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

Course Overview

Expected Implementation in Academic Year (New format)	AY2024-2025
Semester/Trimester/Others (specify approx. Start/End date)	Semester 2
Course Author * Faculty proposing/revising the course	Lee-Chua Lee Hong
Course Author Email	clhlee@ntu.edu.sg
Course Title	Microbiological Principles of Environmental Engineering
Course Code	EN2002
Academic Units	3
Contact Hours	39
Research Experience Components	Not Applicable

Course Requisites (if applicable)

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

Course Aims

The aim of this course is to introduce general concepts of microbiology, microbial ecology and their environmental applications. The course will provide a basic understanding of cellular organization, metabolism, function, and biological interaction of key environmental microorganisms with particular attention to biology and microbiology of the natural environment and environmental engineering processes.

Course's Intended Learning Outcomes (ILOs)

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

ILO 1	Describe cellular structure, organization and function of key environmental microorganisms.
ILO 2	Describe and distinguish main features of different types of metabolisms.
ILO 3	Quantitatively analyse microbial population growth and community biodiversity.
ILO 4	Explain the importance of ecosystems, role of microorganisms in ecosystems, and how materials cycle and energy flow in ecosystems.
ILO 5	Describe the main culture-dependent and culture-independent approaches that are usually used in microbial ecology.
ILO 6	Relate key microorganisms and microbial processes to specific environmental engineering applications and environmental public health issues.
ILO 7	Quantitatively analyse microbial processes in specific environmental engineering applications.

Course Content

S/N	Topic
1.	Cell structure, metabolism and organism physiology
2.	Genetics and molecular biology
3.	Natural ecosystems and biodiversity
4.	Material and energy flows in ecosystems
5.	Biological interactions
6.	Microbial ecology
7.	Public Health microbiology
8.	Microbiology of water treatment
9.	Microbiology of wastewater treatment

Reading and References (if applicable)

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

Planned Schedule

Week or Session	Topics or Themes	ILO	Delivery Mode	Activities	Readings
1	Cell structure, metabolism and organism physiology	1, 2, 3	In-person	Lectures and tutorials	
2	Genetics and molecular biology	1, 2	In-person	Lectures and tutorials	
3	Natural ecosystems and biodiversity	3, 4	In-person	Lectures and tutorials	
4	Material and energy flows in ecosystems	3, 4	In-person	Lecture and Tutorial	
5	Biological interactions	3, 4	In-person	Lecture and Tutorial	
6	Microbial ecology	3, 4, 5	In-person	Lecture and Tutorial	
7	Public Health microbiology	6	In-person	Lecture and Tutorial	
8	Microbiology of water treatment	6, 7	In-person	Lecture and Tutorial	
9	Microbiology of wastewater treatment	6, 7	In-person	Lecture and Tutorial	
10	Microbiology of solid waste transformation and soil remediation	6	In-person	Lecture and Tutorial	
11	Microbiology of air and air treatment	6	In-person	Lecture and Tutorial	

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lecture	Formal lectures on the topics with in-class discussions
Tutorial	This helps students to achieve one or more of the outcomes as they need to work on tutorial questions using the concepts and principles taught in lectures. (The class is split into 2 groups for tutorials so that the instructor-student interaction can be more effective.)

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	Summative Assessment (EXAM): Final exam(Final Examination)	1,2,3,4,5,6,7	EAB SLOs a, b, d, e, g, l	60		Individual	Holistic	Relational
2	Continuous Assessment (CA): Test/Quiz(Quiz)	1,2,3,4,5,6,7	a, b, d, e, g, l	20		Individual	Analytic	Multistructural
3	Continuous Assessment (CA): Test/Quiz(Quiz Session)	1, 2, 3, 4, 5, 6, 7	a, b, d, e, g, l	20		Individual	Analytic	Multistructural

Description of Assessment Components (if applicable)

Quiz 1 and Quiz 2 with the weightage of 20% each. Quiz questions are in the format of MCQs/True or False and Q&A.

Formative Feedback

1. Feedback will be through the dissemination of the students' performance in quizzes as well as review of the quiz questions in tutorial class.
2. Additional channel will be through individual consultation initiated by students on their particular learning needs.

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
Systems Thinking	Intermediate
Embrace Challenge	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

Students are expected to take all scheduled tests by due dates. Students are expected to take responsibility to follow up with course notes, assignments and course related announcements.

Policy (Absenteeism)

(2) Absenteeism

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.

Policy (Others, if applicable)

(3) Instructions to Examination Candidates

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

This course will adopt NTU's policy on the use of AI for take-home assignments and reports, and project reports and presentation slides. More details could be found via the link https://entuedu.sharepoint.com/sites/Student/dept/ctlp/SitePages/Exploring-the-Impact-of-Generative-Artificial-Intelligence-(GAI)-Tools-on-Education.aspx#1-proper-citations-and-acknowledgements

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