

BIOLOGY 448: IMMUNOLOGY

SYLLABUS, SPRING 2007

Time and place: Tuesday and Thursday, 8 – 9:45 am; Rieke Science Center 220

Instructor: Angelia Alexander, Morken Center Room 239
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Office Hours: Mon. 11 am-noon; Tues. 10:30-11:30 am; Wed. 1:30-2:30 pm;
Thurs. 2-3 pm; Fri. 11 am-noon.

General Information

This course is designed for upper division biology students and offers an opportunity to learn about the basics of the mammalian immune system. These include molecular, cellular, and physiological aspects of innate immunity and antibody-based and cell-mediated adaptive immunity. The immune response, in its various forms, is important in our dealing with infectious disease, in hypersensitivity and autoimmune diseases, in medical diagnosis, and in sophisticated medical procedures. It has consequences as a major factor both as an element for good health and as a causative factor in disease.

Immunology is a specialized area of biology that integrates knowledge and methods from a wide variety of other specialties within biology. As an opportunity for intellectual development, the course requires understanding technical language and complex concepts, integration of information and concepts from biochemistry, molecular biology, histology, physiology, developmental biology, evolutionary theory, and microbiology. The field of immunology is very exciting: new information about the immune system arises rapidly (with many new papers published each week in major scientific journals). Therefore, it is not enough to "know" each new bit of information; we must also see how experimental strategies are applied to the questions that arise as people study this system.

Learning Objectives

It may be useful to put the intentions of this course into a set of learning objectives that apply to any of the topics that we will consider. These statements summarize what we will attempt to do with the information we encounter; they also guide the structure of the homework assignments, quizzes, and major examinations in the course. By participating in this course you have the opportunity to become able to:

- State accurate definitions of terms and use the terms correctly
- Describe the molecules, cellular structures, and cells important in the system
- Recite, write out, or diagram explanations of the conceptual models used to explain the data
- Describe experimental strategies, their logic, and how they are applied to particular situations
- Connect the conceptual models into integrated explanations of how things work
- Analyze sets of information related to the conceptual models or experiments

The Activities of the Course

The activities of the course allow opportunity to develop listening, writing, and oral discussion and presentation skills. As a given, it is expected that you will read and carefully study the assigned materials in the textbook chosen for this course. Although lecture will be an important element in the course, we will also use guided classroom discussion and in-class sessions focusing on homework assignments to analyze or summarize certain topics. **For this reason, reading the assigned material and completing homework assignments prior to the class session in which they are due are both very important.** A formal paper and a spoken report to other students on the content of that paper will be required. The general format for the paper is explained below.

The Formal Paper

This paper should be focused on a topic that is an application of our knowledge of the immune system. Suggested topics include autoimmunity, immunity to specific infectious diseases, immunodeficiencies, transplantation immunity, vaccine development and use, immunity vs. cancer, and neuroimmunology. Obviously, the topic MUST relate to the immune system.

The paper should be developed as a mini-review and should not be overly long (7-10 pages is about right). You will need to read enough review articles to be able to write approximately two pages of general information about the topic. In addition, you will be expected to summarize the hypotheses, experimental strategies and findings of three primary research papers written in the last several years. A rough draft is required. It will be

evaluated and with it you will earn some of the points allotted to this assignment. You will complete a polished final draft and also share the highlights of the paper with your classmates. There will be more details about this assignment in a separate document.

Evaluation of Your Work

The table below defines the point values of the various kinds of assignments, quizzes, and major examinations in the course.

Type of class activity	Points
Quizzes, 6 at 20 points each	120
Homework, class discussions; 4 at 25 points each	100
Mid-term Examination	80
Review Paper-draft	30
Review Paper-final form and oral report	60
Review Paper-oral report	10
Comprehensive final examination	100
Total	500

The final examination is weighted more than the mid-term examination because the concepts in the course build on each other and tend to add up to a cohesive whole toward the end of the course. The mid-term and final examinations will be essay examinations. The quizzes will include questions in multiple choice, matching, and short-answer styles.

Usually, the grade range in this course is approximately: 90-100%, A range; 80-89%, B range; 70-79%, C range; 60-69%, D range; 59% and below, E.

Sometimes students ask if there is extra work that they can do to bring up their grades. This course is a very busy one, and extra work would probably detract from your efforts to accomplish what is already expected. Therefore, there is generally no opportunity to do assignments beyond those already in place in the course. The homework and in-class assignments are designed to assist you in understanding or organizing the material you are studying.

Resources

The text for this course is *Immunology*, sixth edition, written by Thomas J. Kindt, Richard A. Goldsby, and Barbara A. Osborne. It is published by W. H. Freeman and Company and is copyrighted 2007. The publisher provides a web site to accompany the text at www.whfreeman.com/immunology6e. This site provides animations, molecular visualizations, self-tests, and links to other web sites. You are also enrolled in the on-line Sakai version of this course where you will find announcements, lectures outlines, and study guides for the mid-term and final examinations. If you are interested, we can also use Sakai for on-line discussions and other interactive purposes.

Your previous course experiences also are resources that support the work you do in this course. By listing a set of possible prerequisites we give you some leeway, but by requiring two from the defined set, we hope you will clearly have strengths to bring into this course. You must have successfully completed two of the following courses in order to enroll in this course: Biology 328, 331, 348, 403, 407, or 441. With permission of the instructor, upper division biochemistry may be substituted for one of these.

We will build on concepts from these courses such as

- Structure and function of animal cells and their intracellular structures and/or regions
- The relationships between genes and proteins, including the recognition that DNA-binding proteins of various kinds act to control gene expression
- The general arrangement of the parts of the bodies of mammals
- The relationship of primary, secondary, and tertiary structures of proteins to both the DNA that contains the code for them and their functions
- The names of the amino acids and general distinctions between the types of R groups (e. g. hydrophobic, positively and negatively charged, sulfhydryl)
- Basics of Mendelian genetics
- The fluid mosaic model of biological membrane structure and function

We will not have basic lectures on these topics, but we could schedule review sessions outside the regular class periods if any of you need them.

Course policies

Although you will not earn points merely for class attendance, there will be opportunities for in-class work that ought to enhance your mastery of this subject. This work cannot be made up easily. Therefore, class attendance is expected. My observation is that those students who fail this course or do nearly failing work are frequently, but not always, the ones who skip class the most. If you are a varsity athlete, a debater, or a musician, etc. who will miss class because of traveling on university business, you must let me know ahead of time. Ordinarily, make-ups will not be allowed for missed examinations, quizzes or formal classroom presentations. If there is a situation that warrants an exception to this rule, it must be a serious situation such as an accident or illness. Not being ready for the examination or presentation because of poor time management is not such a serious situation.

The university's Academic Integrity Policy will be followed in this class. You can find the policy statement on the PLU web page at <http://www.plu.edu/acad/integ.html>. If you are not sure how to summarize materials for your review paper without plagiarizing, meet with me or with a reference librarian. [Genevieve Williams is the reference librarian for the sciences, and she has frequent office hours in the lobby of the Rieke Science Center.] Information about the Natural Science Division's grade dispute policy can be obtained from the Mathematics Department web page (<http://www.plu.edu/~math/gradedispute.html>).

If you need course adaptations or accommodations because of a disability, if you have emergency medical information to share with me, or if you need other special arrangements, you should meet with me as soon as possible. If you have questions about services available for special needs, please contact the Office of Counseling and Testing (Ext. 7206).

Finally, we are asked to remind you that the last date by which you can withdraw from a course without a fee is February 21. That is also the last date on which you can add a course without paying a special fee. For this semester, the last day for withdrawing from the course (with no hope of recovering tuition money, of course) is Friday, May 4. That will earn a grade of W and cost you a \$50 processing fee per course.

Angelia Alexander, Professor of Biology, February 2007

Biology 448 Immunology Spring 2007 Proposed Schedule of Course Activities

Class Schedule: Tuesday and Thursday, 8:00 am – 9:45 am; RCTR 220
 Text: Kindt, Goldsby, Osborne, *Immunology*, 6th edition, Wm Freeman Co., 2007

Date	Topic	Assignment or Activity
Thursday, February 8	Orientation, Overview	Reading: Chap. 1
Tuesday, February 13	Cells of the Immune System; Primary Lymphatic Organs	Reading: Chapter 2: 23-42
Thursday, February 15	Secondary Lymphatic Organs and Tissues; Cells in Experimental Systems	Reading: Chapter 2: 43-49; Homework 1 Due; In-class work session; Reading: Chapter 22: 547-551
Tuesday, February 20	Innate Immune Response	Quiz , Chapters 1 and 2; Reading: Chapter 3
Thursday, February 22	Innate Immune Response, cont.; Leukocyte Migration	Reading: Chapter 3; Reading: Chapter 13
Tuesday, February 27	Characteristics of Antigens; Basic Structure of Antibodies	Reading: Chapter 4: 76-84; Reading: Chapter 4: 84-95 and Chapter 22: 551-555
Thursday, March 1	Antibody Classes and Biological Activities	Quiz , Chapters 3 and 13; Reading: Chapter 4: 95-107
Tuesday, March 6	<i>In vitro</i> antigen-antibody reactions and assays	Reading: Chapter 6
Thursday, March 8	Complement	Quiz , Chapters 4 and 6 Reading: Chapter 7
Tuesday, March 13	Immunoglobulin Genes	Reading: Chapter 5: 111-128
Thursday, March 15	Immunoglobulin Genes, cont. Major Histocompatibility Molecules	Reading: Chapter 5: 128-141; Reading: Chapter 8
Tuesday, March 20	MHC, cont.; T Cell Receptors	Reading: Chapter 9; Paper Topic Due
Thursday, March 22	T Cell Receptors, cont.	Homework 2 Due: Comparisons of Ig, MHC, and TCR; In-class work session
Tues. March 27; Thurs. March 29		Spring Break
Tuesday, April 3		Mid-term Examination
Thursday, April 5	T Cell Maturation	Reading: Chapter 10: 245-253
Tuesday, April 10	T Cell Activation	Reading: Chapter 10: 254-267
Thursday, April 12	B Cell Maturation	Quiz : Chapter 10: Reading: Chapter 11: 271-284
Tuesday, April 17	B Cell Activation and Proliferation	Reading: Chapter 11: 285-298 Homework 3 Due: Comparisons of T and B Cell Maturation and Activation; In-class work session
Thursday, April 19	Cytokines	Quiz : Chapter 11 Reading: Chapter 12
Tuesday, April 24	Cell Mediated Immunity	Reading: Chapter 14; Draft of Paper Due
Thursday, April 26	Hypersensitivities	Quiz : Chapter 12 and 14 Reading: Chapter 15
Tuesday, May 1	Tolerance and Autoimmunity	Reading: Chapter 16
Thursday, May 3	Immunity to Infectious Diseases	Reading: Chapter 18
Tuesday, May 8	Final Overview and Recapitulation	Homework 4 Due: In-class work session
Thursday, May 10	Paper Presentations-First Set	
Tuesday, May 15	Paper Presentations-Second Set	
Thursday, May 17	Paper Presentations-Third Set	Also, course evaluation

Final Examination, Wednesday, May 23, 8 – 9:50 am, RCTR 220; formal paper due in final form.