



Course Description

MCB2010 | Microbiology | 3.00 credits

This course introduces basic principles of morphology, physiology, biochemistry and genetics of microorganisms. The students will learn representative types of microorganisms including bacteria, algae, protozoa and viruses and the roles of various microorganisms in health and disease, modes of transmission and the effects of their activities in our biosphere. Students are strongly recommended to take the laboratory component MCB2010L. Prerequisites: BSC2010/2010L or BSC2085/2085L, CHM1033/1033L or CHM1045/1045L

Course Competencies:

Competency 1: The student will learn the history and the scope of microbiology, the contribution of various scientists to the different branches of microbiology, and the contribution of microorganisms to our environment and natural processes by:

1. Summarizing the history of microbiology's development and the contribution of various pioneers in microbiology and disease prevention
2. Describing the relevant characteristics of each of the five groups of microorganisms
3. Explaining the two opposing theories of the origin of microorganisms - spontaneous generation and biogenesis explaining the germ theory of disease
4. Understanding the roles played by microorganisms on Earth

Competency 2: The student will learn the role of microscopy and staining in the study of microorganisms by:

1. Explaining the function of the major parts of the microscope
2. Discussing magnification and resolving power of microscopes
3. Comparing the different types of microscopies
4. Discussing the procedure and significance of the gram stain
5. Contrasting simple, differential and special staining techniques

Competency 3: The student will learn the structure and functional characteristics of prokaryotic cells by:

1. Comparing prokaryotic and eukaryotic cells
2. Describing structures of prokaryotic cells
3. Describing the endosymbiotic theory of the origin of mitochondria and chloroplasts
4. Describing the formation, function and significance of endospores
5. Explaining various mechanisms for transport of molecules across the plasma membrane, and group translocation
6. Discussing the effects of osmosis on microbial control
7. Contrasting the structures of the cell wall of gram-positive, gram-negative and acid-fast cells and their effect on differential staining
8. Describing the structure and function of the prokaryotic flagellum
9. Understanding the role of cellular structures in the formation of microbial communities and biofilms

Competency 4: The student will learn the taxonomy and classification of microorganisms by:

1. Discussing taxonomy, taxa and phylogeny
2. Discussing the advantages of the three-domain system over other traditional methods to assess the phylogenetic relatedness among microorganisms
3. Defining binomial nomenclature
4. Comparing methods used in classifying and identifying microorganisms
5. Contrasting cladograms and dichotomous keys
6. Explaining the main objectives of Bergey's manual of systematic and determinative bacteriology

Competency 5: The student will summarize distinct structural and physiological characteristics of the major groups of prokaryotic and eukaryotic microorganisms by:

1. Comparing features common to microbes in the domain archaea, domain bacteria and domain Eukarya
2. Discussing the major groups of bacteria
3. Describing the major groups of archaea
4. Comparing the major groups of fungi and protists
5. Listing the major groups of eukaryotic parasites

General Education Learning Outcomes:

- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Describe how natural systems function and recognize the impact of humans on the environment