



MICROBIOLOGY I

MICR 400

Course Description

This course has three sections. The first section is devoted to understanding the basic concepts of immunology and dysfunctional aspects of the immune system. The second section deals with basic bacteriology, virology and mycology which include: classification, structure, growth and replication; mechanisms of gene transfer; mode of action of antimicrobial agents and microbial resistance, pathogenesis; sterilization and disinfection; and laboratory diagnostic methods. The third section deals with the description of the major human parasites; emphasis is given on the life cycle, epidemiology, clinical diseases, diagnosis and prevention/control.

Credit: 3 semester credits

Repeatable: No

Competencies: At the end of Microbiology I and II, the student will have had the opportunity to practice the following competencies through meeting the objectives of the course:

Medical Knowledge

- MK1 Demonstrate knowledge of normal and abnormal structure and function of the human body on the macroscopic, microscopic and molecular levels.
- MK2 Identify the pathology and pathophysiology of various diseases and correlate them with clinical signs and symptoms.
- MK3 Demonstrate knowledge of common or significant, acute and chronic clinical problems.
- MK5 Demonstrate comprehension of clinical interventions and agents including pharmaceutical, surgical, genetic, complementary and alternative medicines, and other therapies.
- MK6 Demonstrate knowledge and ability to interpret epidemiological and public health contributions to understanding health and disease.

Course Structure

The course taught primarily using didactic lecture technique using ppt. presentations. As a means of visualizing and understanding difficult concepts animations and images are often included. To allow students apply learned knowledge cases/problems are frequently presented for discussion. Peer tutorials are available. The lectures are recorded for use as a study aid. This gives students an opportunity to review lecture material without the need to take detailed notes in class and it allows them to listen more attentively, focus on the highlights of the lecture, create connections between diverse sections of the course and understand conceptually

complex ideas. Nevertheless, students should realize that listening to a recorded lecture cannot be a substitute for attending classes

Objectives

A. IMMUNOLOGY: Students who complete this section are expected to:

1. Discuss the hematopoietic development of cells of the immune system
2. Describe the cells of the immune system and the organization of the lymphoid system
3. Identify the components of innate immunity and discuss their role in defense against infections
4. Describe complement activation pathways, the role of activation products and diseases associated with deficiencies of complement system
5. Discuss the process of inflammation and its role in immunity
6. Describe the origin, maturation, activation, differentiation and function of B and T lymphocytes.
7. Discuss the nature of antigens, antigen processing and presentation;
8. Describe the nature and role of MHC
9. Explain how cytokines function to stimulate the interaction of immunocytes, including the source and function of these cytokines.
10. Explain the major features of the immunoglobulins including differences in their structure, their biological importance in immunity, their interaction with the complement system, and their role in hypersensitivity, autoimmunity, and immunodeficiency.
11. Explain the hazard to health when the immune system fails as in autoimmunity, immunodeficiency and the development of tumors and cancers.
12. Explain mechanisms of hypersensitivity reactions and apply this knowledge to explain the pathogenesis of certain diseases.
13. Describe the immunological techniques used to measure immune responses and appreciate the clinical application of these methods.
14. Recognize the role of the immune system in rejection of transplanted tissue
15. Recognize the therapeutic value of monoclonal antibodies and cytokines in autoimmune diseases, cancer as well as tissue transplantation
16. Describe the nature of vaccines and explain vaccine development approaches

B. BASIC MICROBIOLOGY. Students who complete this section are expected to:

1. Describe the morphology, growth and replication of all organisms included in this section: bacteria, virus, and fungi
2. Describe the genetic mechanisms used by these agents in their replication, in their life cycle, and in their development of resistance to antimicrobial agents
3. Identify major the virulence attributes used by these pathogens
4. Explain the mode of action of the different antimicrobial agents and mechanism of resistance of pathogens to these antimicrobial agents
5. Describe the use of sterilization, antiseptics and disinfectants in the control of pathogenic microorganisms.
6. Explain the laboratory diagnostic methods required to identify pathogenic bacteria, virus and fungi
7. Be aware of the dangers of handling biological specimens which contain pathogenic organisms.

C. PARASITOLOGY : After completion of the this section students are expected to:

1. List and categorize the most common human protozoan, helminthic parasites and arthropod parasites.
2. Able to distinguish morphologic criteria that differentiate the various groups of human parasites.
3. Describe the life cycle of these parasites including their important intermediate hosts and vectors.
4. Recognize geographic distribution, habitat and means of transmission of these pathogens.
5. Identify and explain major clinical and pathological manifestations associated with the various parasites.
6. Outline laboratory methods and differential diagnosis of parasitic infections
7. Discuss strategies applied to control and prevent parasitic infections
8. Evaluate the significance of immigrations and global travel on the importation of exotic parasites in non-endemic areas of the world

Schedule

The course schedule is posted at the beginning of the term on the online calendar. Weekly lecture schedule is provided in a separate file. The materials for quizzes and exams may be modified at the discretion of the Course Director when necessary. Students will be notified each time a change is required.

Assignments

- Students are asked to regularly read the lecture notes posted in the student drive at least once before attending each of the lectures. This will increase students' concentration on a topic during the lecture and also enhance the understanding of the subject contents during the lecture time.
- Students are often asked during lecture time to explore some relevant information of the topic themselves and discuss them in the class during the subsequent lecture time.

Textbooks and Reference Materials

Required text books:

1. Parham, P. The Immune System, edition 4, 2014, Garland Publishing
2. Murray, P.R Rosenthal, K.S. and. Pfaller, M.A. Medical Microbiology, 8th edition, 2016, Mosby/Elsevier

Recommended text books:

1. Levinson, W. E. Review of Medical Microbiology and Immunology, 14th edition, 2016, Lange/McGraw-Hill
2. Geha, R. and L. Notarangelo. Case Studies in Immunology, Edition 6th, 2011, Garland Publishing
3. Kaplan: USMLE Step 1 Immunology and Microbiology Lecture notes 2017.

Evaluation

Students are evaluated by 2 quizzes, a midterm and a final examinations. The quizzes comprise 20 questions each and are given around weeks 3 or 4 and 10 or 11. The midterm and final examinations are held during the weeks 7 and 14 respectively and will have approximately 60 questions each.

Grades

Grades are calculated on the basis of the points obtained by the students in the examination as shown in the following table:

Percent of Points	Letter Grade
95-100%	A(h)
90-94%	A
85-89%	B+
80-84%	B
75-79%	C+
70-74%	C
<70%	F

Attendance

Students are required to attend lectures. Class attendance is taken regularly. At the end of the term, a total of 10 points will be allocated for adherence to standard professionalism as well as regular class attendance. Absences may be excused on medical grounds or leave of absence approved by the administration.

The points a student can receive will be proportional (see below) to the number of lectures attended throughout the term and degree of professionalism demonstrated (subject to the professor's judgment).

<u>% of lectures attended</u>	<u>Points out of 10</u>
>95%	10
85-94	9
75-84	8
65-74	7
55-64	6
45-54	5
<45	0

Policies: As per the school's policies given in the student handbook.

Faculty:

Dr. Wezenet Tewodros, Professor and Course Director of Microbiology
wtewodros@trinityschoolofmedicine.org

Contact office hours: Tuesdays and Thursdays 2:00-4:00PM (subject to change) OR by appointment. Drop-in visits are also welcome.

Dr. Hari Nepal, Assistant Professor of Microbiology

hnepal@trinityschoolofmedicine.org

Contact office hours: Mondays and Wednesdays 2:00-4:00PM (Subject to change)

OR by appointment. Drop-in visits are also welcome.