

# BIOLOGY 4350, IMMUNOLOGY

3 CREDIT HOURS, SPRING 2020

CRN 23383

12:30-1:45 PM, TR, LSB 305

**Course Instructor:** Todd P. Primm, Ph.D.

Department of Biological Sciences

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Office Hours are by appointment.

Email is the surest way to reach me. Feel free to email me with questions,

or you can message me on   <https://www.facebook.com/todd.p.primm> Be aware I may not answer after 9 pm.

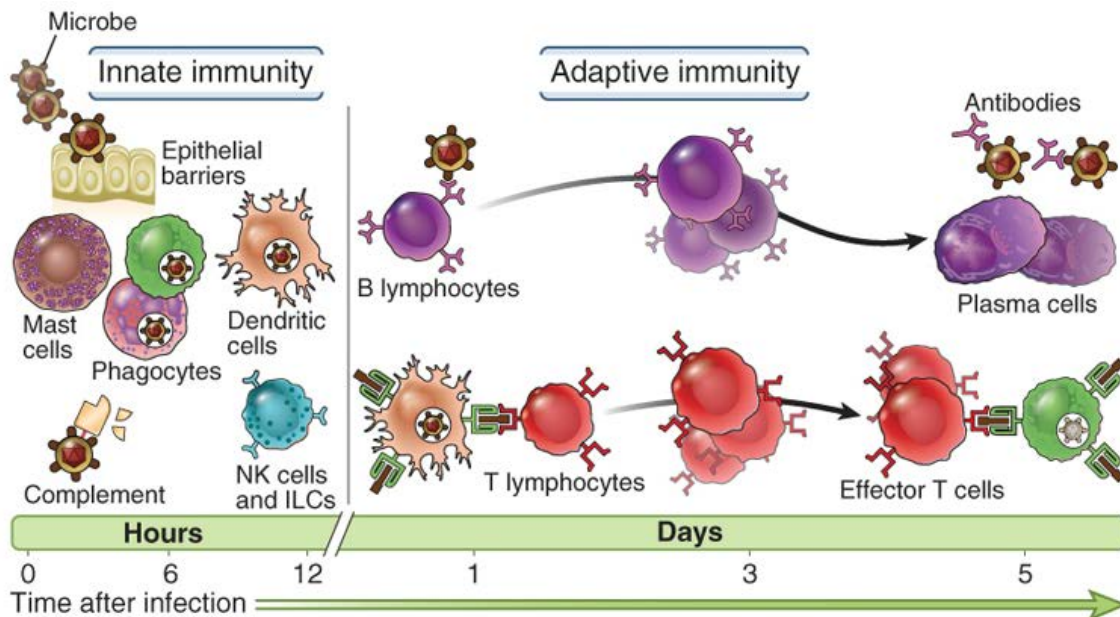
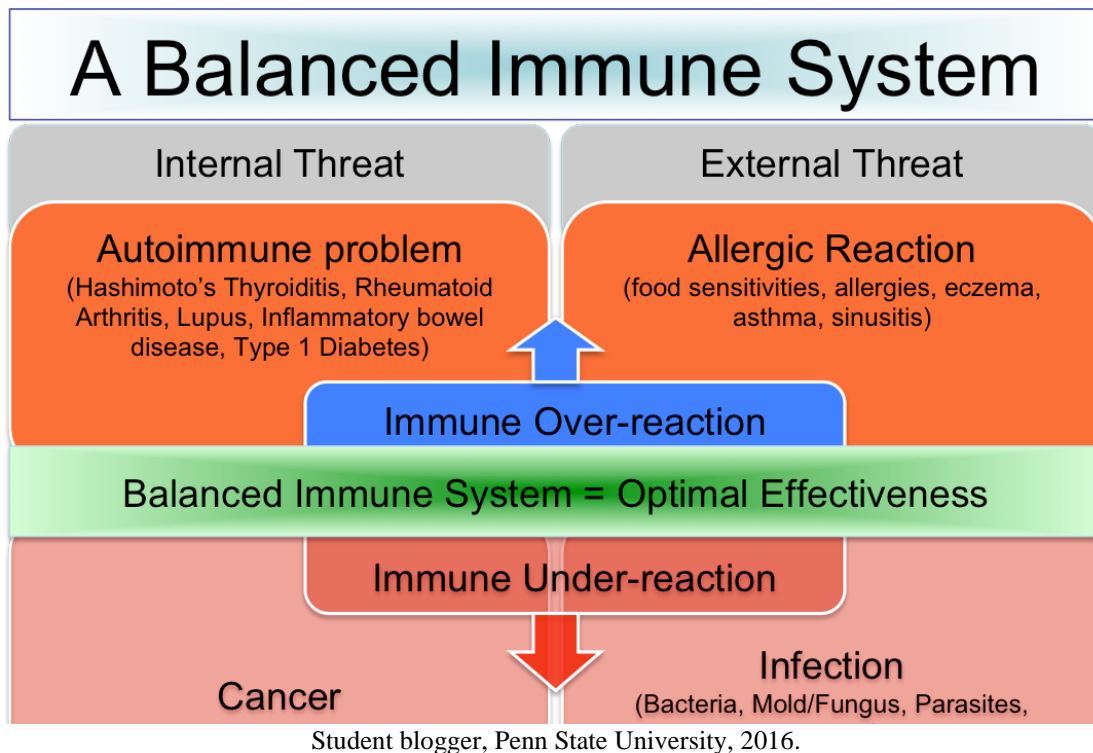


Figure 1-3, Abbas, *Basic Immunology*, 5e, 2016.

**About me:** I attended Atlanta High School (graduating class of 128) in Atlanta, Texas, close to Texarkana. I received a Bachelor of Science in Biochemistry from Texas A&M University, then earned a Ph.D. in Biochemistry from Baylor College of Medicine in Houston, working on protein folding and aggregation. I did a three-year postdoctoral fellowship at the National Institutes of Health, in Bethesda, Maryland in the Tuberculosis Research Laboratory, then taught for five years at UT-El Paso. My current research is focused on mucosal microbiomes and effective teaching and learning in higher education. I came to Sam Houston State University in the summer of 2005.

**Prerequisite Courses:** Minimum grade of C or better in BIOL2440, BIOL3470, and CHEM2323/2123 (cell biology, microbiology, and organic chemistry I). CHEM3438 (Biochemistry) is strongly recommended. Also, must have completed more than 60 hours (junior standing). There is no laboratory component to this course.

**Course Description:** Humans encounter dozens of fungal and protozoan, hundreds of bacterial, and thousands of viral pathogens daily, yet typically thrive. Not only that, our bodies are covered with trillions of microbial cells in a close symbiotic relationship. The immune system is a complex, integrated, remembering, defensive network that protects us from myriad invaders. Even more impressively, while it recognizes millions of foreign antigens, it usually does not react against our own over 250 different cell types (self vs non-self recognition) nor the hundreds of commensal microbial species in our microbiome. The immune system may also be the primary barrier against cancer, identifying and destroying malignant cells. In this course we will explore the mechanisms of this amazing immune system, with a focus on immunogenetics, cancer, and autoimmunity. Since this is an elective, upper-division, majors course, I expect students to be highly motivated, curious about the subject, and act as independent learners.



**Course objectives:**

Upon completion of this course, students will...

1. be able to clearly explain the major terms and concepts of immunology
2. list all of the major components in immunity, and how they function
3. gain a working understanding of how the immune system interacts with pathogens and cancerous cells
4. be able to apply immunology concepts and ideas to research and clinical problems

**Why this course is organized the way it is:** My approach in science education is concept-based learning, as opposed to memorizing a large volume of facts. There are several reasons for this. First, a number of those “facts” will be altered, eliminated, or replaced within the next decade. As new discoveries occur, it is the nature of science to alter our understanding. Thus, you are not learning exactly how immunity works, you are learning our current understanding of how

immunity works, which will inevitably change over time and be improved. Immunology is an extremely fast-moving field, as you will see in class when we discuss topics which have already changed beyond what is in your textbook. Second, if you only memorize a bunch of details, you will forget most of it quickly unless you **apply** that knowledge somehow. Because application is so important, expect activities at the start and end of class often. However, you do have to memorize basic terms, because they are foundational to your understanding. The memorized terms now serve as a set of tools in your mind to think deeply about the subject. Third, in the rapidly advancing field of immunology, you will encounter a large volume of new information in the future. If you have a strong grasp of the basic concepts of the field, then you can fit these new ideas into your web of knowledge. Again, while a number of basic facts and terms must be memorized, we will focus on learning and applying major concepts in this course. There is no lab component to this course.

**Course Materials:** *Basic Immunology: functions and disorders of the immune system*, 6<sup>th</sup> Ed., by Abbas, Lichtman, and Pillai, published by Elsevier. The fifth edition is also acceptable. When you purchase this required textbook, you automatically get access to the e-book as well, using a code.

Also required is the adjunct text *In Defense of Self*, by William R. Clark, Oxford University Press (2008), ISBN 978-0-19-533555-2. It is sold new by Amazon.com or BarnesandNoble.com for about \$15, and used for about \$5. This small book is easy to read, should increase your interest in immunology, and allow you to see many of the applications of knowledge gained by study of the immune system. We will have in-class discussions based on the book, and a written project from it as well.

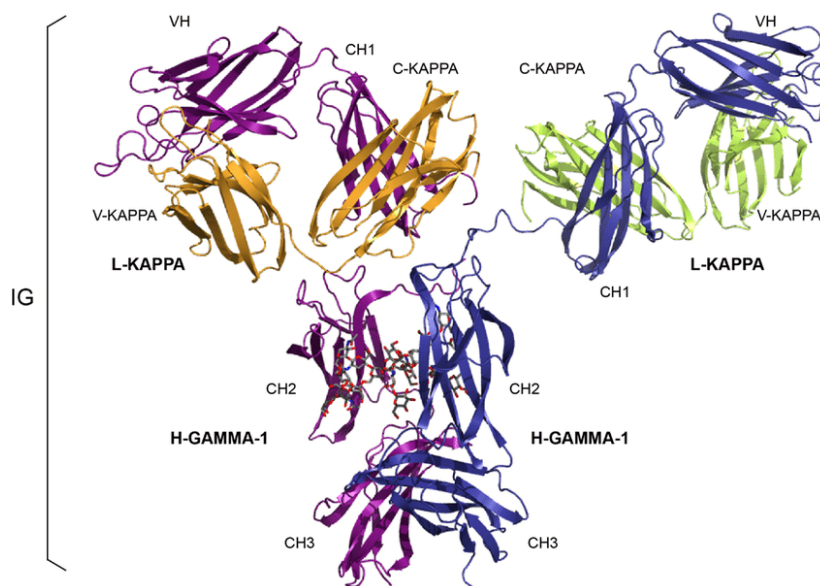
Other readings and resources will be posted to the course Blackboard page.

**Graduate Credit:** This course can be taken as one of the two 4000-level courses within the Masters of Science degree in Biology. When taken for graduate credit, the student must complete all course activities, and earn a grade of A or B. In addition, the student must complete a review of published literature on one selected topic within the field of immunology, which will include a minimum of ten references.

**Attendance Policy:** As a University faculty member, I will provide my knowledge and expertise and try to develop a supportive educational environment. As University students, I expect you to behave professionally (cell phones off in class, prompt attendance, respect to other students, participate in discussions, etc). Exam material is primarily from lectures and in-class discussions, thus if you miss class you will suffer. If something does cause you to miss class, then I expect you to be proactive and obtain lecture notes from a trusted colleague. If you miss an exam or assignment date without notifying me in advance I do not provide a makeup. If you do notify me in advance (at least 24 hrs) and provide verification, and I accept your absence (official University activity or medical), then I reserve the right to give oral exams for makeup or to accept assignments for reduced credit. I want you to learn and enjoy this course, however, that decision is up to you. The more you put in, the more you get out. Since this is a senior-level advanced elective course, attendance and full participation is expected, and I look forward to your own unique contributions.

**Course evaluation:** There will be four equivalent written essay examinations taken during class time which each constitute 17.5% of your course grade, for a total of 70%. No grades are curved, so you are not in competition with other students. Essay exams are the best way for me to determine if you understand the concepts well, which is the main purpose of this course. If you misspell a term or some other minor error, in an essay format I can still tell that you know the concept, and thus give you credit. There is also a comprehensive final exam, which is optional, with the grade from the final replacing your lowest exam grade (you must take all four exams to be eligible for the final). There will be six to twelve written projects, given to enhance understanding of lecture topics. At least one of these is a major written report, and at least two are *fact sheet* reports. These written activities will help you process the course content and understand it better, thus performing better on the exams. The projects combine for 30% of your total grade. Course grade is the typical breakdown of A (100-90%), B (89-80%), C (79-70%), D (69-60%), or F (59% and below).

For official University guidelines and policies related to students with disabilities, academic dishonesty, visitors in the classroom, and religious holidays, see <http://www.shsu.edu/academics/syllabus-guidelines/index.html>



From Lefranc, *Frontiers in Immunology* 2014.

## Course Calendar:

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The course schedule will be on Blackboard, updated daily. The material listed on a date is the subject covered during that class period. Read the assigned material **before** the class so that, as an active and motivated learner, you can participate in class discussions and activities. The predicted date of all exams is listed. The schedule of topics each day of class is posted at least one week in advance.

## Study Groups

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For some of the projects, group work is not only allowed but encouraged. Studying for exams is also often more effective in small group settings. List below the names, phone numbers, and email contact information for potential study partners.

NAME: \_\_\_\_\_

PHONE: \_\_\_\_\_

EMAIL: \_\_\_\_\_

NAME: \_\_\_\_\_

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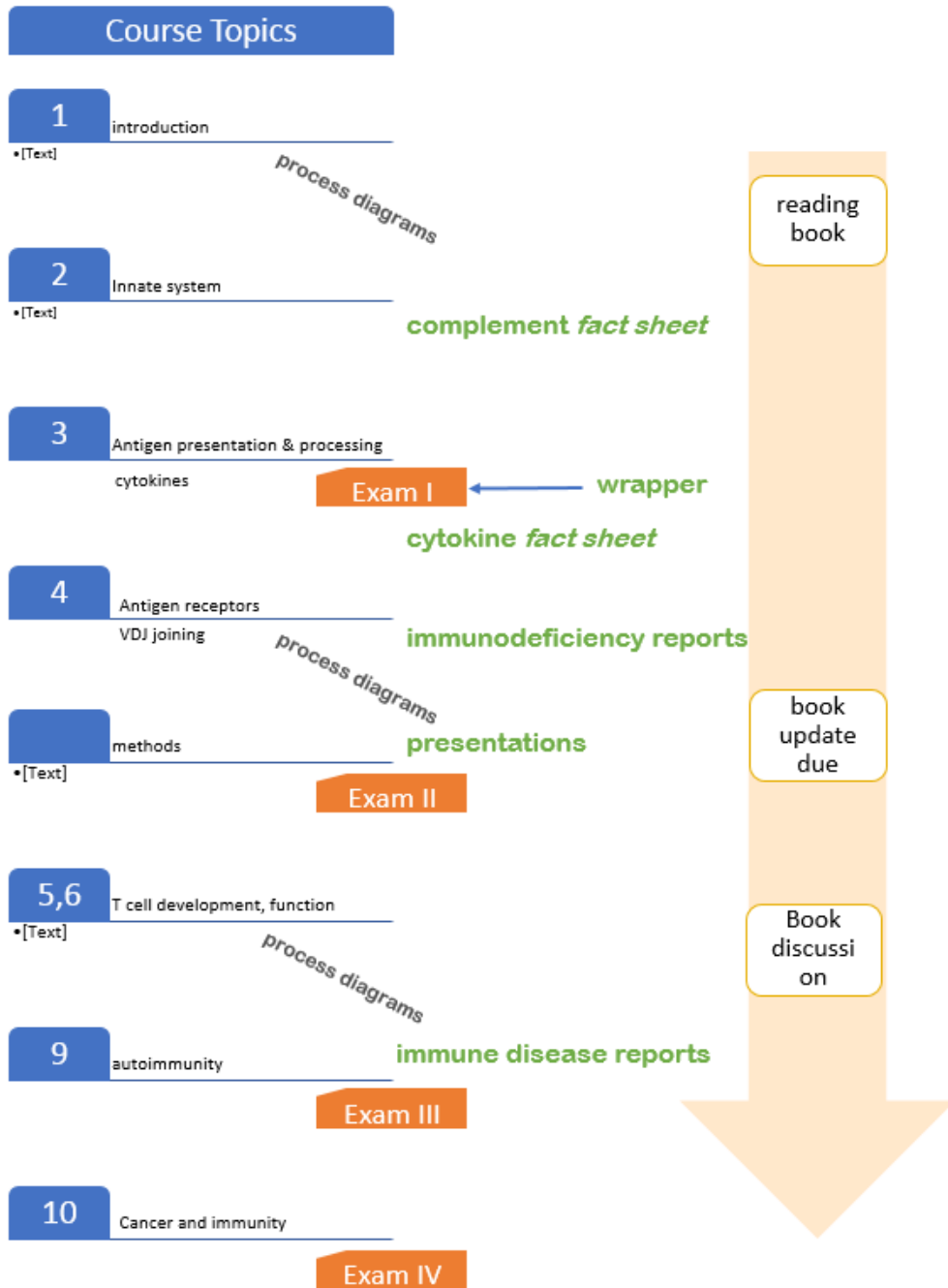
EMAIL: \_\_\_\_\_

### Advice for success from former successful students:

- ✓ Listen carefully in class and take extensive notes. Organize the notes when you get home, that same day when the material is fresh in your mind. If you have trouble listening, then record the lecture and listen again later.
- ✓ Whenever possible, ask questions in class. This class is small, so take advantage of that.
- ✓ Join a study group with other motivated students. You can teach each other and learn from each other. With different backgrounds, you can fill in the gaps in each other's knowledge.
- ✓ Read the textbook carefully, not like you read a newspaper. Make an outline of the chapter, note important terms, and summarize sections in your own words. This will dramatically enhance your learning from the textbook, which was specifically selected for students with little immunology background.
- ✓ With the high level of the material in this course and the critical thinking required, daily interaction with the course will be necessary to absorb it. Set aside time every day to read, rewrite notes, work on projects, etc. Educational research shows that learning that is spread out from day to day (interspersed) persists much longer than learning crammed into one long time period (massed practice).

- ✓ Study in advance with your group, don't cram. Even if you manage to obtain a decent grade, information crammed in at the last minute usually is lost fast from memory. Since the concepts in this course naturally are comprehensive and build on each other, that would be bad.

## Course Map



Blue is textbook chapters, orange is exams, green is assignments, and reader project is in the arrow.