

## **School of Medicine 506: Molecular basis of Microbiology and Immunology**

### **Course Directors:**

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### **Credit Hours**

Graduate students take this course for 4 credit hours. Students are expected to attend all classes.

### **Disability Statement**

Any student who has need for accommodation based on the impact of a disability should contact the course director privately to discuss the specific situation as soon as possible. Contact disability Resources and Services at 215-204-1280 in 100 Ritter annex to coordinate reasonable accommodations for students with documented disabilities.

### **Course Objectives**

The goal of the Molecular Basis of Microbiology and Immunology is to provide substantial information to the students in the area of molecular and cell biology of prokaryotic organisms and in the area of molecular and cellular immunology.

### **Textbook**

The course is based on the scientific literature. Readings from the literature will be recommended to complement lecture topics. Two textbooks are recommended as providing very useful background material: For the Microbiology component, Brock Biology of Microorganisms, 11<sup>th</sup> edition, M.T. Madigan, J.M. Martinko and J. Parker; For the Immunology component; Cellular and Molecular Immunology, 5<sup>th</sup> edition, A.K. Abbas et al.

### **Lectures and Handouts**

The course consists of lecture; discussion of material being presented during lectures is encouraged. Attendance is expected and strongly encouraged. Some lectures will be supplemented with discussion of selected papers from the scientific literature. Handouts are provided to supplement most lectures; often they are printed copies of power-point presentations. Students are responsible for the content of all lectures and handouts, unless a lecturer specifically advises the class otherwise.

### **Examinations and Grades**

There will be four major exams. Exams will cover material presented in lectures, handouts and discussion. Questions will fit within the framework of material.

The numerical value for each examination is based directly on the sum of points assigned to each question and not adjusted for overall class performance. Requests for changes or corrections to examination scores must be requested in writing. Such requests must be submitted to the Course Directors within one week of the return of the marked examination. Any student found cheating on an examination will be reported to the Graduate School and will receive Zero (0) for a grade pending review by the appropriate disciplinary body.

### **Make-up Examinations**

If an examination is missing by reason of an excused absence, a make-up examination will be given. Unexcused absences will receive a grade of 0 for that examination. An absence may be excused only by the Course Director, or the Department Chair, in the event of illness, emergency, or other extenuating circumstance, provided that it is requested no later than a day after the event; on appeal, an absence may also be excused by the Office of Academic Affairs.

### **Help from Faculty**

Faculty, who teach in the course M-506, have offices located in the Medical School in either the Medical Research Building (MRB) or the Old Medical School (OMS) or the Kresge Building (KB) as listed below. Please call and make an appointment if you need help in understanding lecture material.

### **Syllabus**

Many topics listed below are covered in two lectures.

**Examination I and II** (to be specified in the handout)

1. Structure of prokaryotes
2. Energy production in prokaryotes
3. Prokaryote nutrition
4. Transcription in prokaryotes
5. Protein synthesis and localization in prokaryotes
6. Growth of prokaryotes
7. Strategies for stress responses & long-term cell survival
8. Modes of action of antibiotics.
9. DNA replication
10. Mutants, mutations & DNA repair
11. Recombination and genetic exchange in prokaryotes
12. Regulation of gene expression in prokaryotes
13. Systems of global regulation
14. Accessory DNA elements: plasmids, transposons & Bacteriophage
15. Recombinant DNA
16. Prokaryote evolution and classification.

**Examinations III and IV** (to be specified in the handout).

17. Cells and tissues of the immune system
18. Protein-protein interactions: antigens & antibodies
19. Gene rearrangements in somatic cells: immunoglobulin genes
20. Structure of major Histocompatibility complexes

21. Intracellular signal pathways
22. Intercellular signaling; cytokines
23. Adhesion molecules
24. Molecular basis of leukemias & lymphomas
25. T cell receptor
26. Antigen presentation and accessory cell function
27. T cell development
28. Innate immunity, macrophages & natural killer cells
29. Hypersensitivity reactions
30. Delayed type hypersensitivity reactions
31. Autoimmunity and B cell tolerance
32. Immuno-deficiencies: congenital & acquired