

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	2024-2025
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	Readings	Delivery Mode	Activities
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	<p>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.</p> <p>(The class is split into 2 groups for tutorials so that the instructor-student interaction can be more effective.)</p>

Planned no. of hours for learning activities (across entire course)

'Learning activities' refer to the range of activities students will engage in, in-person and online, to acquire the course's intended learning outcomes.

No.	Category	Planned no. of hours
1	<p><u>Lecture-based sessions</u></p> <p>Learning activities where primarily, students receive content and perform notetaking.</p>	26
2	<p><u>Participation-based classroom sessions (Tutorials, Seminars, Studios)</u></p> <p>Learning activities where primarily, students are expected to engage actively with the instructor, their peers and the content.</p>	13
3	<p><u>In-house practical sessions (Labs)</u></p> <p>Learning activities where students engage in hands-on activities to conduct experiments, with the guidance of instructors, alongside peers, within the NTU campus.</p>	0
4	<p><u>In-house practical sessions (Practicum)</u></p> <p>Learning activities where students engage in hands-on activities, with the guidance of instructors, alongside peers, within the NTU campus.</p>	0
5	<p><u>Self/Group learning (without instructor)</u></p> <p>Learning activities where students are expected to engage in independent learning. For example, preparing for classes, labs and practicum, engaging in readings, completing quizzes or tasks.</p>	52
6	<p><u>Others</u></p> <p>Please specify:</p>	0

No.	Category	Planned no. of hours
	Total Planned no. of hours (across entire course)	91

Estimated percentage of hours for online and in-person learning, based on the total estimated no. of learning activity hours (across the semester):

Percentage of hours of Online learning (Includes synchronous and asynchronous learning)	0
Percentage of hours of In-person learning	100

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	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

<ol style="list-style-type: none"> Feedback will be through the dissemination of the students' performance in quizzes as well as review of the quiz questions in tutorial class. 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>

NTU2025 Education Initiatives

In this course, the following NTU2025 education initiatives are emphasised:

No.	Initiative	Description	Select
1	Interdisciplinary learning	Students learn through applying more than one disciplinary framework to solve problems or examine issues from different perspectives.	<input type="checkbox"/>
2	Collaborative learning	Students learn through sharing and working with one another to solve problems or address issues.	<input type="checkbox"/>
3	Experiential learning	Students learn through activities that have significant elements of observation and reflection of concrete experience .	<input checked="" type="checkbox"/>

External Partner

Indicate the organisation's name(s) and describe the nature of involvement e.g., co-curation of course, speaker or instructor (include no. of course hours if known).

No.	Organization Type	Organisation Name	Nature of involvement
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Appendix with Rubric (Assessment Criteria)

Please remember to attach the Appendix with Rubric (Assessment Criteria) if you have uploaded any.

Last Updated Date: 19-09-2024 07:28:04

Last Updated By: Yang, En-Hua

Please refer to the next page for the current status of approval as captured by the Curriculum Management Application.

Progress of Approval Path

This version of the course details, submitted with the Cover Page, has been approved at the levels of:

Approval Level	Triggered By	Approved Date & Time
Chair (or delegate), CEE	Yang, En-Hua	19-09-2024 07:28:04

Final Approval Status

The approval process has been completed on 19-09-2024 07:28:04, based on the Approval Path shown above.

Note: If no Approval Path is shown above, the Course has been approved through offline means (e.g. routing by emails). Please access the [course](#) in the Curriculum Management Application and refer to its Attachment tab for the necessary approval documents/ communication.