NANYANG TECHNOLOGICAL UNIVERSITY

COURSE CONTENT

Academic Year	2023-24	**Semester**	2
Course Coordinator			
Course Code	EN4912		
Course Title	Integrated Design Project		
Pre-requisites	Year 4 standing		
No of AUs	3		
Contact Hours	Lecture: 20 hrs; Tutorial: 0 hr; Project Design: 19 hrs		
Proposal Date	12 September 2023		

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.

Intended Learning Outcomes (ILO)

At the end of the course, the students would be able to:

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

Course Content

This is a project-based course in which you are required to undertake group projects covering both the conceptual and detailed aspects of design and planning. The projects could involve different areas of the environmental engineering disciplines such as storm drainage, water and wastewater treatment; solid waste management; and air, noise, and ground pollution. The project scope can include investigation, planning, design, social, economic, and environmental evaluation and impact assessment studies.

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

	Total	20	19

Assessment (includes both continuous and summative assessment)

Component	Course LO Tested	Related Programme LO or Graduate Attributes	Weighting	Team/ Individual	Assessment rubrics
1. Quiz	1, 2, 5, 6	ENE 2018 SLOs a, b	30%	Individual	
2. Group Project Reports	1, 2, 3, 4,5,6	ENE2018 SLOs a, b, c, d, f, g, i	70%	Team	Appendix 1
Total			100%		

Continual Assessment (100%) consisting of:

(1) One Quiz (30%) conducted during last Teaching Week to evaluate learning outcomes. Questions are designed to test students' understanding of basic concepts and principles as well as their ability in applying them in real application scenarios.

(2) Group Project Reports (70%) to promote teamwork in applying basic principles learned in earlier year, project lectures, and additional literature search to complete the assigned design projects, taking into consideration environmental and sustainability awareness.

Formative feedback

The quiz and project marks are announced to you.

You are encouraged to meet Instructors to seek feedback on your project design reports.

Learning and Teaching approach

Class meets once per week over 2 hours formal lectures for 10 weeks and informal consultations outside lecture hours through the semester.

Approach	How does this approach support students 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

Reading and References

Linsley, R. K., Franzini, J.B., Freyberg, D.L., Tchobanoglous, G. (1992) "Water Resources Engineering", McGraw-Hill

Wanielista, M.P.(1993): “Stormwater Management: Quantity and Quality”, Ann Arbor Science

Chow, V.T.; Maidment, D.R.; Mays, L.W. (1988): "Applied Hydrology", McGraw-Hill

Wanielista M. P.,Kersten, R., Ealgin, R. (1997): “Hydrology: Water Quantity and Quality Control” John Wiley & Sons

Peavy, HS; Rowe, DR; Tchobanoglous, G (1987) "Environmental Engineering", International edition, McGraw-Hill Book Co.

McGhee, TJ (1991) “Water Supply and Sewerage”. International edition, McGraw-Hill Book Co.

Course Policies and Student Responsibilities

(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 assignments. You are expected to participate in all group project discussions and activities.

(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.

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. 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 If you are uncertain of the definitions of any of these terms, you should go to the Academic Integrity Handbook for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Course Instructors

Instructor	Office Location	Phone	Email

Planned Weekly Schedule

Week	Topic	Course LO	Readings/ Activities
1.	Course and Project Overview	1, 4, 5, 6	Read course ppt slides Consultation with project instructor Literature search of material for execution of design projects
2.	Storm Drainage Design Part 1	1, 2	Read course ppt slides Consultation with project instructor Literature search of material for execution of design projects
3.	Storm Drainage Design Part 2	1, 2, 3, 4, 6	Read course ppt slides Consultation with project instructor Literature search of material for execution of design projects
4.	Water Resources Design Part 1	1, 2	Read course ppt slides Consultation with project instructor Literature search of material for execution of design projects
5.	Water Resources Design Part 2	1, 2, 3, 4. 6	Read course ppt slides Consultation with project instructor Literature search of material for execution of design projects
6.	Water Treatment/Water Supply Design	1, 2, 3, 4, 6	Read course ppt slides Consultation with project instructor Literature search of material for execution of design projects
7.	Green Design Concepts for Clean Tech Park	4	Read course ppt slides Consultation with project instructor Literature search of material for execution of design projects
8.	Wastewater Treatment, Water Reclamation and Reuse	1, 2	Read course ppt slides Consultation with project instructor Literature search of material for execution of design projects
9.	Wastewater Treatment, Water Reclamation and Reuse	1, 2, 3, 4, 5, 6	Read course ppt slides Consultation with project instructor Literature search of material for execution of design projects
10.	Wastewater Treatment, Water Reclamation and Reuse	1, 2, 3, 4, 5, 6	Read course ppt slides Consultation with project instructor Literature search of material for execution of design projects
11.	Consultation	2, 3, 6	Consultation with project instructor Literature search of material for execution of design projects
12.	Consultation	2, 3, 6	Consultation with project instructor

			Literature search of material for execution of design projects
13.	Quiz	1, 2, 5, 6	Review of course ppt slides

Appendix 1: Assessment Criteria for Group Project and Presentation

	Performance Level/Criteria			
Performance Indicators	**Outstanding: 4**	**Good: 3**	**Average, meet expectation: 2**	**Below expectations: 1**
Identify appropriate design factors and parameters	Correct design factors and parameters used in design	Some inaccurate design factors and parameters used in design	Some incorrect design factors and parameters used in design	Many incorrect design factors and parameters used in design
Apply correct design principles and methodology	Correct principles and methodology applied in design	some incorrect principles and methodology applied in design	Many incorrect principles and methodology applied in design	Design based on incorrect principles and methodology
Propose cost-effective designs which meet client requirements	Design is cost effective and meets client requirements	Design is generally cost effective and meets client requirements	Design is lacking in cost effectiveness and in meeting client requirements	Design is not cost effective and does not meet client requirements
Consider socio-economic and environmental sustainability in design	Design pays much attention to socio-economic and environmental sustainability	Design pays sufficient attention to socio-economic and environmental sustainability	Design pays little attention to socio-economic and environmental sustainability	No consideration for socio-economic and environmental sustainability in design
Integrate different components of design proficiently	The various design components are fully and compatibility integrated	Some design components may not function as a whole	Most design components do not function as a whole	The various design components cannot function as a whole
Consider practicality of project implementation	Proposed design can be readily and practically implemented	Proposed design can be implemented with some challenges	Proposed design can be implemented with great difficulties	Proposed design cannot be implemented

ENE SLOs (2018)

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

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

c) **Design/development of Solutions**: Design solutions for complex environmental engineering problems and design system components or processes 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 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 environmental 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 the need for the sustainable development.
h) **Ethics**: Apply ethical principles and commit to professional and moral responsibilities in the environmental 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 environmental engineering activities with the engineering community and with society at large, be able to comprehend and write effective reports and design documentation, and make effective presentations.

k) **Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and economic decision-making, and apply these to work, as a member and leader in a multidisciplinary team.

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 evolution.