

**Course Description****MCB4503 | Virology | 3.00 credits**

This course will cover general virology, including virus structure, replication cycles, infection and mode of transmission of human diseases. Student will learn the major families of the bacterial (bacteriophages), plant and animal viruses and how they influence infection. Prerequisites: MCB3023, 3023L.

**Course Competencies:**

**Competency 1:** The student will demonstrate knowledge of the nature of viruses and different methods of viral study by:

1. Explaining the biological and physical properties of viruses
2. Describing the differences between viruses vs. virions
3. Summarizing the different methods of viral study
4. Explaining tissue and cell culture
5. Discussing cloning genes and genomes, DNA sequencing, and PCR. Listing analysis of components SDS treatment & electrophoresis for nucleic acids

**Competency 2:** The student will demonstrate knowledge of viral structure by:

1. Discussing the characteristics of the DNA and RNA genome
2. Listing the characteristics and the structure of the capsid
3. Explaining the characteristics of envelope membrane from the host cell

**Competency 3:** The student will demonstrate knowledge of viral classification by:

1. Explaining the Baltimore's classification for viruses that infect eukaryotic cells
2. Summarizing the classification by host components and morphology
3. Listing the most important characteristics of DNA Viruses
4. Describing the most important characteristics of RNA viruses
5. Explaining the classification by producing mRNA

**Competency 4:** The student will demonstrate knowledge of the Leviviridae, Microviridae, Podoviridae, and Myoviridae by:

1. Listing distinguishing characteristics of these viruses
2. Explaining the structure (size, envelope, nucleocapsid, physical genetic map and capsid) of these viruses. Summarizing classification and characteristic members
3. Analyzing viral multiplication

**Competency 5:** The student will demonstrate an understanding of distinct structural and physiological characteristics of the Siphoviridae by:

1. Summarizing distinguishing characteristics
2. Describing the structure of the siphoviridae
3. Explaining classification and characteristic members
4. Analyzing viral multiplication
5. Assessing clinical correlations related to lysogeny

**Competency 6:** The student will demonstrate knowledge of RNA and DNA plant viruses by:

1. Classifying plant viruses as single-strained RNA (SS RNA), double-strained RNA (DS RNA ); single- strained DNA (SS DNA), and double-strained DNA (DS DNA)
2. Demonstrating knowledge about the genetic composition of plant viruses
3. Demonstrating knowledge of different viruses' shapes (rods, polyhedral, and bullets)

**Competency 7:** The student will demonstrate knowledge of the epidemiology of selected plant viruses by:

1. Discussing the plant viruses' methods of transmission

2. Listing selected plant viruses and demonstrating knowledge of current methods of detection

**Competency 8:** The student will demonstrate knowledge of RNA animal viruses by:

1. Describing the structure, replication, and diseases caused by viruses in the families Picornaviridae, Togaviridae, Flaviviridae, Caliciviridae, Astoviridae, Coronaviridae, and Arteriviridae
2. Explaining the structure, replication, and diseases caused by viruses in the families Rhabdoviridae, Paramyxoviridae, Filoviridae, Orthomyxoviridae, and Bunyaviridae

**Competency 9:** The student will demonstrate knowledge of viruses with Reverse Transcriptases by:

1. Describing the structure, replication, and diseases caused by viruses in the family Retroviridae  
Describing the structure, replication, and diseases caused by viruses in the family Hepadnaviridae

**Competency 10:** The student will demonstrate knowledge of DNA animal viruses by:

1. Describing the structure, replication, and diseases caused by viruses in the families Poxviridae, Herpesviridae, Adenoviridae, Poliomaviridae, Papillomaviridae, and Parvoviridae  
Listing prions, viroids, satellites, satellite viruses, and comparing them to other viruses and bacteria

**Competency 11:** The student will demonstrate knowledge of prions by:

1. Comparing prions to viruses, viroids, and bacteria
2. Describing infections caused by prions
3. Describing the occurrence, transmission, and epidemiology of diseases caused by prions

**Competency 12:** The student will demonstrate knowledge of bacteriophages by:

1. Describing the structure, replication, and diseases caused by bacteriophages
2. Listing selected bacteriophages
3. Demonstrating current methods of detection

**Learning Outcomes:**

- Communicate effectively using listening, speaking, reading, and writing skills
- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information
- Demonstrate knowledge of ethical thinking and its application to issues in society
- Create strategies that can be used to fulfill personal, civic, and social responsibilities