NANYANG TECHNOLOGICAL UNIVERSITY

Teaching, Learning and Pedagogy Division

Reg. No. 200604393R

PROPOSED COURSE OUTLINE TEMPLATE FOR STUDENTS AT NTU

Academic Year	AY2020	**Semester**	1
Course Coordinator	Asst/P Fang Mingliang		
Course Code	EN4105		
Course Title	Integrated Environmental Management		
Pre-requisites	Year 3 Standing		
No of AUs	3		
Contact Hours	Lecture (26 hrs) ; Tutorial (13 hrs); Laboratory (0 hr)		
Proposal Date	16 July 2020		

Course Aims

This course aims to introduce the issues of air, water, solid waste and industrial hazards, which is further developed to their risk assessment and control strategies. You will be able to apply these concepts in integrated environmental management for the various environmental systems. This course covers several fundamental concepts that will reinforce your learning of other environmental management and urban sustainability courses in the aspects of analyzing and solving complex problems.

Intended Learning Outcomes (ILO)

By the end of this course, you (as a student) would be able to:

1. Identify and discuss water and wastewater management Issues.
2. Describe and compare various air quality management and industrial waste management.
3. Identify the potential environmental and safety hazard and its control method.
4. Describe and discuss land contamination and management strategy.
5. Conduct environmental impact assessment for different environmental issues.
6. Explain the concept of industrial ecology and its application in eco-industrial park.

Course Content

S/N	Topic	Lecture Hrs	Tutorial Hrs
1.	Integrated Water and Wastewater Management Issues	2	1
2.	Environmental Impact Assessment	6	3
3.	Air quality management Issues	2	1
4.	Industrial Waste Management Issues	2	1
5.	Environmental Health and Safety	4	2
6.	Environmental Site Assessment	2	1
7.	Environmental Risk Assessment and Management	2	1
8.	Special topic: Industrial Ecology	2	1
9.	Quiz and Project	4	2
	Total:	26	13

Assessment (includes both continuous and summative assessment)

Component	Course LO Tested	Related Programme LO or Graduate Attributes	Weighting	Team/Individual	Assessment rubrics
1. Final Examination	1, 2, 3, 4,5,6	ENE SLOs* a, b, c	60%	Individual	Appendix 1
2. Continuous Assessment 1 (CA1): Quiz	1,2,5	ENE SLOs* a, b, c	10%	Individual	-
3. Continuous Assessment 2 (CA2): Quiz	3,4,5,6	ENE SLOs* a, b, c	10%	Individual	-
4. Group Project	3,4,6	ENE SLOs* a, b, c, g, i, j	20%	Teams	Appendix 2
Total			100%		

* ENE SLOs stands for the Student Learning Outcomes of B.Eng (Environ Eng) program. See Appendix 2.

Formative feedback

Two quizzes will be conducted. The solutions to the quiz questions will be discussed in the class. You will be able to see their marked quiz papers.

Learning and Teaching approach

Approach	How does this approach support students in achieving the learning outcomes?
Lecture	Conduct 2 hours of TEL-based or normal lectures or open interactions per week for 13 weeks.
Tutorials	Conduct 1 hour per week of classroom-based discussions of tutorial questions and solutions on related topics.
Quizzes	The first quiz will be conducted after 30% of lectures are covered, while the second quiz will be conducted after 50% of lectures are covered.

Projects	The projects will be conducted after 100% of the lectures are covered.

Reading and References

Text:

Nil

References:

Lecture materials by individual instructors

Peter Morris and Riki Therivel,(2009). Methods of Environmental Impact assessment, 3rd edition, Routledge

Canter L.W. (1997). Environmental Impact Assessment, McGraw-Hill

Masters, G.M. and Ela, W.P, (2008). Introduction to Environmental Engineering and Science, Prentice Hall

Davis, M.L. and Cornwell, D.A. (2008). Introduction to Environmental Engineering, McGraw-Hill

Joseph Cascio, Gayle Woodside and Philip Mitchell (1996). ISO 14000 Guide: The New International Environmental Management Standards, McGraw-Hill

W.Lee Kuhre (1995). ISO 14001 Certification: Environmental Management Systems, Prentice Hall

S.E. Manahan Industrial Ecology (1999). Environmental Chemistry and Hazardous Waste, Lewis Publishers

T.E. Graedel and B.R. Allenby (2010). Industrial Ecology and Sustainable Engineering, Prentice Hall

Course Policies and Student Responsibilities

Absenteeism

The Quizzes are conducted during regular lecture sessions, which is a form of in-class activities. Absence from Quizzes without a valid reason will result in zero mark. 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.

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. 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
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Planned Weekly Schedule

Week	Topic	Course LO	Readings / Activities
Week 1	Integrated Water and Wastewater Management Issues	1	Course materials by instructors; ppt as the main reading material and Lecture Note as supplementary material.
Week 2	Environmental Impact Assessment	5	Course materials by instructors; ppt as the main reading material and Lecture Note as supplementary material.
Week 3	Environmental Impact Assessment	5	Course materials by instructors; ppt as the main reading material and Lecture Note as supplementary material.
Week 4	Environmental Impact Assessment	5	Course materials by instructors; ppt as the main reading material and Lecture Note as supplementary material.
Week 5	Air Quality Management Issues	2	Course materials by instructors; ppt as the main reading material and Lecture Note as supplementary material.
Week 6	Industrial Waste Management Issues	2	Course materials by instructors; ppt as the main reading material and Lecture Note as supplementary material.
Week 7	Environmental Health and Safety	3	Course materials by instructors; ppt as the main reading material and Lecture Note as supplementary material.
Recess week			
Week 8	Environmental Health and Safety	3	Course materials by instructors; ppt as the main reading material and Lecture Note as supplementary material.
Week 9	Land Contamination and Management Issues	4	Course materials by instructors; ppt as the main reading material and Lecture Note as supplementary material.
Week 10	Environmental Site Assessment	4	Course materials by instructors; ppt as the main reading material and Lecture Note as supplementary material.
Week 11	Environmental Risk Assessment and Management	5	Course materials by instructors; ppt as the main reading material and Lecture Note as supplementary material.

Week 12	Special topic: Industrial Ecology / Eco-Industrial Park (special lecture) Project presentations	- 6	NA Course materials by instructors; ppt as the main reading material and Lecture Note as supplementary material.
Week 13	Project presentations	6 -	Course materials by instructors; ppt as the main reading material and Lecture Note as supplementary material. NA

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Appendix 1: Assessment Criteria for Examination

	Performance Level/Criteria				
Performance criteria	**Outstanding: 4**	**Good: 3**	**Average, meet expectation: 2**	**Below expectations: 1**	***Score (1-4)**
Identify and discuss water and wastewater management Issues.	• Excellent ability in understanding water and wastewater management Issues	Good ability in understanding water and wastewater management Issues	• Show ability in understanding water and wastewater management Issues	Unable to understand water and wastewater management Issues	
Describe and compare various air quality management and industrial waste management.	Excellent ability in understanding air quality management and industrial waste management	Good ability in understanding air quality management and industrial waste management	Show ability in understanding air quality management and industrial waste management	Unable to understand air quality management and industrial waste management	
Identify the potential environmental and safety hazard and its control method.	Excellent ability in identifying the potential environmental and safety hazard and its	Good ability in identifying the potential environmental and safety hazard and its	Show ability in identifying the potential environmental and safety hazard and its	Unable to identify the potential environmental and safety hazard and its control method	

	control method under real industrial scenarios	control method under real industrial scenarios	control method under real industrial scenarios	under real industrial scenarios	
Describe and discuss land contamination and management strategy.	Excellent ability in understanding Land contamination and management strategy	Good ability in understanding Land contamination and management strategy	Show ability in understanding Land contamination and management strategy	Unable to understand Land contamination and management strategy	
Conduct environmental impact assessment for different environmental issues.	Excellent ability in understanding the concept of industrial ecology and its application in eco-industrial park	Good ability in understanding the concept of industrial ecology and its application in eco-industrial park	Show ability in understanding the concept of industrial ecology and its application in eco-industrial park	Unable to understand the concept of industrial ecology and its application in eco-industrial park	
Explain the concept of industrial ecology and its application in eco-industrial park.	• Excellent ability in conducting environmental impact assessment for different environmental issues	Good ability in conducting environmental impact assessment for different environmental issues	• Show ability in conducting environmental impact assessment for different environmental issues	Unable to conduct environmental impact assessment for different environmental issues	

Appendix 2: Rubrics for Group project marking

Please note that in practice, you will receive the same score as your team. However, your score may vary if there are evidence that you did not contribute to the team.

Criteria	Good (16-20)	Ave (11-15)	Fair (6-10)	Poor (0-5)	Remarks
Report – Introduction on Background (15%)					Brief background; well defined problem; clear objectives
Report – Approaches or Mitigation Measures (20%)					A balanced summary of approaches or measures to tackle the problem
Report - Conclusions and References (15%)					Clear and concise; proper and well-formatted in-text citations and the list of references
Presentation – PPT Slide Content (20%)					Clear and concise; minimal language mistakes with appropriate Tables//Figures
Presentation – Teamwork (15%)					Good coordination between the team members. Good transitions and connections between slides. Well pace and finish on time
Presentation - Individual Contribution (15%)					Able to present and answer questions clearly and correctly
TOTAL					

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Appendix 3

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.