

# Medical Microbiology and Immunology

J525

2006 Spring Semester

January 3 - May 6

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## ***COURSE OBJECTIVES:***

This course encompasses the autonomous disciplines of bacteriology, mycology, virology, immunology, and parasitology. Basic and clinical research in these fields have advanced our understanding of microbial pathogenicity and dramatically enhanced our ability to diagnose and treat infectious diseases. Knowledge of the infecting agent's identity, biological properties, and the host's response to the infecting agent are essential for an accurate clinical prognosis. The student will therefore learn medical microbiology, infectious diseases, and associated host responses through the study of:

1. Basic and clinical immunology.
2. The classification, physiology and pathogenicity of microorganisms.
3. Mechanisms of actions of antibiotics and chemotherapeutic agents.
4. Mechanisms of microbial virulence.
5. Infectious diseases common to North (and occasionally South & Central) America.

## **SUGGESTED TEXT:**

Murray, Rosenthal, Pfaller. 2005. Medical Microbiology, 5th ed., Elsevier

## ***EXAMS and GRADING:***

1. There will be 6 exams (one at the conclusion of General Immunology, Clinical Immunology, General Bacteriology, Clinical Bacteriology, Virology, and Mycology/ Parasitology) and comprehensive state-wide Immunology and Microbiology final exams (written by IUSM faculty).

Target exam dates:

Test 1 (General Immunology), week of January 23 (week 4)

Test 2 (Clinical Immunology), week of February 6 (week 6)

Test 3 (General Bacteriology), week of February 27 (week 9)

Test 4 (Clinical Bacteriology), week of March 27 (week 13)

Test 5 (General and Clinical Virology), week of April 10 (week 15)

Test 6 (General and Clinical Mycology and Parasitology), week of May 1 (week 18)

2. According to State-wide Microbiology standards, you must get at least a combined score of 60% on the final exam to pass the course.
3. Final grading:  
Honors, 92-100%  
High Pass, 84-91.9%  
Pass, 75-83.9%

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## LECTURE TOPICS

(see the appropriate core for details)

- Week 1-2: Introduction to Medical Microbiology; General Immunology:** Innate defense mechanisms; antigens; cells of the immune system; antibody structures, functions, and genetics; antigen/antibody interactions (RIA, ELISA, immunoblotting, etc.); complement; primary and secondary immune responses; major histocompatibility complex (structure, genetics, and function); control of antibody production (tolerance, immunization, and immunosuppressive agents); Cytokines; Inflammation.
- Week 3-4: Clinical Immunology:** IgE-mediated hypersensitive reactions (allergic rhinitis, asthma, atopic dermatitis); antibody-mediated cytotoxic reactions (hemolytic anemias, thrombocytopenias, and glomerulonephritis); Immune complex reactions (serum sickness, allergic pneumonitis, glomerulonephritis, autoimmune rheumatic diseases); Cell-mediated immune reactions, (contact dermatitis); Hypersensitive reactions in specific organs: GI allergy, pernicious anemia, Crohn's, ulcerative colitis, sarcoidosis, hepatitis, disseminated encephalomyelitis, MS, idiopathic polyneuritis, myasthenia gravis, thyroiditis, diabetes.
- Week 5-6: Clinical Immunology (contd):** Antibody immunodeficiencies; Cellular immunodeficiencies; combined immunodeficiencies; Plasma cell dyscrasias (multiple myeloma, Waldenstrom's, etc.); Leukemias; tumor immunology (lymphomas); blood group antigens (Lansteiner, etc.), transplantation immunology ; Reproductive Immunol.; Physiologic, age, and environmental influences.
- Week 6-7: General Bacteriology:** Morphology, ultrastructure, and taxonomy (walls, membranes, endospores, etc.); bacterial physiology; bacterial genetics; bacterial growth and nutrition; normal flora of humans; host-parasite relationships; antibiotics and chemotherapy; epidemiology.
- Week 8-9: Clinical Bacteriology:** medically important gram positive cocci (*Staphylococcus*, *Streptococcus*); medically important gram positive bacilli and coccobacilli (*Listeria*, *Corynebacterium*, *Mycobacterium*, *Bacillus*); medically important anaerobes (*Clostridium*, *Peptococcus*, *Peptostreptococcus*, *Bacteroides*, *Fusobacteria*, *Eubacterium*, *Propionibacterium*)

**Week 10: Spring Break**

**Week 11-12:** **Clinical Bacteriology** (contd.): medically important gram negative cocci and coccobacilli (*Neisseria*, *Haemophilus*, *Moraxella*, *Gardnerella*, *Bordetella*, *Yersinia*, *Francisella*, *Pasteurella*, *Brucella*); Intracellular parasites (*Rickettsiaceae*, *Chlamydia*); bacteria without cell walls (*Mycoplasma*, *Ureaplasma*); medically important gram negative bacilli (*Enterobacteriaceae*, *Vibrio*, *Pseudomonas*, *Legionella*, *Campylobacter*); *Spirochaetaceae* (*Treponema*, *Borrelia*, *Helicobacter*, *Leptospira*). **Filamentous Gram-Positive Bacteria:** *Streptomyces*, *Actinomyces*, *Nocardia*

**Week 13:** **General Virology:** general characteristics, methods of cultivation, structure, multiplication, genetics, taxonomy, antiviral chemotherapy, pathogenesis.  
**Clinical Virology:** Adenoviruses, Herpesviruses (HSV, VZV, CMV, EBV), Poxviruses, Parvovirus, Papillomaviruses, Polyomaviruses, Picoraviruses (Enteroviruses).

**Week 14-15:** **Clinical Virology** (contd.): Rhinoviruses, Orthomyxoviruses (Influenza), Paramyxoviruses (Parainfluenza, Mumps, Measles, RSV), Coronaviruses, Rhabdoviruses (Rabies), Togaviruses (Rubella, Alphaviruses, Flaviviruses), Arenaviruses, Bunyaviruses, Reoviruses (Orbivirus, Rotavirus), Norwalk agents, Hepatitis viruses (HAV, HBV, HCV, HDV, HEV), Retroviruses (HTLV, HIV), slow virus infections.

**Week 16-17:** **General Mycology:** morphology, reproduction, nutrition, physiology, taxonomy, pathogenesis, antifungal chemotherapy.  
**Clinical Mycology:** Superficial fungal pathogens: Dermatophytes (*Trichophyton*, *Epidermophyton*, *Microsporum*), *Malassezia*, *Exophiala*; Subcutaneous fungal pathogens: *Sporothrix*; Systemic fungal pathogens: *Coccidioides*, *Histoplasma*, *Blastomyces*, *Cryptococcus*; Opportunistic fungal pathogens: *Candida*, *Aspergillus*, Mucormycosis, *Pneumocystis*.

**Week 17-18:** **Pathogenic Parasites:** Biology, morphology, classification, pathogenesis.  
Sporozoa: *Plasmodium*, *Toxoplasma*, *Cryptosporidia*, *Cyclospora*; Rhizopods: *Entamoeba*; Flagellates: *Trichomonas*, *Giardia*, *Leishmania*, *Trypanosoma*; Nematodes: *Enterobius*, *Trichuris*, *Ascaris*, *Necator*,

*Strongglyoides, Toxocara, Trichinella*; Cestodes: *Taenia, Diphyllbothrium*;

Trematodes: *Schistosoma*.

**Arthropods and ectoparasites**

**Finals (Week 19):** May 9-13