

BIO 327 IMMUNOLOGY

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Block 4, Nov. 18-Dec. 18, 2019

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Office hours: Since we will be together for at least four hours every day, you can talk to me during that time to arrange a private appointment. I am usually in my office around 8:30 am and from 3 to 3:30 pm every day (longer if I do not have a meeting).

Please check your email at least twice a day. I do not return phone calls to cell phone numbers.

Shea Lynn Putz

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Course Description

A study of the human immune system including the basic principles involved in host defense mechanisms and methods of immunology. Prerequisite: BIO 205.

Immune mechanisms are all about defense: defense against organisms that can cause disease, defense against non-disease causing organisms in the wrong place, and defense against the bodies' own cells that have transformed into cancerous cells. Immunology considers the cellular, biochemical and physiological basis for this defense. We will discuss the components of this system and how this system allows us to survive under constant insult. It is true; without your immune system, you cannot survive.

Course Goals

The primary goal of this course is for you to acquire a fundamental knowledge of the components of the immune system and how these components interact in the response against invaders of the body. This involves learning the molecular, cellular, evolutionary, and genetic principles underlying the immune response. Another goal is for you to learn to integrate these principles together and be able to solve and understand the multifactorial problems encountered in clinical cases involving immunity.

By the end of this course you

- should be able to clearly articulate and understand innate and acquired immunity by studying lecture material, reading the text and asking questions. This goal will be evaluated by performance on exams.
- should be able to analyze the repercussions of genetic and environmental impacts on the immune system by analyzing and discussing case studies. This goal is evaluated by quizzes, performance on exams, and the accurate and complete presentation of cases.
- will become more familiar with the process of science and how scientific questions are researched including posing a searchable question, designing an experiment to analyze that question, and interpreting the findings. This goal will be assessed by evaluating how you design, perform and

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analyze an experiment to assess the requirements for T-cell activation including the writing of a primary research article.

Course Support of Educational Priorities and Outcomes of the College

Knowledge: You are probably familiar with words and statements such as “antibody”, “vaccination”, “this product will boost your immune system”, “I got the flu from the flu shot.” But do you really understand what these words and statements mean? In fact, both of the statements are false, but we hear them all the time. We begin our study with a crucial component of the human immune response that few people have heard about, innate immunity. Innate immunity sets the stage for the entire response to foreign organisms with the capacity to cause illness or disease. We then proceed to how innate immunity determines the immune response that you are probably more familiar with, adaptive immunity involving the production of “antibodies”, the basis for “vaccination”, and the long-lasting protection of the body from non-self invaders called immunological memory. This course will cover a great deal of information that will help you to not only understand the complexity of the human immune response but also realize the potential for harnessing this response to treat diseases.

Inquiry: You will design, implement, and analyze an experiment examining the response of living cells of the immune system to agents that can either stop or enhance the function of these cells. You will need to access, analyze, and understand the primary literature on these cells and on these agents and their potential role in the immune response.

Reasoning: Your case studies require you to determine how the immune response can be distorted, circumvented, or eliminated by primary or secondary defects in the response, or by evasion or subversion by pathogens.

Communication: You will give 3 oral presentations explaining a case and teach the rest of class how the case can be explained through an analysis of disruption of the immune system. You will also write a proposal outlining your experiment and a final paper in the form of a primary research article.

Required Texts, and Materials

The Immune System by Peter Parham, 4th ed., Garland Publ., 2015. Note that topics in previous editions of this text do not match the 4th ed. You are responsible for information in the 4th ed.

Case Studies in Immunology: A Clinical Companion, R. Geha and L. Notarangelo, 7th ed., Garland Publ., 2016.

Course Moodle Page: The PowerPoint presentations I use in lecture will be available in the course folder on Moodle. Access to these PowerPoint presentations requires that you use them wisely! They are convenient study guides but unless you take notes during lecture, these presentations will do you no good on exams.

Daily Work/Homework

See the Schedule for topics and readings for each day. There will be a quiz on the Cases every Friday.

Immunology has many overlapping areas; each topic depends on knowledge of another aspect of immunity. Hence, it is not a linear discipline. You will find yourself reading a chapter and having to review information in a previous chapter for complete understanding. In addition, the number of facts, acronyms,

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and linkages that you will have to know can be rather daunting. Comprehension and understanding of all of this takes a great deal of time, and you only have 3.5 weeks. You are learning a new language, and you must be prepared to be fully immersed in that language. You will not understand this material by simply reading, reviewing, and regurgitating, particularly all on the night before an exam. Do not fall behind!

I strongly suggest that you begin study sheets on day one of the course. Rewrite your daily notes in the form of concept maps that include a sequence of events. Note that your text does this via pathway figures. For example, look at Figure 3.7 describing the stimulation of TLR4 and eventual relocation of NF κ B to the nucleus to control transcription of specific cytokine genes. Knowing these pathways is crucial to understanding the complexity of the immune response.

Course Grading

Exams: (45% of total grade)

There are three exams in this course covering materials from lecture, lab, and case studies. The exams may be a combination of essay, short answer, true/false or multiple choice questions. I will provide examples of exam questions for each exam.

I use a 15 point grading scale for exams:

Exam Grades:

90-100% A

85-89% A-

80-84% B+

75-79% B

70-74% B-

65-69% C+

60-64% C

55-59% C-

Case Discussions: (30% of total grade. 3 Case discussions, including quizzes, every Friday afternoon.)

Your text refers to cases in Geha and Notarangelo with a clipboard symbol. The cases we will discuss are listed in the calendar. Read these cases when they are assigned; do not wait until Thursday evening to review them all. You will have a short quiz over one of the cases each Friday afternoon but you will not know which case. You will be assigned to a group on Monday afternoon but will not be told which case you will present until Friday afternoon. Groups should get together and go over **each case** before Friday to be prepared. Bring Geha and Notarangelo with you on Friday afternoons! Each group must have a computer.

REMEMBER to fill-out the Case Presentations Self and Group Evaluation and send to me by Saturday.

No self evaluation, no grade.

Format for Friday Case Studies: **You will not be assigned these ahead of time.**

1. 10 minute quiz (Obviously this means show up on time! You will not be given any extra time if you are late. To accommodate the quizzes, discussion of an assigned case within a group, and presentation of each case, class will begin at **12:15 every Friday.**)
2. 20 minute group discussion of case
3. 15 minute group presentation of case to entire class
4. 5 minutes for questions

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I will provide figures from the case as a PowerPoint presentation. You may not add any other slides to this presentation. Use the board to present pertinent facts. Consider presenting in the format of a concept map to link information together in a coherent way. One way a group can prepare is to map out each case prior to Friday.

Everyone must participate in the presentation. You will be graded individually, not as a group. (See Rubric for Case Presentations) Assign who is going to say what! The more you personally demonstrate that you know the case, the better your grade.

Research Procedure/Proposal: (5% of total grade) You will be assigned to a team to examine T-cell proliferation. Detailed instructions are in your lab handout. This formal, written procedure is due Friday, November 22, by 9AM. Name your document: Last Names_Proposal, and email it to both Shea and I by 9AM. Use WORD to write this! I will not accept any other format! You may turn this in any time prior to November 22. Your group cannot begin the experiment until your proposal is approved. Read the information in the lab handout carefully and in the Research Paper document.

Research Paper: (20% of total grade) See Research Paper in course folder on Moodle. Using the format of a primary research article, your research team will write a 10-12 page paper describing your experiment on T lymphocyte proliferation (see Lab Handout). Work closely with the other groups who are using your same substance. Compare results with them. Including the other group's data with yours will enhance your research paper. (This is more than just a hint; I will look more favorably on groups that participate together than on groups that only do "their own thing.")

The most important item that you must have in this paper is why determining the factors that control T-cell proliferation are important. Consider your work as a prelude to designing a new therapy for a specific disease or disorder. The first step would be to get T-cells to proliferate. Instructions for writing this paper along with examples are discussed in the Research Paper document.

You will write 1 paper per group. This paper should include all of the components of a primary paper including introduction, materials/methods, results, discussion, literature cited, and figures. These sections will appear in this order. Everyone must participate in writing the paper. Although you may be only writing one section, you must edit the sections written by other members of your group. The final paper should be a coherent paper that does not reflect any one person's particular style. If there is any plagiarism in any section, every member of the team will suffer the consequences since you are all editing each other's writing. You will have to tell me which section you wrote, and I want an electronic copy of each of your drafts, along with your final paper which means more than one draft! If you give me one draft and a final paper, I will know that the final paper did not undergo a thorough editing.

Course Policies and Information for Students

Please play an active role in this course by asking questions or responding to questions. However, refrain from eating, reading materials not related to the course, and conversing with your fellow classmates during lectures. Our classroom is NOT a cafeteria, nor is it a place to check your communication with people outside of our class. Coffee, tea, water, and other drinks are allowed only in the lecture classroom, nowhere in the lab.

Leave your iPods, MP3 players, other musical devices, blackberries, pagers, anything with an on/off button in your room or, at least, turned off and out of sight. You will not use them in class or during class time.

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You may not use your cell phone anytime and anywhere while taking the exam. I will ask you to place your cell phone on the front desk during exams.

I do permit the use of a laptop for note-taking purposes only; if I determine that you are not using the computer for this sole purpose, I will ban it from the classroom or lab for the rest of the block. You may not record my lectures unless you have an accommodation to do so.

Personal electronic devices can be very disruptive to you and to your classmates. Using these devices during instructional times is a clear sign of disrespect to both me and to your classmates who are your colleagues. Every student has the right to learn in a non-disruptive environment.

Attendance: Attendance in lecture and lab is required. Call before you miss a lecture or lab. Realize that “sleeping-in” or a “defunct alarm clock” is not a valid excuse for missing class. Ten percent will be removed from your cumulative total for each unexcused absence. If you are absent 3 or more times without a valid excuse, I will not allow you to withdraw on the 15th day, and the highest grade you can hope for is a C-, regardless of your cumulative total.

In addition, class starts at 9am Monday-Friday, 12:15pm on Fridays, and 12:30pm Monday-Thursday, not at 9:05am, or 12:20pm on Fridays, or 12:35pm M-Th. Obviously, this means BE ON TIME! If you are habitually late for class, I will ask you to leave and this will be considered an unexcused absence.

Exams are administered on the date scheduled only. I will accommodate illness or emergency situations; however, you must notify me as soon as possible, and I will determine if the illness or emergency is valid.

Case discussions are every Friday afternoon. Since these are an integral part of this course, you cannot miss Friday afternoon. If you have a previously scheduled event occurring on a Friday afternoon such as an athletic competition, drop this course by the third day. Sorry! According to Academic Standards, NCAA Guidelines, “No athlete is automatically excused from class for an athletic event. There are no excused absences for games and students should not expect that professors are required to let them out of class.” (https://www.cornellrams.com/d/2018-19/Academic_Standards_9-13-18.pdf)

Drop Policy: College policy states that you may drop at any time during the first three days of class. If you want or need to drop this course on the 15th day, you must have attended class and completed all assignments/ exams due or administered by that day and have made a reasonable effort on these. I will determine what is considered a “reasonable effort”.

DISABILITIES AND ACCOMODATIONS POLICY: Cornell College makes reasonable accommodations for persons with disabilities. Students should notify the Office of Academic Support and Advising and their course instructor of any disability related accommodations within the first three days of the term for which the accommodations are required, due to the fast pace of the block format. For more information on the documentation required to establish the need for accommodations and the process of requesting the accommodations, see <http://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml>.

ACADEMIC HONESTY POLICY: Cornell College expects all members of the Cornell community to act with academic integrity. An important aspect of academic integrity is respecting the work of others. A student is expected to explicitly acknowledge ideas, claims, observations, or data of others, unless generally

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known. When a piece of work is submitted for credit, a student is asserting that the submission is her or his work unless there is a citation of a specific source. If there is no appropriate acknowledgment of sources, whether intended or not, this may constitute a violation of the College's requirement for honesty in academic work and may be treated as a case of academic dishonesty. The procedures regarding how the College deals with cases of academic dishonesty appear in The Catalogue, under the heading "Academic Honesty."

OK, rules understood. Time to think about getting the most you can from this course. And time to realize how much you are about to learn! And, now, let's fight those invaders of the self!!!