



Course Syllabus

**ICBI 214 – General Microbiology 4 (4-0-8)
Trimester II, 2022-2023**

Course instructor:

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Office hours:

Tuesday 12:00-14:00
Wednesday 9:00-10:00
Thursday 9:00-10:00

Pre-requisite:

ICBI 121 Biology I

Co-requisite:

ICBI 271 General Microbiology Laboratory

Course description:

Structure, physiology, and ecology of viruses, bacteria, protozoa, and fungi, especially bacteria, aspects of microbiology importance in health, sanitation, food processing, and industry

Course Goal

ICBI 214 General Microbiology 4 (4-0-8) is a 4-credits course taught over a 12-weeks trimester for students in the Biological Sciences Program. The teaching and learning activities include lectures, discussion, recitation activities, one written assignment, optional online discussion, and self-study. Assessments include mid-term and final written assessments, written and oral communication of the written assignment. This course focuses on the concepts in microbiology to expose the students to microbial diversity and evolution, structure and function, metabolic pathways, information flow and genetic, microbial systems, and the impact of microorganisms. The students will be introduced to bacteriology, virology, mycology, and immunology. The importance of microorganisms to health, sanitation, food processing, and industry, in particular, will be emphasized. Equally important are the parallel practical activities in the co-requisite course, ICBI271 General Microbiology Laboratory 2 (0-4-2). ICBI271 provides the practical skills in handling microorganisms (i.e., culture inoculation), staining, and the use of selective media and biochemical tests. Thus, while ICBI271 provides practical and psychomotor development, ICBI214 provides the concepts and cognitive development.

Course learning outcomes (CLO):

By the end of the course, successful students will be able to:

- CLO1 - Describe the basic biology of microorganisms (e.g., viruses, bacteria, protozoa, helminths, and fungi), including cell structure and function, growth and division, energy and metabolism, metabolic pathways, microbial evolution and genetics, and information flow within a cell
- CLO2 - Distinguish and explain microbial diversity, interactions, microbial ecology, and impact of microorganisms in various environments/habitats
- CLO3 - Apply the knowledge of microorganisms in the contexts of health, sanitation, food processing, and industry

Lecture & classroom:

- Tuesday, Thursday, 12-14:00; on-site; Zoom as back-up, please use your @student.mahidol.edu
- Active participation and submission of the assignment will be required.

Texts:

- Willey JM, et al. Prescott's microbiology. 10th Ed. International Edition. Boston: McGraw-Hill Higher Education; 2017.
- Cowan MK, et al. Microbiology Fundamentals: A clinical approach. 3rd Ed. International Edition. New York: McGraw-Hill Education; 2019.
- Madigan MT, et al. Brock biology of microorganisms. 14th Ed. Global Edition. Harlow, Essex: Pearson Education Limited; 2015.
- Parker N, et al. Microbiology. Openstax™: Rice University; 2018.
- Online academic databases (i.e., sciencedirect.com, isiwebofknowledge.com)
- McLaughlin S, Petersen J. , Queensborough Community College. Laboratory Exercises in Microbiology: Discovering the Unseen World Through Hands-On Investigation. CUNY Academic Works; 2016. Available from: https://academicworks.cuny.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1015&context=qb_oers
- Bruslind L. General Microbiology. 1st Ed. Oregon State University; 2021. Available from: <https://open.oregonstate.education/generalmicrobiology/>
- Smith M, Selby S. Microbiology for Allied Health Students. University System of Georgia; 2017. Available from: <https://oer.galileo.usg.edu/biology-textbooks/15/>
- Bruslind L. Allied Health Microbiology. Oregon State University; 2017. Available from: <https://open.oregonstate.education/microbiology/>

*Previous editions of the textbook are available from the library, but older editions may not reflect up-to-date knowledge as knowledge progresses. The optional online textbook will be available to subscribe from the publisher. **Although lecture slides are provided, they are simply guidelines and are not sufficient for comprehensive learning. Please be responsible for reading the textbook.

Evaluation/Assessment:

| CLOs | Assessment Activity | Assessment Methods | Assessment Ratio | Remark |
|------------------------------------|---|---------------------------|------------------|---------------|
| Formative assessment CLO1, 2, 3 | Active learning and other assignments; Infographic (canva.com); Venn Diagram; Growth calculation; In-class oral presentation; in-class study questions | Faculty & Peer assessment | 15% | In-class only |
| | Quiz 1, Quiz 2 (2.5% each) | MCQ | 5% | In-class |

| | | | |
|--|--------------------------|--------------------|-----------------------|
| Written assignment (1 st draft) | Assessment rubric | 5% | Optional second draft |
| Written assignment (final draft) | Assessment rubric | 20% | Near perfection |
| Mid-term assessment | Written assessment | 25% | |
| Summative assessment | Final written assessment | Written assessment | 30% |

* Extra credit can be earned through participation in the online discussion forum and submission of a reflective paragraph (max. 3%).

Assignment submission and course communication:

Submission of assignments must be made on Google Classroom or via email to <tumnoon.cha@mahidol.ac.th (.edu)>.

Course communication will be through:

- 1) University email <@student.mahidol.ac.th> and <@student.mahidol.edu>
- 2) Learning management system – Google Classroom.

*Please beware that the course materials are protected by copyright. As such, course materials may not be copied, distributed, or published in any form without authorization.

Grading Scheme and Academic Standing:

| Grade | Achievement | Final score (% range) | GPA |
|-------|-------------|-----------------------|-----|
| A | Excellent | 90-100 | 4.0 |
| B+ | Very good | 85-89 | 3.5 |
| B | Good | 80-84 | 3.0 |
| C+ | Fairly good | 75-79 | 2.5 |
| C | Fair | 70-74 | 2.0 |
| D+ | Poor | 65-69 | 1.5 |
| D | Very poor | 60-64 | 1.0 |
| F | Fail | Less than 60 | 0.0 |

*Other letter grades, without credit points, are assigned as follows: I – Incomplete (awaiting evaluation); T – Transfer of credit; X – No report from the instructor; P – In progress (the study is incomplete); S – Satisfactory; U – Unsatisfactory; AU – Audit (a study which leads to no credit); W – Withdrawal

** assignment of other letter grades will follow the policies and rules outlined in Mahidol University International College Student Handbook 2022-2023.

Student course evaluation: In course evaluation and improvement, students will be asked to provide feedback at mid- and post-course. For **mid-course evaluation**, the **Start-Stop-Continue technique** will be employed. For **post-course evaluation**, the assessment will be conducted through **MUIC Sky System**.

Academic misconduct: Academic dishonesty is prohibited and is taken very seriously. It includes cheating, fabrication, falsification, and plagiarism. Students should be aware of the rules, policies, and disciplinary procedures for academic dishonesty in the Mahidol University International College Student Handbook 2022-2023. Students who committed a severe breach of the university rules and regulations may be dismissed from MUIC.

Classroom, Building, and Examination Policies and Code of Student Conduct: Students are expected to be aware of their conduct. Due to the Covid-19 pandemic and relaxation scheme, the instruction will be in accordance to the MUIC guideline and policy. Students are expected to be responsible for participating and attend classes.

Course outline & schedule:

| Wk | Date | Topic/Section/Description | Reading/Chapter | Remark |
|----|--------------------|--|-----------------------|---|
| 1 | Tue., 10 Jan. 2023 | Course outline and expectation; Historical perspective | 1.1-1.4 | |
| | Thu., 12 Jan. 2023 | Microscopy | 2.1-2.5 | Recitation 1 |
| 2 | Tue., 17 Jan. 2023 | Bacterial cell structure and function | 3.1-3.9, 4.1-4.5 | |
| | Thu., 19 Jan. 2023 | Archaeal and eukaryotic cell structure and function | 5.1-5.8 | Recitation 2 |
| 3 | Tue., 24 Jan. 2023 | Viruses and other acellular infectious agents; | 6.1-6.7 | |
| | Thu., 26 Jan. 2023 | Microbial growth; Growth curve | 7.1-7.9 | Recitation 3 |
| 4 | Tue., 31 Jan. 2023 | Culture media and requirements, quorum sensing and biofilm | 7.1-7.9 | Quiz 1 |
| | Thu., 2 Feb. 2023 | Control of microorganisms in the environment | 8.1-8.7 | Recitation 4 |
| 5 | Tue., 7 Feb. 2023 | Microbial metabolism; Microbial catabolism | 10.1-10.7; 11.1-11.11 | |
| | Thu., 9 Feb. 2023 | Anabolism | 12.1-12.2 | Recitation 5 |
| 6 | Tue., 14 Feb. 2023 | Microbial genome and replication; Microbial genetics | 13.1-13.8; 16.1-16.9 | |
| | Thu., 16 Feb. 2023 | Review | | Recitation 6 |
| 7 | Tue., 21 Feb. 2023 | Mid-term review and assessment period | | Closed-book, calculator allowed, 1 h 50 m exam |
| | Thu., 23 Feb. 2023 | Biogeochemical cycling | 28 | Term paper 1 st draft due midnight of Thu., 23 Feb. 2023 |
| 8 | Tue., 28 Feb. 2023 | Marine and freshwater ecosystem, Terrestrial Ecosystem; | 30, 31 | |
| | Thu., 2 Mar. 2023 | Microbial ecology and interaction; Archaea | 32.1-32.3; 20.1-20.4 | Recitation 7 |
| 9 | Tue., 7 Mar. 2023 | Bacterial diversity | 21-24 | |
| | Thu., 9 Mar. 2023 | Bacterial diversity; Protists | 21-24; 25.1-25.5 | Recitation 8 |
| 10 | Tue., 14 Mar. 2023 | Fungi; Viruses | 26.1-26.7; 27.1-27.8; | Quiz 2 |
| | Thu., 16 Mar. 2023 | Innate immunity | 33.1-33.6 | Recitation 9 |
| 11 | Tue., 21 Mar. 2023 | Adaptive immunity | 34.1-34.10 | Term paper final draft due midnight of Tue., 21 Mar. 2023 |
| | Thu., 23 Mar. 2023 | Microbial pathogenicity | 35.1-35.3 | |
| 12 | Tue., 28 Mar. 2023 | Helminths; Industrial applications | 42.1-42.6 | |
| | Thu., 30 Mar. 2023 | Review | | |

*The date for the final assessment will be according to MUIC assigned date.