

Biology 389: Immunology

Fall 2018

Course Syllabus

Course and Instructor Information

Lecture: W, F 2:00-3:15, CBB 135

Final Exam: Monday, December 17, 2:45pm-4:45pm

Instructor: Dr. Matt Rogge

Office: CBB 345

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Office hours: W, F 10:00-10:50

Other times by appointment

Course Description

The purpose of this course is to discuss the complex activities and interactions of a vertebrate immune system. The course will cover the organs, tissues, and chemical and cellular factors involved in vertebrate immune responses. Cellular interactions and subsequent signaling events leading to development, activation, and effector responses of white blood cells will be detailed. Finally, once a foundational understanding of activation and regulation of immune responses is achieved, the various roles of the immune system in human health will be discussed.

What you should acquire from this class

Students will understand that...

- The vertebrate immune system includes multiple organs, tissues, and cells within the host.
- Various stimuli can activate immune responses, and the types of responses induced will depend on the type of stimulus received.
- An immune response consists of numerous, complex interactions involving chemical and cell-to-cell signaling, leading to effector responses by cells to protect the host against non-self entities.
- The immune system has powerful mechanisms for the destruction of bacteria, viruses, and other pathogens through the recognition of non-self antigens (mainly proteins). If not properly developed, however, these mechanisms can target self-cells and tissue leading to significant disease.
- Dysfunction of the immune system can have severe impacts on the health of a host.

Learning outcomes

Knowledge:

Students will...

- Distinguish innate from adaptive immune responses.
- Describe the role of specific cytokines in the generation of specific immune responses.
- Explain how innate immune responses help to initiate adaptive immune responses.
- Explain how antigens are identified by various immune receptors and how specific responses are generated in response to different types of antigens.
- Describe how immunization occurs following natural exposure to pathogens or through vaccination.
- Explain how abnormal cell function or cytokine production leads to immune-related disorders.
- Analyze the roles of the immune system in the inhibition and enhancement of tumor growth.

Skills:

Students will...

- Critically evaluate the role of specific immune responses against different infectious agents.
- Critically analyze why deficiencies in immune factors lead to specific diseases and cancers.

Dispositions:

Students will...

- Appreciate the complexity and power of the vertebrate immune system.
- Recognize the diversity of immune factors and their role in generating diverse responses to multitudes of different pathogens.
- Recognize the importance of proper stimulation and regulation of immune responses for various human health-related reasons.
- Evaluate the role of immunoassays in all areas of biological research.

Required materials

Textbook: Owen, et al. 2013. Kuby Immunology, 7th Edition. W. H. Freeman and Co., New York, New York. Available from text rental.

Attendance

Students are expected to attend all lecture sessions. **ATTENDANCE AT ALL EXAMS IS REQUIRED.** Missed exams will only be allowed a makeup in the event of illness or emergency, which will require documentation. The professor reserves the right to change the format of any makeup exams. If you are aware ahead of time of a conflict with a scheduled exam, a meeting with the instructor is required at least a week in advance of the exam to discuss the situation. **A makeup date is not guaranteed for any circumstance.**

Grading

Exams

There will be four exams. The first three exams are each worth 50 points. The information covered builds upon itself as we progress through the semester, so assume there will be cumulative components to each exam. The final is worth 100 points, with 50 points covering the fourth unit of material and 50 points covering cumulative material from the semester. **The lecture exams cover all material that was discussed in class. The level of detail you will be required to know is the level of detail covered in lecture.** The format of the exams will be mostly short answer, but will include any combination of multiple choice, short answer, matching, diagrams and fill in the blank questions. The only excuses for missing an exam will be a death in the family, violent illness, or accident, and written evidence of some kind will be required to make up a missed exam. **NO EXCEPTIONS.**

Total value: 250 points

TOTAL CLASS POINTS:

Grades will be calculated by dividing the total points received by the total points possible and multiplied by 100. The following scale will be used to assign a final grade. Grades will not be curved.

| | | | | | |
|------------|----|-----------|----|-----------|----|
| 92 to 100% | A | 79 to 81% | B- | 66 to 68% | D+ |
| 89 to 91% | A- | 76 to 78% | C+ | 60 to 65% | D |
| 86 to 88% | B+ | 72 to 75% | C | <60% | F |
| 82 to 85% | B | 69 to 71% | C- | | |

Grades are assigned based on how well you perform on the graded exercises. I do not “give” grades because you need it to get into med school, grad school, or stay in your current program of study. If you want an A in the course, you will need to exhibit excellence in every aspect of the course. Average performance will result in an average grade (usually a C). Achieving only the *minimum* expectations is not exhibiting excellence and will result in an average grade.

ROUNDING: Percentages with a decimal value of xx.50 or higher will be rounded up to the next whole percentage (e.g., 89.50% → 90%). Percentages with a decimal value less than xx.50 will be rounded down to the next whole percentage (e.g., 89.49999999% → 89%). **NO EXCEPTIONS.**

Future Letters of Recommendation and References

In the future, you may need a former professor to write a letter of recommendation or be a reference for your employment application, application for graduate school, awards and scholarships, or other future endeavors. If you decide that you want to ask me to be a reference for you, you need to consider what you have provided for me to write or talk about. Were you an average, above-average, or excellent student? Were you engaged in class and excited about the material? Do I only know you based on a grade you received, or am I familiar with you outside of class and your goals for your life and career? Have you separated yourself from other students I have had in terms of interest, motivation, or academic success? *What am I going to be able to say about you to convince someone else that you are better than other applicants?* Furthermore, have you exhibited any negative characteristics that I might mention in my letter? The information I give reflects my honesty in what I observed, and I will not give false or misleading information. Serving as a reference in no way guarantees that the reference will be a *positive* one. You need to consider these things for *any* person you hope to be a reference.

If you do ask me to be a reference or write a letter, I require the request to be in writing and an in-person meeting scheduled to discuss the position(s) for which you are applying. Before I give a recommendation, I require a current CV and/or transcript, copies of or links to forms I need to fill out, and all necessary contact information (names, addresses, phone numbers) required for me to submit the recommendation. Finally, I require these materials be delivered a minimum of **two weeks** before a recommendation is due. More time is greatly appreciated. If any of these criteria are not met, I will not have time, nor will I be well enough informed to write a letter.

Graduate credit

Students taking the course for graduate credit will be assigned additional work and should discuss this work with the instructor as soon as possible.

Attendance

I do not take attendance other than during the times required by the University. In a small class such as this, however, frequent absences will be noticed. You are responsible for attending lecture to ensure exposure to all the material covered. You are responsible for asking questions regarding topics you do not fully understand. I am willing and happy to meet with you outside of class to further explain any topics. You can stop by during office hours or call/email/see me after class to set up an appointment outside of office hours. If there is any way I can assist you in this class, do not hesitate to ask, and I will do my best to help. Do not risk falling so far behind that catching up is impossible.

Academic Expectations

UWSP values a safe, honest, respectful, and inviting learning environment. In order to ensure that each student has the opportunity to succeed, we have developed a set of expectations for all students and instructors. This set of expectations is known as the *Rights and Responsibilities* document, and it is intended to help establish a positive living and learning environment at UWSP.

Academic integrity is central to the mission of higher education in general and UWSP in particular. Academic dishonesty (cheating, plagiarism, etc.) is taken very seriously. **Don't do it!** The minimum penalty for a violation of academic integrity is a failure for the assignment. For more information, see the UWSP "Student Academic Standards and Disciplinary Procedures" section of the *Rights and Responsibilities* document, Chapter 14.

Access for all Students

The Americans with Disabilities Act (ADA) is a federal law requiring educational institutions to provide reasonable accommodations for students with disabilities.

If you have a disability and require classroom and/or exam accommodations, please register with the Disability and Assistive Technology Center and then contact me **AT THE BEGINNING OF THE COURSE**. I am

happy to help in any way that I can, but you need to be registered. For more information, please visit the Disability and Assistive Technology Center, located on the 6th floor of the Learning Resource Center.

How to be successful in this class

- Attend all lectures and, pay attention, and be an active learner.
- Look at the material you anticipate will be covered in class *before* you arrive to class. We cover **a lot** of material during the semester.
- Develop good note-taking skills. **Do not try to write down everything that is said or that appears on the PowerPoint slides.** Sort through the information and make note of the important ideas and concepts being discussed. Reading and processing the information is the first step in learning the information. Print out the provided PowerPoint presentations and bring them to class to supplement your notes.
- Learn to take notes with abbreviations so that you can spend enough time listening in addition to writing. Leave space in your notes so that you can go back and fill in more details later.
- Be engaged in the classroom. Write information in *your own words*, and answer questions asked by the instructor, even if it is quietly to yourself. If your answer is incorrect, make sure you understand why.
- Do not study *for exams*. Studying that way promotes memorization, not understanding. Instead, study for learning and understanding, and do it often. *You need to develop critical thinking skills to succeed in a science-based course and career.* No boss is going to walk into your workspace and ask you to define a list of terms. They will expect you to understand and apply the information, not define it.
- Do not try to memorize definitions. You will need to know what words mean to understand and answer questions, but I will never ask you to define a word.
- Begin studying for exams *at least two weeks* before the exam.
- Study frequently. Repetition is the key to learning *any* topic. Studying for 40 hours over the span of two weeks will be much more beneficial than studying for 40 hours the weekend before the exam.
- After you have studied and know some or most of the material, meet with other students in the class and actively *discuss* the information. Explain mechanisms, theories, concepts, etc. to other students. The other students can help you fill in areas where you are deficient. You will find that explaining these things to someone else is one of the best ways to ensure you know and understand the information. Then have another student explain a different idea or concept and help them identify areas in which they are deficient.
- Begin studying your notes in terms of “big picture” ideas. Find the bigger concepts and make sure you have a basic understanding of those ideas. Once those bigger concepts are understood, add additional details relating to those ideas. By doing this, you construct “compartments” in your mind to store the details rather than simply trying to absorb all the details and hoping that they arrange themselves into a coherent idea. Ultimately, the difference between an A, B, or C is the level of detail that you know, but you should *begin* by focusing on the bigger picture.
- The level of detail that you will be required to know is the level of detail that I cover in lectures. The book has much more detailed information, which may help you better understand the material I cover, but I will not ask about the details I do not cover.
- When you do not understand something, **LOOK IN THE TEXTBOOK!** The book can give more detailed explanations and images that may help you better understand the material. Alternatively, **use the internet.** You have a wealth of information at your fingertips, use it!
- When your notes do not make sense and the book does not help, schedule an appointment with me. I am here to help you learn. I do not expect you to be an immunologist *before* taking the class. I understand that much of this material may be new to you, and one or two lectures may not be enough for you to fully grasp the concepts. Do not be too stubborn to ask for help or you will risk falling behind.
- When answering questions on exams, be sure you answer them *clearly* and *completely*. You should not expect me to interpret vague answers in your favor (because I will not). Your ability to explain something clearly is related to your knowledge of the subject. If your answers are not clear or direct, my interpretation is that you do not understand that topic very well.
- When I ask you to *explain* something, the answer should not be a one or two-word answer. A good explanation will incorporate answers to the following questions:

- “What is happening?”
- “Why is it happening?”
- “How is it happening?”
- Remember ***WHAT, WHY, and HOW.***
- Watch the following YouTube videos. The first is 1hr lecture by a psychology professor discussing how to study. The second is a 6 minute summary of the first video.
 - <https://www.youtube.com/watch?v=IIU-zDU6aQ0>
 - <https://www.youtube.com/watch?v=23Xqu0jXlfs>

Use of electronics during class

Please turn off/mute any electronic devices that could interrupt class *before class begins*. If it is a personal emergency, feel free to excuse yourself from the class and communicate outside of the classroom.

TENTATIVE SCHEDULE

| Week | Topic | Date | Topic | Chapter(s) | |
|--------|---|--|---|---|--------------------|
| 1 | General Concepts in Immunology | Sept 5 | Syllabus and Introduction to Immunology | 1 | |
| | | Sept 7 | Immune Cells | 2 | |
| 2 | | Sept 12 | Immune Organs | 2 | |
| | | Sept 14 | Signal Transduction | 3 | |
| 3 | | Sept 19 | B Cell and T Cell Receptors | 3 | |
| | | Sept 21 | Cytokines and Chemokines | 4 | |
| 4 | | Sept 26 | Cytokines and Chemokines | 4 | |
| | | Innate Immunity and its Initiation of Adaptive Responses | Sept 28 | Innate Immunity | 5 |
| Oct 3 | | | EXAM 1 – IMMUNOLOGY BASICS (Ch. 1-4) | | |
| Oct 5 | | | Innate Immunity | 5 | |
| 6 | | | Oct 10 | The Complement System | 6 |
| | | | Oct 12 | Lymphocyte Receptor Genes | 7 |
| 7 | | | Oct 17 | MHC and Antigen Presentation | 8 |
| | | | Lymphocyte Development, Activation, and Responses | Oct 19 | T Cell Development |
| Oct 24 | T Cell Activation, Differentiation, and Memory | 11 | | | |
| Oct 26 | EXAM 2 – INNATE/ADPATIVE INTERACTION (Ch. 5-8) | | | | |
| 9 | Oct 31 | B Cell Development | | 10 | |
| | Nov 2 | B Cell Activation, Differentiation, and Memory | | 12 | |
| 10 | Nov 7 | T and B Cell Effector Responses | | 13 | |
| | Nov 9 | T and B Cell Effector Responses | | 13 | |
| 11 | Immunology and Human Health | Nov 14 | Allergy, Hypersensitivities, and Chronic Inflammation | 15 | |
| | | Nov 16 | EXAM 3 – LYMPHOCYTES (Ch. 9-13) | | |
| 12 | | Nov 21 | TBD | | |
| | | Nov 23 | THANKSGIVING BREAK – NO CLASS | | |
| 13 | | Nov 28 | Tolerance, Autoimmunity, and Transplantation | 16 | |
| | | Nov 30 | Infectious Diseases and Vaccines | 17 | |
| 14 | | Dec 5 | Infectious Diseases and Vaccines | 17 | |
| | | Dec 7 | Immunodeficiency Disorders | 18 | |
| 15 | | Dec 12 | Cancer and the Immune System | 19 | |
| | | Dec 14 | Immunological Technologies | 20 | |
| 16 | | | Dec 17 | FINAL EXAM, Monday, December 17, 2:45pm-4:45pm | |