

BIOLOGY 404 SYLLABUS SUMMER 2023

CONTACT INFORMATION

David Allman: 215-746-5547 (office)

Email: dallman@penmedicine.upenn.edu

OFFICE HOURS (for Dave)

Mondays 10:00AM-11:00AM
230 John Morgan Building

Teaching assistant:

To be determined

BIOLOGY 404
BASIC IMMUNOLOGY

Wednesdays - 5:15pm TO 9:00 PM

Room 10, Leidy Labs (on Hamilton Walk)

COURSE GOALS: The goals of this course are several: First, I hope to introduce you to basic principles and current concepts in the field of immunology. Second, I would like to stimulate your thinking, especially from an experimental standpoint, about how these principles and concepts are formed. Finally, I hope you will leave with a foundation, for both the field of immunology and general experimental approaches, which will enable you to learn more on your own, through critical appraisal of the literature.

COURSE DESCRIPTION: The course will begin with a general overview of immunity, followed by in-depth considerations of the underlying cellular, molecular, and genetic events. Finally, later discussions will focus upon more specialized issues in immunology, such as disease states involving the immune system, as well as particularly interesting problems in modern immunology.

EXAMS: There will be two exams, EACH WITH A TAKE-HOME AND AN IN-CLASS PORTION. The exact format of these will be announced prior to each exam, but will be primarily essay or brief answer questions. Take-home exams will be distributed two weeks before the in-class exam dates, and must be turned in along with the in-class exam. *Take-home exams will not be accepted late.*

QUIZZES: There will be a quiz at the beginning of every session. These are mainly for self-evaluation, and can only improve your final grade. Each will be corrected and returned by the next class.

ONLINE THREADED DISCUSSION GROUPS: We will be utilizing the Canvas web site (<https://canvas.upenn.edu/>) in which we will be able to discuss, as a group, basic principles and problems that guide our current understanding of the immune system. Each week the class will be given a question or problem to work on as a group. For some weeks, I may also pose a question or describe an experiment in class, and then each student will be expected to attempt to address the issue online. These are threaded discussions in the sense that all members of the class will be able to view, and respond to, comments made by others in the class or within their specified group. In addition, the course director and teaching assistant may guide the discussion when appropriate. We may also have certain "guests" with expertise in a relevant area add comments. I think that these exercises will be fun and will add to your understanding of scientific principles and your ability to learn from your colleagues. Participation is mandatory: Roughly 33% of your final grade will be derived from your participation, or lack thereof, in this activity.

SCHEDULE: Each session will be divided as follows:

* Up to the first 20 minutes will be devoted to an open discussion of the previous lecture/homework problems/quiz questions.

*A 10-minute break.

READINGS: Readings in the primary text are given in the table on page 6. I strongly suggest you use these, as you see fit, to strengthen your grasp and broaden your perspective of the concepts conveyed in class.

TEXT: The recommended text is Immunobiology 8th or 9th edition, by Janeway et al., published by Garland Publishing, Inc. Copies are available in the University bookstore, Amazon, you name it . . .

ATTENDANCE: Attendance is not required, although participation in the quizzes will allow us to determine if excessive absences might be the basis for poor performance - and could mitigate against any special consideration if this is the case.

GRADING

The following "straight scale" grading system will be used:

>97 = A+	87-89 = B+	77-79 = C+		
93-96 = A	83-86 = B	73-76 = C	<70 = D	<60 = F
90-92 = A-	80-85 = B-	70-72 = C-		

Throughout the course you may collect chips. At the end, you cash in your chips, and your grade will be computed by taking your total "chips" and dividing by 3.

CHIP SOURCES AND MAXIMA

Exams: Each exam has two parts: an in-class portion consisting of short answer questions similar to the quiz questions you have had, and a take-home portion consisting of three sets of essay questions. On each take-home exam, the question sets will be progressively more challenging. You may answer as many as one question from each set. *The in-class portion of each exam is worth a maximum of 55 chips.* The take-home questions are worth 15 chips/question. Thus, on each exam, *the maximum from each take-home exam is 45 chips.*

Threaded Discussion Groups: There will be 8 threaded discussions/debates, each worth 10 chips for a total of 80 possible chips. At the end of the class your grade will be normalized to 100. Each week you will be graded on your participation in these online discussions and debates of current topics in immunology. Each discussion/debate will be posted by 10pm on the night of a lecture. Responses from each individual registered for the class are due by 10pm the following Monday.

Quizzes: There will be 9 quizzes, each worth 10 chips. At the end of the course, 20% of your quiz chips are added to your other chips **PRIOR TO** division by 3. The maximum chips from quizzes is thus (90 X .20), or 18. **Therefore the maximum the quizzes can add to your final grade is 18/3, or 6.0.**

SUMMARY OF CHIP SOURCES AND MAXIMA

Quizzes	18
Threaded Discussions (normalized)	100
Exam I 2 week portion	45
Exam I 24-hour portion	55
Exam II 2 week portion	45
Exam II 24-hour portion	55
MAX POSSIBLE TOTAL CHIPS	318
MAX POSSIBLE FINAL SCORE	106 (318/3)

LECTURE SCHEDULE

- May 24 INTRODUCTION TO BASIC IMMUNOLOGY
KINETICS AND PROPERTIES OF IMMUNE RESPONSES -
AB STRUCTURE AND MOLECULAR BASIS FOR AB SPECIFICITY
- May 31 INTRODUCTION TO CELLULAR IMMUNOLOGY
CELLS AND TISSUES OF THE IMMUNE RESPONSE
CONTRAST: INNATE AND ADAPTIVE IMMUNE MECHANISMS
CLONAL SELECTION HYPOTHESIS & RECEPTOR DIVERSITY
- June 7 THE GENETIC BASIS FOR AG-RECEPTOR DIVERSITY
MECHANISMS OF AG RECEPTOR DIVERSITY
B CELL DEVELOPMENT - LINKING DEVELOPMENT WITH RECEPTOR DIVERSITY
- June 14 THE B CELL RESPONSE, EFFECTOR FUNCTIONS MEDIATED BY ANTIBODIES
THE GERMINAL CENTER & AFFINITY MATURATION
ANTIBODY ISOTYPES, THEIR GENERATION AND FUNCTION
ANTIBODY MEDIATED EFFECTOR FUNCTIONS AND COMPLEMENT
COMMUNICATION BETWEEN B CELLS AND INNATE IMMUNE CELLS
HAND OUT TAKE-HOME EXAM #1
- June 21 TOOLS, TESTS AND EXPERIMENTAL SYSTEMS USED IN IMMUNOLOGY
- June 28 **MID-TERM IN-CLASS EXAM - TAKE-HOME EXAM #1 DUE**
- July 5 THE MHC AND T CELL BIOLOGY
ALLOREACTIVITY AND IMMUNE RESPONSE GENES
"MHC RESTRICTION" AND ITS IMPLICATIONS
THE MHC, A GENETIC LOCUS CONTROLLING T-DEPENDENT IMMUNE RESPONSES
- July 12 CONTROL OF T CELL-MEDIATED IMMUNITY
POSITIVE SELECTION OF IMMATURE T CELLS
ANTIGEN RECOGNITION BY T-CELLS - STRUCTURE OF THE T CELL RECEPTOR
ANTIGEN PROCESSING AND PRESENTATION
COSTIMULATION
CYTOKINES AND T CELL SUBSETS
- July 19 THE PROBLEM OF SELF VERSUS NON-SELF DISCRIMINATION
B AND T CELL DEVELOPMENT VIS A VIS TOLERANCE
MECHANISMS OF PERIPHERAL TOLERANCE
HAND OUT TAKE-HOME EXAM #2
- July 26 INNATE IMMUNITY AND ITS RELATIONSHIP TO ADAPTIVE IMMUNITY
INFLAMMATORY CYTOKINES
PATTERN RECOGNITION MECHANISMS
IMMUNE MEMORY
- August 2 **FINAL IN-CLASS EXAMINATION - TAKE HOME EXAM 2 DUE**

SUGGESTED READINGS

LECTURE	TOPIC	PAGES IN JANEWAY 8TH EDITION	PAGES IN JANEWAY 9TH EDITION
1	Intro / Kinetics / Ab-Ag interactions	Pages 1-10, 18-22; Skim Chapter 1	Pages 1-24 Pages 141-151
2	Cells and tissues / development Cell interactions / clonal selection Innate immunity	Pages 127-138; Pages 1-30 Chapter 11	Chapter 2 (all) Pages 11-24 (repeat)
3	Genetic basis for receptor diversity	Chapter 1 (all); Pages 157-168	Pages 174-186 Pages 296-313
4	Ab isotypes and isotype switching / germinal center reaction Antibody-mediated effector mechanisms	Pages 48-71; Chapter 10; Pages 179-189	Pages 191-198 Chapter 10
5	Immunologist's Toolbox	Appendix 1	Skim pages 740-779
6	MHC and T cell receptor function	Pages 652-654; Pages 169-173 Chapter 6 Pages 138-151	Pages 214-242 Pages 152-170 Pages 328-340
7	T cell mediated immunity	Chapter 9	Pages 282-290 Chapter 9
8	T Lymphocyte development and B and T Cell tolerance	Chapter 8	Chapter 15
9	Integrating innate and adaptive immunity	Chapter 11	Chapter 11