Module Information

Module Code	Module Title	Semester	Mod. Credits
LSM2291	Fundamental Techniques in Microbiology	1 & 2	4

Module Description

This module gives an overview of microbial diversity, the biological properties of microbes, methods and approaches in the study of microbiology. At the end of the module, students should have fundamental knowledge of microbiology, including tools in the study of cells and microbes and the awareness of biosafety, and students should be excited by the microbial world and wishing to know more.

Eligibility and requirements

Prerequisites (prior knowledge required): GCE `A' Level or H2 Biology or equivalent, or

LSM1301

Corequisites: NIL

Precluded modules (if any): NIL

Instructional methods

The following instructional methods will be employed:
1) Lecture
2) Laboratory (Dry/Wet)

Assessment modes

The following assessments will be employed:
1) CA1 = 30%
2) CA2 = 40%
3) Lab report = 30%

Contact information for Module Coordinator and other instructors

Dr. John Chen
(Module Coordinator, Sem 1)
Office: MD4, Level 3
Phone number: 66015208
Email: miccjy@nus.edu.sg

Assoc. Prof. Justin Chu
(Module Coordinator, Sem 2)
Office: MD4, Level 5
Phone number: 65163278
Email: miccjh@nus.edu.sg

Course content and syllabus

Both the lectures and practical classes provide an overview of microbial diversity, the biological properties of microbes, methods and approaches in the study of microbiology with the emphasis on the fundamental techniques in microbiology. The concept of biosafety in microbiology research is also introduced in this module.

Lectures:
(1) Introduction to the diversity of microbial world and phylogeny
(2) Biosafety
(3) Isolation and identification of microbes
(4) Microbes in the environment: Where are microbes found and why are they there
(5) Microbes and immunity

Practical Classes (Wet Lab):
(1) Soil microbiology: Isolation, identification and characterization (antibiotic producers, polysaccharide producers)
(2) Water-borne pathogens: Isolation, enumeration, physiology and behaviour outside the host
(3) Food microbiology: Isolation, enumeration and characterization (yeast, lactic acid bacteria, enteric bacteria)
(4) Human skin microbiology: Isolation, are they pathogens?

Learning activities

The following learning activities will be employed to achieve the learning outcomes of knowledge, cognitive skills, generic skills and/or attributes development stated in the 'Intended Learning Outcomes' below:

1) Expedition/Field Trip/Site Visit
2) Laboratory Activities (Wet/Dry)
3) Report/Essay Writing

This module provides an overview and introduction to the fundamentals of microbiology with the heavy emphasis on the development of technical skills to basic microbiology. The content of lectures are kept to minimal (no more than 13 hours) and a series of interesting practical sessions (32 hours) are lined up for the students. There is a lecture that introduce to the concept of biosafety in microbiology research and a field trip is organized for students to visit a microbiology-related industries such as Yakult Singapore and Asia Pacific Breweries Singapore. Together, these learning activities will ensure that the students will achieve the learning outcomes of knowledge, cognitive, generic skills and/or attributes development as stated above.

Intended Learning Outcomes

Knowledge development

At the end of the module, students should have fundamental knowledge of microbiology, including tools in the study of cells and microbes and the awareness of biosafety, and students should be excited by the microbial world and wishing to know more.

This module will provide the opportunities to develop the following cognitive skills, generic skills and attributes:

Very Good Opportunities	Good Opportunities
1) Remember: Recognize, Recall & Know 2) Understand: Question, Connect & Explain 3) Apply: Use, Execute & Implement 4) Analyze: Differentiate, Organize & Attribute 5) Written Communication 6) Planning, Organizing & Management skills 7) Self-Efficacy 8) Adaptability & Learnability 9) Resilience	1) Evaluate: Review, Check & Critique 2) Create: Ideate, Plan, Generate & Produce 3) Verbal/Oral Communication 4) Analytical & Critical Thinking 5) Quantitative Thinking 6) Interdisciplinary Thinking 7) Creative Thinking 8) Problem-solving & Decision-making 9) Collaboration & Teamwork

Required and/or recommended readings

(1) Foundations in Microbiology, Talaro