

Biology 257 Immunology Syllabus

Fall 2008

MW 11:30-12:55, Sills 117

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The ability of the vertebrate immune system to protect the body from infection relies on the successful orchestration of a complex set of cells and molecules. Over the past century, immunologists have developed a wide variety of experimental methods to understand how the immune system works, what happens when the immune system goes awry, and how different components of the immune system can be harnessed for basic and clinical research. This course will explore many of the molecular and cellular players involved in immunity and the importance of their interactions. We will also discuss some of the fundamental experiments in immunology and practical applications of immunological research.

McBride Office Hours and Communication

I will be in my office on **Tues. from 1-2:50 pm** and **Fri. from 11-12:20 am** (if I'm not there, check my lab). You can also **set up a time** to talk to me on **Wed. afternoon** if you email me the times you are available.

Email is a very handy form of communication; I check my email regularly and will respond to questions over email. **My responses to *scientific* questions** related to the class (e.g. what does "allelic exclusion" mean?) **will be sent to everyone** in the class **anonymously**, which should become particularly useful around exam time. **You should become accustomed to checking your email at least once every day or two.**

As the semester continues, the **course website** will grow with useful information and links relevant to immunology. I **welcome any suggestions for enhancing the site**, from information that you would like posted, to articles you have found that relate to what we are discussing, to immunology webpages (from bonafide sources). The URL for the course home page is:

<http://academic.bowdoin.edu/faculty/A/amcbride/courses/bio257>

Dates to remember

Exams***:	Mon., Oct. 6 and Nov. 10, 7:30 PM
Final exam:	TBA
Discussions:	Wed., Sept. 17, Mon., Oct. 20, Mon., Nov. 24 (in class)
Poster symposia:	Mon., Dec. 8 and Wed. Dec. 10 (during class), Druckenmiller Atrium
Seminars***:	Rob Wheeler Thurs., Oct. 9 or Lennart Johns Thurs., Nov. 13 4-5:15 pm, Druckenmiller 20 (Thanksgiving make-up class)

*****If you have a conflict for any of the exams or can't make either seminar dates and times, come see me by Fri., Sept. 12 to discuss possible alternatives.*****

Reading

Text: Goldsby, Kindt, and Osborne. Kuby Immunology 6th ed. Freeman, 2007.

This text also has good web-based resources available at: <http://bcs.whfreeman.com/immunology6e/>

Other reading assignments: **Articles** from scientific journals will be available at least **one week before** we are scheduled to discuss them in class. Optional reading material will also be available on the course website.

An important **goal** of the course is for everyone to gain experience **reading, analyzing, and synthesizing the immunological literature**. To this end, we will begin by **discussing journal articles in class** and then you will **select a topic related to immunology** for a **final project**, which will include analyzing papers and presenting a poster on the topic.

Understanding the more recent literature will require a **sound background in the fundamentals of immunology**, so it is **critical** that you **keep up with the course material**. The **textbook** will serve as a **useful resource** throughout the semester, but the chapters noted under each lecture in the syllabus present a **vast amount of detail**. Exam questions (and practice questions handed out over the course of the semester) will test your **knowledge of the material we cover in class** and your ability to **apply that knowledge to novel situations**. Therefore, I **recommend reading the chapter** we will discuss **before class, focusing** primarily on the **subheadings, figures and tables** and then **returning to the textbook after class** to read in more detail about specific subjects we have covered.

After you have **read the text carefully** and **studied your notes, first work through the practice problems** (both those from the book and those that I will post on the course website) **on your own**, and then **discuss your answers** with your classmates. **Do not wait until right before an exam to work on practice problems!**

Requirements and Grading Criteria

Exams 1&2: **20% each**

Final exam: **20%**

Final project: **25%**

Participation: **15%**

Exams 1&2:

To allow ample time for **thought** as well as **clear, concise writing**, the first two exams will be given on **Monday evenings (Oct. 6 & Nov. 10, 7:30 PM)**. **If you have a conflict** with either of these dates, **please come talk to me at the beginning of the semester**. These exams will include **material discussed in class** through the **previous Wednesday**. Class on these Mondays will be a help session; I will not present an overview of the material on the exam, rather your questions will direct a class discussion of immunology.

Final exam:

The final exam will include questions **specific to** the material from **the last third of the course**. This section will include a **choice of questions** related to the **final projects**. The rest of the exam will consist of **questions that ask you to synthesize ideas from throughout the semester**.

Final project:

The semester is far too short to cover all of the fascinating aspects of immunology. Using a "divide and conquer" strategy, however, as a class we will be able to explore a number of additional topics. The final project will also allow you to **hone your research, critical reading, writing, and presentation skills**. You will **work with a partner to select and research an interesting topic** we have not yet discussed. You will analyze papers on the topic and use the data in the papers to create a **poster**; posters will be presented in symposia during class on **Dec. 8 and 10** and you will write **reviews of other people's poster presentations**.

Given the importance of this project, there are several **intermediate deadlines** (see schedule below) to help you maintain an appropriate pace over the second half of the semester. We will also schedule sessions **right after fall break** with **Sue O'Dell in Hatch library** to give you an overview of how to best use the resources there for your projects. Since Bowdoin is no longer a medical school, we have a limited number of immunology journals and you will likely need to use a wide range of resources. If you would like help getting started on your research, you can **sign up for one of these sessions in class on Wed., Oct. 8**. More information on the format for these projects and potential topics will be handed out later in the semester.

Participation:

The participation portion of the grade combines a number of aspects that are critical to scientific pursuits.

1. Discussions: Three classes over the course of the semester will be dedicated to **analyzing an article from the scientific literature**. You will be assigned the article a **week in advance** and will **get ready to discuss it** in class by **writing a short preparation** (see p. 4). You should make sure that you **attend** these classes and **actively participate** in the discussions. **I will read** your preparations and **make comments** and **suggestions for improvement**. **Handing** the preparations in **on time** and **participating** in discussions is more important than the mark on each preparation (\checkmark , $\checkmark+$, $\checkmark-$). Together these three aspects of each discussion will be worth 4% of your final grade (i.e. together all four discussions will be worth 12% of the final grade).

2. Class: The more actively everyone becomes involved during class, the more **dynamic, exciting, and comprehensible immunology** will become. Active participation includes **asking questions, responding** to my queries, and **making comments** that are **relevant** to the topic we are discussing. You can also participate by coming to **talk with me** after class or at other times. These modes of participation, combined with **writing practice exam questions** and **attending an immunology seminar** (see below), will account for 3% of your final grade.

3. Student study questions: One useful studying exercise is to think about what sort of questions *you* might include on an exam, if you were teaching Immunology. The questions should attempt to be **synthetic** (e.g. having people relate two concepts that were approached separately or to apply a general concept to a specific, novel situation) rather than regurgitant. I will hand out practice questions throughout the semester and then each student will write one question. I will **select** several of these questions, edit for clarity and **post them on the course website** as practice questions. **One student-written question** will be included on each exam.

4. Seminars: Since our class meets on Mon. and Wed., we will replace the class lost on the Wed. before Thanksgiving with a seminar related to Immunology. You can choose between two options: **Rob Wheeler on Thurs., Oct. 9** or **Lennart Johns on Thurs., Nov. 13**.

Discussion preparations

Being able to **read, understand, and interpret** the **scientific literature** is a **critical skill** for all biologists (and chemists, physicists, geologists, doctors etc.). We are going to practice reading and analyzing journal articles over the course of the semester. The week before we have an in-class discussion, everyone will **read the assigned article** and **write a discussion preparation**, which they will **bring to class** to help guide the discussion. The discussion preparation should be **2-3 p.** (12 pt, 1.5 space) and should contain the following elements:

1. What **main biological question(s)** were the authors addressing in this paper? (1-2 sentences)
2. What **general approach** did they take to address this question? (1-2 sentences)
3. For **each figure or table** in the paper:***
 - a. What was the **experiment** (i.e. how was it performed)? (for a&b summarize *qualitatively*;
 - b. What were the **results** of the experiment? do not include exact numbers)
 - c. Do you agree with the **authors' interpretation** of their results? **Why or why not?**
 - d. How could they **improve** the **experiment**? Make sure you focus on the experiment (e.g. were there proper controls?) and not the writing or organization of the paper itself.
4. What are the **major conclusions** the authors draw from their data? (1-2 sentences)
5. What **further experiments** could be done to follow up on this work? **Explain how** you might **perform** the experiment(s) and why it would be **interesting**.

Some questions (3c,d, 5) will be harder to answer than others. You will find that getting together in a **small group** (no more than 4-5 people) **to discuss the paper** before writing your preparations will be **extremely helpful**. Therefore, I **encourage** you to form discussion groups, **HOWEVER**:

1. Make sure that **everyone has read the paper before you meet** (otherwise the meeting won't be as productive)
2. **Write your own discussion preparation; take notes** during the group discussion and then **write the paper individually**. **Copying** someone else's preparation or **coauthorship** of discussion preps **will not be tolerated**. Also, make sure you cite the article properly when quoting verbatim (see **Scientific Citations and References** sheet).

On the day we are discussing a paper, everyone will be divided randomly into **small groups to discuss specific figures and questions for 15-20 min.** and then we will reconvene as an entire class to **share our thoughts and to analyze the paper as a whole**.

Wed., Sept. 17 discussion

We will begin by discussing two papers by Emil von Behring and Shibasaburo Kitasato, who worked on mechanisms of immunity at the end of the 19th century (von Behring won the Nobel Prize in 1901). You'll notice that the format of papers was significantly different at that time than it is now. Unfortunately, there are no figures per se, but we will discuss the experiments described in the following sections and you should treat each one as a "figure" in your discussion prep:

1. p. 139, 2nd column, paragraphs 1-7.
2. p. 139, last 2 paragraphs through p. 140.
3. p. 141-142, point #2.
4. p. 142, point #4
5. p. 143, 1st column, paragraphs 3&4 (I prepared . . .)
6. p. 143, paragraph from 1st to 2nd column

Immunology class and assignment schedule

We will set out to discuss the following topics on the following days. With plenty of lively participation, we may well need to make adjustments later in the semester. Exams and discussion dates, however, will not be altered.

Week of:	Class topics	Text Readings	Other Assignments
9/8	Immunology as an experimental science Overview: Innate and adaptive immunity	Ch. 1-2 (for themes), Ch, 3	
9/15	Antigen and antibody: Structure and function <i>Paper discussion #1: "Blood is a very unusual fluid" (von Behring and Kitasato)</i>	Ch. 4	Discussion prep.: Wed., Sept. 17
9/22	Beyond immunity: Antigen-antibody interactions as tools for research Generation of antibody diversity: Immunoglobulin genes	Ch. 6, 5	
9/29	Presentation of antigen by major histocompatibility complex molecules T-cell receptor and antigen recognition	Ch. 8,9	Student study question #1 due Wed., Oct. 1 (email by 5 pm, posted Fri.)
10/6	<i>Help session</i> T-cell development	Ch. 10	Midterm #1: Mon., Oct. 6, 7:30 pm <i>Rob Wheeler seminar: Thurs., Oct. 9 4 pm Druck 20</i>
10/13	<i>Fall Break</i> B-cell development	Ch. 11	Final project (FP): Topic requests due Fri., Oct. 17 by email
10/20	<i>Paper Discussion #2</i> Cell-cell communication in the immune system	Ch. 12	Discussion prep.: Mon., Oct. 20
10/27	Effector mechanisms: The results of cooperation Fighting infectious diseases	Ch. 15, 14, 18	FP: Descriptive paragraph and literature search due Fri., Oct. 31 (5 pm)
11/3	AIDS and the immune system Vaccines	Ch. 20, 19	Student study question #2 due Wed., Nov. 5 (email by 5 pm, posted Fri.) FP: Paper discussion due Fri., Nov. 7 (5 pm)
11/10	<i>Help Session</i> Allergies and other hypersensitive reactions	Ch. 15	Midterm #2: Mon., Nov. 10, 7:30 pm <i>Lennart Johns seminar: Thurs., Nov. 13, 4 pm, Druck. 20</i>

11/17	Autoimmunity Transplantation immunology	Ch. 16, 17	FP: Outline due Fri., Nov. 21 (5 pm)
11/24	<i>Paper discussion #3</i> <i>Thanksgiving break (make up=seminar)</i>		Discussion prep.: Mon., Nov. 24
12/1	Cancer and the immune system Immunology: What lies ahead	Ch. 21	FP: Abstract due Wed., Dec. 3 (5pm, by email)
12/8	<i>Final project poster symposia</i>		FP: Poster reviews due after symposia Student study question #3 due Thurs., Dec. 11 (email by 5 pm)
12/15	<u>Help session</u> TBA		<u>Final Exam</u>: Officially 2 pm, Sun., Dec. 21; alternative time(s) TBD