

## COURSE CONTENT

<b>Academic Year</b>	AY2017/18	<b>Semester</b>	1
<b>Course Coordinator</b>	A/P Lo Yat Man, Edmond (CEE)		
<b>Course Code</b>	EN2001		
<b>Course Title</b>	Environmental Issues in a Changing World		
<b>Pre-requisites</b>	Nil		
<b>No of AUs</b>	3		
<b>Contact Hours</b>	Lecture: 39 hrs; Tutorial: 0 hr; Lab: 0 hr.		
<b>Proposal Date</b>	31 Aug 2016 (updated 29 Jun 2017)		

### Course Aims

The aim of this course is to keep students up to date with current and emerging global environmental issues at a level deeper and broader than that portrayed in the main stream media. The students will attain an 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.

Note: Under NTU current curriculum, all students go through two full 3-AU courses on sustainability. This is second of the 2 required courses for students majoring in Environmental Engineering.

### Intended Learning Outcomes (ILO)

By the end of this course, you would be able to:

1. Apply adaptation measures to cater for increased urban stress, e.g. flooding, solid waste
2. Apply low carbon and/or renewable energy engineering solutions
3. Discuss implications of climate change and role taken by the International Panel on Climate Change (IPCC)
4. Discuss on a broad range of current and emerging global environmental issues, e.g. natural resource depletion, energy-water-food debate.

### Course Content

S/N	Topic	Lecture Hrs	Tutorial Hrs
1.	Overview of environmental issues from a global perspective	3	
2.	Global warming and climate change, impact, and adaptation/mitigation solutions	6	
3.	Natural resources depletion, impacts, and adaptation/mitigation solutions: water resource, fossil fuels resource, forest resource, food supply issue, clean and renewable energy, energy efficiency	6	
4.	Low carbon technology	6	

5.	Urbanization and industrialization, impact, and adaptation/mitigation solutions: water resource, land resource, and waste generation	6	
6.	Eco industrial park	3	
7.	Emerging contaminants, impact, and adaptation/mitigation solutions	3	
8.	Projects and case studies	6	
Total:		39	0

**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	CEE SLOs (c), (f), (g) and (l).	60%	Individual	Refer to Appendix 1
2 Continuous Assessment 1 (CA1): 2 Quizzes	1, 2, 3, 4	CEE SLOs (c), (f), (g) and (l).	20%	Individual	Refer to Appendix 1
3. CA2: Group Project	Each group chooses a topic which then encompass 1, 2, 3 or 4	CEE SLOs (c), (f), (g), (i) and (l).	20%	Team	Refer to Appendix 1
Total			100%		

\* CEE SLO = Civil and Environmental Engineering Learning Outcomes (as per EAB Student Learning Outcomes (subset of 12 points))

<https://www.ies.org.sg/professional/eab/EAB%20Accreditation%20Manual%20-%20Draft%20Revision%203%20full%20document%20.pdf>

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

(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 t h e sustainable development.

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

(I) 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 consultation initiated by students on their particular learning needs.
3. Feedback on the group projects is via the student groups orally presenting their project ideas to the class mid-way through the semester during which feedback from the entire class is solicited/facilitated. This is followed by submission of written abstracts to the course instructor who then can provide further feedback.

### **Learning and Teaching approach**

Class meets once per week over 3 hours in lecture format.

<b>Approach</b>	<b>How does this approach support students in achieving the learning outcomes?</b>
Lecture	Formal lectures on the topics with in-class discussions
Group presentation	This helps students to achieve one or more of the outcomes as they need to do self-study and research.  (The class is split into 2 parallel sessions for the Group Project presentations so that the presentations can be completed within a 3-hour session. Note the students are organized into 4-5 students per group)

### **Reading and References**

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

### **Course Policies and Student Responsibilities**

#### **Course policies:**

[http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/Pages/AcademicUnitSystem\(AUS\).aspx](http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/Pages/AcademicUnitSystem(AUS).aspx)

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 3-4 days before the last class during which each group make an oral presentation of 20 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.

## Instructions to Examination Candidates:

<http://www.ntu.edu.sg/Students/Undergraduate/AcademicServices/Examination/pages/instructionstoexamcand.aspx>

## 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
A/P Lo Yat Man, Edmond	N1-01b-38	6790 5268	cymlo@ntu.edu.sg
Prof Chiew Yee Meng	N1-01b-53	6790 5256	CYMChiew@ntu.edu.sg
A/P Cheng Nian Sheng	N1-01b-46	6790 6936	CNSCheng@ntu.edu.sg
A/P Tan Soon Keat	N1-B1a-03	6790 5321	CTANSK@ntu.edu.sg
Asst/P G. Lisak	N1-01c-77	6790 4737	g.lisak@ntu.edu.sg
Two external lecturers taking 4 hours total			

## Planned Weekly Schedule

Week	Topic	Course LO	Readings/ Activities
1	Overview from global perspectives; Population growth and carrying capacity	4	Lectures and Q/A session
2	Natural resource depletion: the role of oxygen and second law in resource depletion. Impact of nature and human activities	4	Lectures and Q/A session
3	Natural resource depletion: impact of primary production and manufacturing sectors on resource depletion. How changing practices will alleviate the problem.	4	Lectures and Q/A session

4	Global warming & climate change: Introduction and impact on water resources	3	Lectures and Q/A session
5	Global warming & climate change: General impacts and adaptation strategies	3	Lectures and Q/A session
6	Sustaining Singapore as a Highly Liveable City – Framework for sustainable urban development: Case Study and group discussions & presentations	1,2,4	Seminar; Group discussions & presentations
7	Emerging Contaminant: definition, sources, types of EC. Impacts on environment and health effects.	1,4	Lectures
8	Guest Seminar (topic varies) Project work – Presentation of Abstracts	4	Seminar; Group discussions & presentations
9	Low Carbon: A closer look at the various greenhouse gases, their source and impact on carbon emission. Mitigation measures.	2	Lectures and Q/A session
10	Low Carbon: Emerging technological solutions and implications of the low carbon future	2	Lectures and Q/A session
11	Impact of urbanization & Industrialization: Integrated water management and Low impact development	1	Lectures and Q/A session
12	Impact of urbanization & Industrialization: Solid Waste – generation, characterization, collection, treatment and disposal; land resource issues	1	Lectures and Q/A session
13	Presentation by student groups	4	Group presentations

### Appendix 1: Assessment Rubric

Performance Indicators/ Course LO Tested	Performance Level/Criteria			
	Outstanding: 4	Good: 3	Average, meet expectation: 2	Below expectations: 1
<b>Apply design measures to cater for increased urban stress/LO1</b>	Excellent ability in understanding key concepts and issues of urban stress (floods/waste/natural resource) and in applying knowledge in evaluating solutions	Good ability in understanding key concepts and issues of urban stress (floods/waste/natural resource) and in applying knowledge in evaluating solutions	Ability in understanding key concepts and issues in urban stress (floods/waste/natural resource) as related to urbanization	Unable to understand key concepts and issues in urban stress (floods/waste/natural resource) as related to urbanization
<b>Apply low carbon and/or renewable energy</b>	Excellent understanding of key concepts of low	Good understanding of key concepts of low carbon/ renewable	Ability in understanding key concepts of low	Unable to understand key concepts of low

<b>engineering solutions/LO2</b>	carbon/renewable energy, able to apply knowledge in evaluating renewable energy options, and able to perform energy efficiency calculations	energy and able to apply knowledge in evaluating renewable energy options	carbon/renewable energy	carbon/renewable energy
<b>Understand the global climate debate/LO3</b>	Excellent understanding of global climate debate and the role taken by the IPCC	Good understanding of the global climate debate and the role taken by the IPCC	Understanding of the global climate debate	Unable to understand the global climate debate
<b>Understand of broad range of current and emerging global environmental issues/LO4</b>	Excellent understanding of a broad range of current and emerging global environmental issues	Good understanding of a broad range of current and emerging global environmental issues	Understanding of a range of current and emerging global environmental issues	Unable to understand a range of current and emerging global environmental issues