach; fair quality of data collected and used; fair demonstration of incorporation of techno-economic analysis, sustainability assessment, and practicality evaluation; fair analysis and discussion of topics.	Fail to apply best available or/and innovative approach; poor quality of data collected and used; unable to incorporate techno-economic analysis, sustainability assessment, and practicality evaluation; poor analysis and discussion of topics.
Conclusion and recommendation (15%)	Excellent summary and highlight of key findings and limitations; provide concise, clear and workable recommendations.	Good summary and highlight of key findings and limitations; provide good recommendations.	Fair summary and highlight of key findings and limitations; provide fair recommendations.	Poor summary and highlight of key findings and limitations; provide poor or no recommendations.

<u>Appendix 3</u> – CA3: Group Presentation (30% x MF x GF)

Criteria	Outstanding (80-100%)	Good (60-79%)	Average, Meet Expectation (40-59%)	Below Expectation (<40%)
Presentation slides and aids (20%)	Format and style, grammar & spelling, use of diagrams/tables /graphs, AV materials, etc. to make presentation interesting and meaningful.	Format and style, grammar & spelling, use of diagrams/tables/graphs, AV materials, etc. to make presentation interesting and meaningful.	Format and style, grammar & spelling, use of diagrams/tables/graphs, AV materials, etc. to make presentation interesting and meaningful.	Format and style, grammar & spelling, use of diagrams/tables/graphs, AV materials, etc. to make presentation interesting and meaningful.
Organization, presentation and communication skills (30%)	Finish presentation within prescribed time with excellent pacing; excellent coordination and interaction between members during presentation and Q&A; excellent clarity, structure, delivery, and audience engagement.	Finish presentation within prescribed time with good pacing; good coordination and interaction between members during presentation and Q&A; good clarity, structure, delivery, and audience engagement.	Finish presentation within prescribed time with appropriate pacing; fair coordination and interaction between members during presentation and Q&A; fair clarity, structure, delivery, and audience engagement.	Fail to finish presentation within prescribed time and poor pacing; poor coordination and interaction between members during presentation and Q&A; not clear, poor structure, poor delivery, and no audience engagement.
Content, questions & answers (50%)	Clear & concise background, objectives, approach, analysis, discussion, conclusion and recommendation; answers are clear, concise, accurate, informative, completeness.	Good background, objectives, approach, analysis, discussion, conclusion and recommendation; answers are good and sound.	Fair background, objectives, approach, analysis, discussion, conclusion and recommendation; answers are acceptable.	Poor background, objectives, approach, analysis, discussion, conclusion and recommendation; answers are not clear.

Appendix 4 – Criteria for Peer Assessment

Component (Equal Weightage for all components)	Performance Level / Criteria			
	Outstanding (4)	**Good (3)**	**Average, Meet Expectation (2)**	**Below Expectations (1)**
Collaborative Behavior	Cooperative and always delivered assigned tasks on time. Take initiative to help other to ensure success of team project.	Cooperative and always delivered assigned tasks on time. Willing to assist others upon request.	Stop short at delivering assigned tasks, sometimes after reminder(s).	Uncooperative, 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 and Participations	Active participation and initiatives, good ideas and suggestions in enhancing the quality of group works.	Contributed suggestions and ideas to enhance the quality of group works.	Somewhat contributed in enhancing the quality of group works.	Did not participate in group works.

Average Peer Assessment Score	MF *
3.51 – 4.00	1.05
3.01 – 3.50	1.00
2.51 – 3.00	0.95
2.00 – 2.50	0.90
Below 2.0	Separate Assessment

Note: * cap to the max moderated score at 100%.

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 contact any other team member(s) to further assess the appropriate MF.

In addition to peer assessment, MF might be moderated by course coordinator and panel judges from the interaction during consultations, minutes of meetings, feedback from other team members, observation during group presentation.

Appendix 5 – Criteria for Group Evaluation

Each group will evaluate the presentation of the rest of the groups and rate them in numerical order with one (1) being the best presentation. For example, if there are 8 groups in total, then each group will rate the rest of the 7 groups from 1 to 7. The group members are encouraged to discuss among themselves first before deciding to rank the rest of the 7 groups. The purpose of this group evaluation is to encourage participation and teamwork and review training, i.e., training to review the quality of project presentations.

The criteria used to evaluate the group presentation are:
1. Content of the presentation: background and objective; methodology, analysis, and discussion; conclusion and recommendation.
2. Presentation format & Skills: clear and concise presentation; captivating, lively and engaging; smooth delivery within the time allocated as well as the ability to answer questions.

Average Group Assessment Score	**GF ***
1	1.050
2	1.035
3	1.020
4	1.005
5	0.990
6	0.975
7	0.960
8	0.945

Note: * cap to the max moderated score at 100%.

Group evaluation exercise will be done after the group presentation and it will be submitted by end of the semester by each group, hence the score will be applied to all members within the group.

In addition to group evaluation assessment, GF might be moderated by course coordinator and panel judges.