

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	
Semester/Trimester/Others (specify approx. Start/End date)	
Course Author * Faculty proposing/revising the course	Perrine Hamel;#1124
Course Author Email	perrine.hamel@ntu.edu.sg
Course Title	Resilient Urban Systems
Course Code	ES3202
Academic Units	0
Contact Hours	39
Research Experience Components	

Course Requisites (if applicable)

Pre-requisites	0
Co-requisites	0
Pre-requisite to	0
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

The urban population is growing globally, creating or exacerbating major global environmental issues such as climate change and biodiversity loss. To understand the role that cities can play in mitigating these issues, this course aims to equip you with the basic knowledge and tools to analyze urban landscapes using the frameworks of resilience and ecosystem services. We will cover the major challenges that cities face in the 21st century and the role that natural infrastructure –forests, parks, trees, green roofs– can play in addressing these challenges. Through a group project, you will apply this knowledge in practice by articulating the potential for natural infrastructure and presenting an urban ecosystem services assessment for a case study of your choice.

Course's Intended Learning Outcomes (ILOs)

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

ILO 1	Describe the major challenges and opportunities faced by cities in the Anthropocene
ILO 2	Explain how natural infrastructure can address urban challenges using the analytical frameworks of resilience and ecosystem services
ILO 3	Apply modelling tools to assess ecosystem services provided by natural infrastructure in cities
ILO 4	Collaborate with other students to produce and present an assessment of urban ecosystem services in a case study

Course Content

The course comprises two parts: i) a series of lectures aiming to provide the basic theoretical knowledge on urban challenges and natural infrastructure –what it is and how it benefits people; ii) practical activities aiming to consolidate this knowledge through discussions and hands-on modeling experience (see weekly schedule for details). If possible, a visit to a Government Agency in Singapore will complement the course by providing some local examples of the concepts studied in class.

Reading and References (if applicable)

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Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Introduction to course		*Readings will be provided to you for certain weeks to prepare discussion and class activities	In-person	
2	Introduction to urban landscapes: challenges and opportunities	1	*Readings will be provided to you for certain weeks to prepare discussion and class activities	In-person	
3	Urban resilience and ecosystem services analyses	1,2	*Readings will be provided to you for certain weeks to prepare discussion and class activities	In-person	
4	Urban natural infrastructure (NI) for planetary health	1,2	*Readings will be provided to you for certain weeks to prepare discussion and class activities	In-person	
5	Urban NI for water management	1,2		In-person	Tutorial: Urban NI for air quality and temperature regulation
6	Recap and quiz	1,2		In-person	
7	Modelling NI: InVEST 101	2,3,4		In-person	Tutorial: InVEST hands-on exercises
8	Tools to inform urban planning decisions	3,4		In-person	Tutorial: InVEST hands-on exercises
9	Informing urban planning decisions: case studies	1,2,3,4		In-person	Tutorial: project work

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
10	Modelling NI: Model evaluation	3,4		In-person	Tutorial: project work
11	Mid-project presentations	1,2,3,4		In-person	Tutorial: project work
12	Work on group project	3,4		In-person	Tutorial: class presentations
13	Feedback on class presentations	1,2,3,4		In-person	Tutorial: recap and feedback

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lecture	Lectures effectively convey information on fundamental theories and key concepts and to bring you up to similar levels of knowledge (ILO 1 and 2)
Interactive team-based activities	Various activities (discussion groups, presentation, etc) to help you analyse, formulate and communicate a deep understanding of topics that are fundamental to natural infrastructure management (ILO 1 and 2)
Computer modeling	Computer models allow you to gain technical skills and test your ability to apply concepts in practice (ILO 3)
Project-based learning	Project-based learning allows you to develop critical thinking, applying environmental knowledge in the real world, and hone communication and collaboration skills (ILO 4)

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): Others([quiz/test] In class quizzes and Discussions)	1,2,3,4		20	Individual		
2	Continuous Assessment (CA): Others([quiz/test] Mid-term quizzes)	1,2		20	Individual		
3	Continuous Assessment (CA): Others([group or individual projects/evaluations] Computer Modeling Project)	2,3		25	Individual		
4	Continuous Assessment (CA): Others([presentations] Presentation and report)	1,2,3,4		35	Team		

Description of Assessment Components (if applicable)

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Formative Feedback

You will receive informal feedback continuously throughout the course where appropriate, and formal feedback following every assignment. In addition, I will be available to answer questions regarding your research or assignments throughout this course.

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
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Course Policy

Policy (Academic Integrity)

Policy (General)

(1) General

You are expected to complete all assigned pre-class readings and activities on time, attend all lectures and class discussions, and submit all scheduled assignments and tests by due dates. You are expected to take responsibility to follow up with course notes, assignments and course related announcements for seminar sessions they have missed. You are expected to participate in all discussions and activities.

Policy (Absenteeism)

(2) Absenteeism

Absence from any part of the course without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate. There will be limited make-up opportunities. If you miss a lecture or discussion group exercise you must inform me via email (perrine.hamel@ntu.edu.sg) prior to the start of the class.

Policy (Others, if applicable)

(3) Compulsory Assignments

You are required to submit compulsory assignments on due dates, unless a valid reason is provided. Valid reasons include falling sick supported by a medical certificate.

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Last Updated By: Koh Yi Jing