



The Florida State University
College of Medicine

**General Medical
Microbiology and
Infectious Disease**

BMS 6301

Fall 2011

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Instructors

Course Director

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Course Overview

Course Goals

This course provides learning opportunities in the basic principles of medical microbiology transmission, principles of aseptic practice, and the role of the human body's normal microflora. The class is divided into four thematic areas: bacteriology, virology, mycology and parasitology. Relevant clinical examples are a major focus for learning. The course provides the conceptual basis for understanding pathogenic microorganisms and the mechanisms by which they cause disease in the human body, and presents concepts concerning host-parasite relationships and their association with human immunological phenomena. It also provides opportunities to develop informatics and diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of infectious diseases. Bacterial culture and antimicrobial susceptibility testing,; microscopy for bacterial, fungal and parasitic agents, and other forms of laboratory testing for the identification of infectious organisms and evaluation of host immune parameters are important diagnostics aspects that are incorporated throughout the learning activities.

Learning Objectives

NOTE: Course-specific learning objectives that are matched to the FSU COM competency domains are provided for each lecture, small group session and TBL session.

Knowledge

- K1. Describe microbial taxonomy and nomenclature as well as their relationship to structure, physiology, and function of organisms.
- K2. Categorize the microbial organisms with regard to virulence factors and disease characteristics, and correlate these aspects with specific patient populations at-risk for infection.
- K3. Summarize the major pathogen types and the diseases that they produce in humans.
- K4. Diagram at least six patient specimen collection and testing methods
- K5. Outline the general categories of anti-microbial therapeutics and the typical infections they are effective for treating.
- K6. Demonstrate knowledge of public health surveillance and measures to deal with infections in a population.

- K7. Organize your knowledge of the effect of age on clinical presentations of infections across the life cycle, including those seen in perinatal, pediatric, and geriatric patients.

Skills

- S1. Interpret laboratory findings for each diagnostic method within the context of the patient's clinical presentation and history of present illness.
- S2. Produce a problem solving strategy and demonstrate diagnostic reasoning ability with respect to specific infectious diseases.
- S3. Develop an ability to use evidence-based medicine to determine methods for diagnosis and treatment of infections.
- S4. Relate specific signs and symptoms appearing as clinical manifestations in the patient history and physical examination to the presence of infection.
- S5. Relate at least three radiologic findings to specific microbial infections.
- S6. Demonstrate the ability to organize, record, research, present, critique, and manage information.

Attitudes/Behaviors

- A1. Demonstrate professional attitudes and behaviors towards others.
- A2. Articulate the unique patient populations most at-risk for infections and how this information applies to future practice settings.

Course Format

Combination of lectures, laboratories, online materials and 2-hour case-based, small-group discussion sessions (see topical syllabus, below).

Competencies

| FSUCOM – Competencies -Course Title BMS 6301 | | |
|--|------------------------------------|---------------------------------------|
| Competency Domains | Competencies Covered in the Course | Methods of Assessment |
| Patient Care | | |
| Medical Knowledge | X | Written exams and quizzes |
| Practice-based Learning | | |
| Communication Skills | X | Small group sessions and TBL sessions |
| Professionalism | X | Small group sessions and TBL sessions |
| System-based Practice | | |

Policies

Americans with Disabilities Act

Candidates for the M.D. degree must be able to fully and promptly perform the essential functions in each of the following categories: Observation, Communication, Motor, Intellectual, and Behavioral/Social. However, it is recognized that degrees of ability vary widely between individuals. Individuals are encouraged to discuss their disabilities with the College of Medicine's [Director of Student Counseling Services](#) and the FSU Student Disability Resource Center to determine whether they might be eligible to receive accommodations needed in order to train and function effectively as a physician. The Florida State University College of Medicine is committed to enabling its students by any reasonable means or accommodations to complete the course of study leading to the medical degree.

[The Office of Student Counseling Services](#)

Medical Science Research Building

G146

Phone: (850) 645-8256 Fax: (850) 645-9452

This syllabus and other class materials are available in alternative format upon request. For more information about services available to FSU students with disabilities, contact the:

Student Disability Resource Center

97 Woodward Avenue, South

Florida State University

Tallahassee, FL 32306-4167

Voice: (850) 644-9566

TDD: (850) 644-8504

sdrc@admin.fsu.edu

<http://www.fsu.edu/~staffair/dean/StudentDisability>

Academic Honor Code

The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. (Florida State University [Academic Honor Policy](#))

The College of Medicine has detailed attendance policies as they relate to each cohort and events that conflict with course schedules. **See pages 28** of [FSUCOM Student Handbook](#) for details of attendance policy, notice of absences and remediation.

Microbiology 201 Course Specific Absence Policy

In this course (BMS 6301), missed small group sessions must be made up within one week of returning to class. They will be made up by handing in written answers to the questions in the small group cases and a written, one-page discussion of the material covered in the missed session. ONLY excused absences can be remediated. A total of 1% of the final percentage in the course will be subtracted for EACH unexcused absence from small group sessions.

Evaluations

Student evaluations throughout the course are an important way of improving medical education, particularly during the founding years of the College of Medicine. Not only are your comments and suggestions valued, but the evaluation process represents one way for you to become familiar with the peer review process. Peer review is an important quality management function in all branches of medicine. In order for peer review to work properly, it must be taken seriously by both the evaluators as well as those being evaluated. Therefore, we ask that you give careful consideration to evaluations. When making comments, consider what you would say if you were face to face with the person to whom the comments are directed. How would you react if the comments were directed at you? Give thought to how learning resources were used in regard to the way to learn best. What worked for you and what did not? How is your time used optimally? Are you making adequate progress? Are you being challenged to improve? Be specific. Ultimately, your use of the evaluation process can help you learn how to improve your own medical practice.

Required Materials

Required Text

Sherris Medical Microbiology, 6th Ed. (2010) Ryan, KJ and Ray, CG, editors. Access Medicine; Elsevier-Mosby, ISBN: 978-0-07-160402-4.

<http://www.accessmedicine.com.ezproxy.med.fsu.edu/resourceTOC.aspx?resourceID=656>

This textbook is available online through the Charlotte Edwards Maguire Medical Library, Access Medicine Textbook Collection.

Recommended Resources

Morbidity and Mortality Weekly Report (CDC) <http://www.cdc.gov/mmwr/>

Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases, 7th Ed., Churchill Livingstone an imprint of Elsevier.

<http://www.mdconsult.com.ezproxy.med.fsu.edu/books/about.do?about=true&eid=4-u1.0-B978-0-443-06839-3..X0001-X--TOP&isbn=978-0-443-06839-3&uniqlid=267548881-2>

Available online through the Charlotte Edwards Maguire Medical Library, MD Consult E-Book Collection.

Class schedules, weekly assignments, and information on coverage of exams are posted on the Blackboard website for this course. Copies of lecture topic summaries, and PowerPoint presentations are also posted on Blackboard.

Grading

Assignments and Grading Scale

FSU COM has adopted a pass/fail grading system for the first and second years. See page 31 of Student Handbook for details. In order for a student to receive a grade of PASS, all the following required course activities must be completed:

- An average of 70% on all four block exams, with no individual exam score <65% Exams consist of multiple choice, best answer questions based on clinical vignettes. Any exam with score < 65% will need to be remediated as determined by the Course Director in order to pass the class.
- An average of 70% ACROSS all quiz sets. The individual quizzes will give an indication of student progress on the associated materials, but the average across all quiz sets will be used to determine the 70%.
- Adequate and appropriate preparation and participation in all small group sessions (determined by small group faculty and Course Director evaluation with input from small group peers).
- Satisfactory completion of the opinion paper. To receive a satisfactory score, the work must be of good quality as determined by the Course Director, and submitted by the due date.
- Satisfactory completion of the group process reflection paper as determined by the Course Director and uploading of the reflection to your Share Point student portfolio by the due date.

The material for examinations and quizzes will come from lectures, small group sessions, material on the Blackboard site for the course, **and the textbook**. The format for written examinations will be multiple choice questions (single best answer).

There will be four integrated block examinations in the Fall semester. These examinations will cover material in all the courses for the four weeks prior to each examination. The microbiology component of each examination will consist of ~34 multiple choice questions. There will also be quizzes for each block in this course. More information about the small group process will be provided when the assignments are due, in October. As indicated above small group participation and evaluation process are required elements of the course. Information about the opinion paper will be discussed during class shortly after Exam 1; this paper will concern an important topic in medical microbiology.

Topical Syllabus

| Date | Session | TOPIC |
|-----------------|-----------------|---|
| 8/15 10-11am | Introduction | Introduction to the Course: learning objectives; course format; evaluation, testing, and grading policies; expectations; BlackBoard structure. |
| 8/16 & 8/19 | Online Module 1 | Bacterial Classification, Morphology & Cell Structure: must be completed BEFORE the "Microscopy Skills Laboratory". Medically important groups of microorganisms; classification (taxonomy) of bacteria; morphology (cell shapes, gram stain); ultrastructural features (cytoplasm, cell envelope, external features); bacterial spores. |
| 8/23 | | Quiz 1 |
| 8/24 8-9am | Lecture 1 | Bacterial Culture and Physiology: nutrient requirements of bacteria, overview of metabolism, aerobic respiration, anaerobic respiration, fermentation, biosynthesis, bacterial growth. |

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| 8/24 9-10am | Lecture 2 | Bacterial Genetics: the bacterial genome (chromosome, extrachromosomal elements, bacteriophages), gene organization (operons, cistrons), DNA replication (binary fission, replication rules & fidelity), mutation & repair (types of mutations, mutagens, DNA repair processes), gene transfer (transposons, extrachromosomal elements), mechanisms of DNA exchange, recombination, genetic engineering, polymerase chain reaction. |
| 8/26 8-10am | Small Group 1 | Bacterial Genetics & Antibiotic Resistance - cases illustrating the role of gene transfer in rapid spread of antibiotic resistance & development of multiple resistance, causes of antibiotic resistance, implications for future practice of medicine. |
| 8/30 | | Quiz 2 |
| 8/30 10-11am | Lecture 3 | Sterilization, Disinfection & Antisepsis: medical importance of methods, definitions and approaches (sterilization, disinfection, antisepsis), mechanisms of action (physical and chemical agents). |
| 8/30 11-12pm | Lecture 4 | The Gram-Positive Cocci – I: <i>Staphylococcus aureus</i> (cutaneous infections, food poisoning, endocarditis, toxic shock syndrome, etc.), <i>Staphylococcus epidermidis</i> (endocarditis, catheter & shunt infections, etc.), <i>Staphylococcus saprophyticus</i> (urinary tract infection) |
| 9/1 10-11am | Lecture 5 | The Gram-Positive Cocci – II: <i>Streptococcus pyogenes</i> (pharyngitis, impetigo, erysipelas, rheumatic fever, etc.), <i>Streptococcus pneumoniae</i> (pneumococcal pneumonia, otitis media, sinusitis, meningitis, etc.), <i>Streptococcus agalactiae</i> (neonatal diseases, other infections), <i>Enterococcus</i> (urinary infections, septicemia, endocarditis). |
| 9/1 11-12pm | Lecture 6 | Bacterial Respiratory Infections (Opportunistic and Respiratory Pathogens): <i>Pseudomonas aeruginosa</i> (pulmonary, skin & urinary infections, etc.), <i>Bordetella pertussis</i> (whooping cough), <i>Haemophilus influenzae</i> (meningitis, otitis, arthritis, etc.), <i>Legionella pneumophila</i> (Legionnaires' Disease, Pontiac fever), <i>Neisseria meningitidis</i> (meningitis, etc.) |
| 9/2 8-10am | Small Group 2 | Molecular & Serologic Diagnostic Methods - cases illustrating the technology of DNA probes, DNA fingerprinting methods, PCR-based methods, precipitation & immunodiffusion, enzyme-linked immunofluorescence assays (ELISA), radioimmunoassay (RIA), etc. |
| 9/9 | | Exam I |
| 9/12 9-10am | Lecture 7 | Anaerobic Metabolism; Gram-Negative Anaerobes & Gram-Positive Anaerobic Bacilli: <i>Clostridium perfringens</i> (gas gangrene, food poisoning, etc.), <i>Clostridium tetani</i> (tetanus), <i>Clostridium botulinum</i> (botulism), <i>Clostridium difficile</i> (gastroenteritis), <i>Propionibacterium</i> (acne); <i>Bacteroides</i> , <i>Prevotella</i> , and <i>Fusobacterium</i> species. |
| 9/12 10-11am | Lecture 8 | Gram-Negative Enteric Bacilli (Facultative Anaerobes): <i>Escherichia coli</i> (gastroenteritis), <i>Klebsiella pneumoniae</i> (pneumonia), other members of the family <i>Enterobacteriaceae</i> |
| 9/14 8-9am | Lecture 9 | Gram-Negative Enteric & Zoonotics: <i>Salmonella</i> (gastroenteritis, enteric fevers, etc.), <i>Shigella</i> (shigellosis), <i>Yersinia</i> (bubonic plague, enterocolitis), <i>Vibrio</i> (cholera, gastroenteritis, etc.), <i>Campylobacter</i> (gastroenteritis), <i>Helicobacter</i> (gastritis, gastric & duodenal ulcers), <i>Francisella tularensis</i> (tularemia), <i>Brucella</i> (undulant fever, etc.) |
| 9/14 9-10am | Lecture 10 | Gram-Positive Zoonotic Pathogens and Other Gram Positives: <i>Bacillus anthracis</i> (anthrax), <i>Listeria monocytogenes</i> (neonatal diseases, etc.), <i>Erysipelothrix rhusiopathiae</i> (erysipeloid), and <i>Corynebacterium diphtheriae</i> (diphtheria). |
| 9/16 8-10am | Small Group 3 | Aseptic Practice & Nosocomial Infections - cases illustrating the etiology & epidemiology of nosocomial infections, medical & economic significance, techniques for prevention of nosocomial infections. |
| 9/20 | | Quiz 3 |

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| 9/21 8-10am | Small Group 4 | Laboratory Diagnosis of Bacterial Diseases – Culture & Handling: cases illustrating collection & handling of specimens, types of pathogens to be expected for various body fluids & tissues, etc. |
| 9/23 8-9am | Lecture 11 | Gram-Positive Zoonotic Pathogens and Other Gram Positives: <i>Bacillus anthracis</i> (anthrax), <i>Listeria monocytogenes</i> (neonatal diseases, etc.), <i>Erysipelothrix rhusiopathiae</i> (erysipeloid), and <i>Corynebacterium diphtheriae</i> (diphtheria). |
| 9/23 9-10am | Lecture 12 | Spirochetes and Sexually-Transmitted Infections. <i>Neisseria gonorrhoeae</i> (gonorrhea, PID, etc.), <i>Treponema pallidum</i> (syphilis), <i>Borrelia</i> species (Lyme disease and Relapsing fever), <i>Chlamydia trachomatis</i> (Chlamydia and PID), <i>Haemophilus ducreyi</i> (chancroid) |
| 9/26 9-11am | Small Group 5 | Sexually Transmitted Infections - cases from the CDC illustrating the pathogenesis of bacterial and parasitic sexually transmitted infections |
| 9/27 | | Quiz 4 |
| 9/29 8-9am | Lecture 13 | Rickettsial, & Chlamydial Pathogens: <i>Rickettsia rickettsiae</i> (Rocky Mountain spotted fever), <i>Rickettsia prowazekii</i> (epidemic typhus), <i>Rickettsia typhi</i> (endemic typhus), <i>Coxiella burnetii</i> (Q fever), <i>Chlamydia trachomatis</i> (conjunctivitis & trachoma), <i>Chlamydophila pneumoniae</i> (pneumonia), <i>Chlamydophila psittaci</i> (ornithosis). |
| 9/29 9-10am | Lecture 14 | Actinomyces, Nocardia, Mycobacteria & Mycoplasmas: <i>Actinomyces</i> (endogenous infections), <i>Nocardia</i> (pulmonary & cutaneous infections), <i>Mycobacterium</i> (tuberculosis, leprosy, etc.), <i>Mycoplasma</i> (atypical pneumonia, etc.). |
| 10/3 10-11am | Online Module 2 | Bacterial Toxins Review. Botulinum toxin, Cholera toxin, Pertussis toxin, Tetanospasmin, pore-forming toxins, ADP-ribosylation, protein synthesis inhibitors |
| 10/4 10-12pm | Online Module 3 | Bacterial Infectious Disease – Case Studies for Comprehensive Review (STUDENTS WILL WORK INDEPENDENTLY THROUGH BLACKBOARD TO STUDY THIS MATERIAL): entry into the human body; adhesion, colonization & invasion; pathogenic actions of bacteria (tissue destruction, toxins, immunopathogenesis); mechanisms for escaping host defenses; spread of disease in populations, reservoirs of infection (human, animal, and non-living reservoirs), portals of entry and portals of exit, modes of transmission (contact, vehicles, vectors). |
| 10/7 | | Exam 2 |

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| 10/10 10-11am | Lecture 15 | Mechanisms of Viral Pathogenesis: acquisition & infection of target tissue, cytopathogenesis (lytic & nonlytic, oncogenic viruses), host anti-viral defenses, immunopathology, epidemiology of viral diseases, (age, immune status & other host factors), control of viral spread. |
| 10/13 10-11am | Lecture 16 | Viral Classification, Structure, & Replication – I: basic characteristics and classification of viruses, virion structure (non-enveloped viruses, enveloped viruses), viral replication: overview, recognition & attachment to host cell, penetration. |
| 10/13 11-12pm | Lecture 17 | Viral Classification, Structure, & Replication – II: viral replication: uncoating, comparison of DNA and RNA virus replication, assembly, and release from host cells. |
| 10/14 8-9am | Lecture 18 | The Human Herpesviruses: Herpesviridae—herpes simplex viruses (cold sores, genital herpes, encephalitis, etc.), varicella-zoster virus (chicken pox, shingles, etc.), cytomegaloviruses (congenital disorders), Epstein-Barr virus (mononucleosis, Burkitt's lymphoma) |
| 10/14 9-10am | Lecture 19 | Parvovirus, Papillomaviruses, Polyomaviruses, & Poxviruses: Papillomaviridae—human papilloma viruses (warts, benign tumors, cervical cancer, etc.); Polyomaviridae—BK virus (cystitis), JC virus (PML); Parvoviridae—B19 (fifth disease, aplastic crisis); Poxviridae—variola virus (smallpox), molluscipoxvirus (molluscum contagiosum), etc. |
| 10/17 10-11am | Lecture 20 | GI viruses - Reovirus, Non-Respiratory Picornaviruses, Norwalk virus (Norovirus) and Hepatitis Viruses: Reoviridae—rotaviruses (gastroenteritis), coltivirus (Colorado tick fever); Picornaviridae—polioviruses (polio), Coxsackie viruses (meningitis, encephalitis, myocarditis, pericarditis, cold-like diseases, conjunctivitis, etc.), echoviruses (meningitis, encephalitis, exanthems, myocarditis, pericarditis, etc.); Norwalk virus (gastroenteritis); summary of hepatitis viruses. |
| 10/18 | | Quiz 5 |
| 10/20 10-11am | Lecture 21 | Retroviruses and HIV: Retroviridae—HIV (AIDS) and HTLV (adult acute T-cell lymphocytic leukemia) |
| 10/21 8-9am | Lecture 22 | The Respiratory Viruses I: Rhinovirus, Coronaviruses, Adenovirus: Picornaviridae—rhinoviruses (common colds); Coronaviridae—coronoviruses (common colds, SARS); Adenoviridae—adenoviruses (pharyngitis, conjunctivitis, cold-like infections, gastroenteritis, pneumonia, acute respiratory tract disease, etc.). |
| 10/21 9-10am | Lecture 23 | The Respiratory Viruses II: Paramyxoviruses & Orthomyxoviruses: Orthomyxoviridae—influenzaviruses (influenza, other respiratory infections, etc.); Paramyxoviridae—parainfluenzaviruses (cold-like diseases, croup, etc.), mumps virus (mumps), measles virus (measles); rubella virus (German measles); respiratory syncytial virus (colds, bronchitis, etc.); hantaviruses (hantavirus pulmonary syndrome, ARDS) |
| 10/25 | | Quiz 6 |

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| 10/25 9-10am | Lecture 24 | Rhabdoviruses, Togaviruses, Bunyaviruses, Other Miscellaneous Viruses & Prions: Rhabdoviridae—rabies virus (rabies); hemorrhagic fever viruses; and prions (mad cow disease; vCJD). |
| 10/27 8-10am | Online Module 4 | The Arboviruses and Rodent-Borne Viruses - Caliciviruses—Flaviviridae—flaviviruses (encephalitis, dengue hemorrhagic fever, yellow fever, etc.); Filoviridae—Ebola & Marburg viruses (hemorrhagic fevers); Togaviridae—various encephalitis viruses (flu-like disease, encephalitis, etc.), Bunyaviridae—various encephalitis viruses (flu-like disease, encephalitis) STUDENTS WILL WORK INDEPENDENTLY THROUGH BLACKBOARD TO STUDY THIS MATERIAL |
| 10/28 8-10am | Online Module 5 | Basic Biology of Parasites: medical importance of parasites & parasitic diseases, classification & structure of protozoa (Sarcomastigophora, Ciliophora, Apicomplexa, Microspora), classification & structure of metazoa (helminths, arthropods), physiology & replication. STUDENTS WILL WORK INDEPENDENTLY THROUGH BLACKBOARD TO STUDY THIS MATERIAL |
| 10/31 8-9am | Lecture 25 | Blood and Tissue Parasites: most important parasites for North American physicians |
| 11/2 9-10am | Lecture 26 | Review of Bacteriology and Virology |
| 11/4 | | Exam 3 |
| 11/8 10-11am | Lecture 27 | Basic Biology of Fungi: general characteristics, classification, medical importance of major fungal groups, fungal cell structure, fungal morphology, fungal replication, general information on fungal pathogenesis. |
| 11/15 | | Quiz 7 |
| 11/15 11-12pm | Lecture 28 | Superficial, Cutaneous & Subcutaneous Mycoses: mechanisms of fungal pathogenesis, superficial mycoses (pityriasis versicolor, tinea nigra, black piedra, etc.), cutaneous mycoses (etiology, ecology & epidemiology, clinical manifestations), subcutaneous mycoses (lymphocutaneous sporotrichosis, chromoblastomycosis, phaeohyphomycosis, etc.). |
| 11/18 10-12pm | Lecture 29 | Systemic and Opportunistic Mycoses: histoplasmosis (reticuloendothelial cytomycosis), blastomycosis (Gilchrist's disease, North American blastomycosis), coccidioidomycosis, cryptococcosis, candidiasis (nail disease & disseminated infections), aspergillosis, zygomycosis, <i>Pneumocystis jirovecii</i> pneumonia. |
| 11/29 | | Quiz 8 |
| 11/29 10-12pm | TBL 1 | Pulmonary Pathogens I Review of the pulmonary pathogens across organism groups using Team-Based Learning methods (TBL), consisting of an Individual Readiness Assessment Test (IRAT) and Group Readiness Assessment Test (GRAT). The IRAT and GRAT scores will not contribute to the overall course grading. |
| 12/2 10-12pm | TBL 2 | Pulmonary Pathogens II Review with cases illustrating the etiology & epidemiology of respiratory infections from all organism groups using the TBL methods described above. |
| 12/13 | | Exam 4 |