UTTyler MEDICINE

BIOT 6334 **Advanced Immunology** **Credit Hours: 3**

Semester: Summer 9-week **Year:** 2026
Class Day/Time: Tuesday 9a-12p **Class Location:** B12.1 (BMRC Basement)

Instructor of Record: Dr. Buka Samten
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Office Hours: By appointment

Course Description: Advanced survey of the immune system with focus on the human and mouse models. Covers the origin and differentiation of the hematopoietic system, antibody structure and function, T cell subsets and the function of each subset, and the role of innate and adaptive immunity in the response to infection, in autoimmune diseases, allergy and organ transplantation.

Prerequisite: None **Co-requisite:** None

Goals of Course:

1. To gain an understanding of all common serological and immunological techniques and methods.
2. To learn to communicate clearly and concisely in an appropriate scientific form.
3. To gain an understanding of the components, cells, tissues, and organs of the immune system.
4. To gain an understanding of the properties of antigens and mitogens.
5. To gain an understanding of the various classes, structures and functions of antibodies and related immunoglobulin superfamily proteins.
6. To gain an understanding of antigen-antibody and antigen-receptor interactions, including co-signaling molecules.
7. To gain an understanding of the organization and expression of the genes and the structures of the gene products associated with the immune system: T- and B-cell receptors, major histocompatibility complex proteins and complement.
8. To gain an understanding of the mechanisms associated with antigen processing and presentation and the resulting primary and secondary immune response and cellular proliferation, differentiation, and memory formation in both humoral and cell-mediated immunity and helper T cells.
9. To gain an understanding of the functions of cytokines and cytokine receptors.
10. To gain an understanding of the processes involved in complement activation and regulation.
11. To gain an understanding of hypersensitivity reactions, autoimmunity, evasion of the immune response by pathogens, tumor immunotherapies, and immunodeficiency conditions.

Student Learning Outcomes (SLO or "course objectives"):

1. The student will be able to differentiate between innate and adaptive immune functions and their cellular basis and differentiate between humoral and cellular immune responses.
2. The student will be able to describe the structures and functions of the five immunoglobulin (Ig) isotypes and how they are involved in the primary and secondary immune responses to the antigenic challenges.
3. The student will be able to identify and describe the functions of all the cells, tissues and organs of the immune system and how they interact.
4. The student will be able to describe the interaction and functions of all components and regulatory substances of the complement cascade

5. The student will be able to describe the genetic mechanisms involved in the generation of diversity for both T-cell and B-cell receptors and the processes involved in their expression.
6. The student will be able to describe the role of intercellular interactions, signaling pathways, chemokine gradients, and cytokine production in the initiation and regulation of the immune response.
7. The student will be able to describe the mechanisms and surface proteins involved in recognition of "self" and its implications in tissue and organ transplantation.
8. The student will be able to describe the mechanisms involved in immunodeficiency conditions and the therapeutic approaches involved in reinstating a normal response.
9. The student will be able to describe the mechanisms involved in autoimmune disorders.
10. The student will be able to differentiate between the forms and effects of hypersensitivity and tumor immunity

Subject-specific Skills:
See Marketable Skills list for this course.

Course Assessment/Methods of Evaluation:
The student's understanding will be evaluated with comprehensive exams exclusively of a subjective nature covering each topic in detail.

Comprehensive Lecture Examinations: There will be three take-home examinations of exclusively a subjective format and worth 1/3 of the final grade.

Grade:
A >90%
B 89-80%
C 79-70%
D 69-60%
F <59%

Assignments
Students are expected to turn in assignments on time. Late assignments will be handled as follows:

1 day late:	5% deducted from overall assignment grad
2 - 3 days late:	10% deducted from overall assignment grade
4 -7 days late:	20% deducted from overall assignment grade
7-14 days late:	30% deducted from overall assignment grade
14+ days late:	An additional 5% deduction for each additional week
4 weeks late:	Assignment will not be accepted

Linked Program Learning Outcomes:
The student learning outcomes listed above address the following Biotechnology Program PLOs:
- PLO1 - The student will demonstrate English communication skills in both oral and written forms.
- PLO4 - The student will demonstrate independent and critical thinking skills integrated with the ability to utilize multiple informational resources.
- PLO5 - The student will explain the principles, mechanisms, and interrelatedness of both in vivo and in vitro biochemical, molecular biological, and genetic processes.

Textbook:
Janeway's Immunobiology 10th Edition. Kenneth Murphy, Casey Weaver, and Leslie Berg, *W.W. Norton & Company,* 2022. ISBN: 978-0-393-68093-5

Course Content:

UTTyler MEDICINE

Lecture Topical Outline:

- Basic concepts in immunology
- Innate immunity: The First Lines of Defense
- Cellular Mechanisms of Innate Immunity
- Antigen Recognition by B-cell and T-cell Responses
- The Generation of Lymphocyte Antigen Receptors
- Antigen Presentation to T Lymphocytes
- Lymphocyte Receptor Signaling
- The Development of B and T Lymphocytes
- T cell Mediated Immunity
- The Humoral Immune Responses
- Integrated Dynamics of Innate and Adaptive Immunity
- The Barrier Immune System
- Failures of Host Defense Mechanisms
- Allergic Diseases and Hypersensitivity Reactions
- Autoimmunity and Transplantation
- Manipulation of the Immune Response

2026 Summer Advanced Immunology Lecture Schedule

Date		Topic	Related Reading	Instructor
Week 1	May 12	Basic Concepts in Immunology Innate Immunity: The First Line of Defense	Chapters 1 & 2	Samten
Week 2	May 19	Cellular Mechanisms of Innate Immunity Antigen Recognition by B-cell and T-cell Receptors	Chapters 3 & 4	Tvinnereim
Week 3	May 26	The Generation of Lymphocyte Antigen Receptors	Chapter 5	Tvinnereim
Week 4	June 2	Antigen Presentation to T lymphocytes Lymphocyte Receptor Signaling	Chapters 6 & 7	Samten
		TAKE-HOME EXAM I (Chapters 1-7) available on Canvas – Due on June 9th		
Week 5	June 9	The Development of B and T Lymphocytes	Chapter 8	Samten
Week 6	June 16	The Barrier Immune System	Chapter 12	Samten
Week 7	June 23	T Cell-mediated Immunity The Humoral Immunity	Chapters 9 &10	Tvinnereim
		TAKE-HOME EXAM II (Chapters 8-10, 12) available on Canvas – Due on June 30th		
Week 8	June 30	Integrated Dynamics of Innate and Adaptive Immunity	Chapter 11	Tvinnereim
Week 9	July 7	Failures of Host Defense Mechanisms	Chapter 13	Yi
Week 10	July 14	Allergic Diseases and Hypersensitivity Reactions	Chapter 14	Tvinnereim
Week 11	July 21	Autoimmunity and Transplantation	Chapter 15	Samten
Week 12	July 28	Manipulation of the Immune Responses	Chapter 16	Yi
		TAKE-HOME EXAM III (Chapters 11, 13-16) available on Canvas – Due on July 31st		

UT Tyler MEDICINE

Other Class Policies

Attendance:
Regular or punctual attendance is expected. If a student misses a class or lab, the student is responsible for obtaining any information distributed during those times. Make-ups are possible only under certain instances (labs cannot be made up). Arrangements for any make-ups and/or missed labs should be discussed directly with the instructor for that day's class.

Academic Honesty:
Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

Cheating
Dishonesty of any kind involving examinations, assignments, alteration of records, wrongful possession of examinations, and unpermitted submission of duplicate papers for multiple classes or unauthorized use of keys to examinations is considered cheating. Cheating includes but is not limited to:

- Using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class.
- Falsifying or inventing any information, including citations, on an assigned exercise.
- Helping or attempting to help another in an act of cheating or plagiarism.

Plagiarism
Plagiarism is presenting the words or ideas of another person as if they were your own. Materials, even ideas, borrowed from others necessitate full and complete acknowledgment of the original authors. Offering the work of another as one's own is plagiarism and is unacceptable in the academic community. A lack of adequate recognition constitutes plagiarism, whether it utilizes a few sentences, whole paragraphs, articles, books, audio-visual materials, or even the writing of a fellow student. In addition, the presentation of material gathered, assembled or formatted by others as one's own is also plagiarism. Because the university takes such misconduct very seriously, the student is urged to carefully read university policies on Misconduct in Research and Other Scholarly Activity 05.00. Examples of plagiarism are:

- Submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another.
- Submitting a work that has been purchased or otherwise obtained from an Internet source or another source.
- Incorporating the words or ideas of an author into one's paper without giving the author due credit.

Adding/Dropping:
The official deadline for adding and dropping courses is published in the academic calendar (Registrar Withdrawal webpage). However, students are strongly encouraged to meet with their graduate advisor or the Program Coordinator prior to adding/dropping courses. Movement into and out of classes after the 4th class day requires approval of the Program Director. Each student is responsible for their own enrollment status with the university.

Disability Accommodations:
UT Tyler HSC abides by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act, which mandate reasonable accommodations be provided for students with documented disabilities. If you have a disability and may require some type of instructional and/or examination accommodations, please contact me early in the semester so that I can provide or facilitate provision of accommodations you may need. If you have not already done so, you will need to register with the Student Services Office (located on the main campus). You may call 903-566-7079 for more information.

Usage of AI
UT Tyler is committed to exploring and using artificial intelligence (AI) tools as appropriate for the discipline and task undertaken. We encourage discussing AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Faculty and students must not use protected information, data, or copyrighted materials when using any AI tool. Additionally, users should be aware that AI tools rely on predictive models to generate content that may appear correct but is sometimes shown to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches

to research. You are ultimately responsible for the quality and content of the information you submit. Misusing AI tools that violate the guidelines specified for this course (see below) is considered a breach of academic integrity. The student will be subject to disciplinary actions as outlined in UT Tyler's Academic Integrity Policy. For this course, **AI is not permitted on this course at all**. a. Example 1: I expect all work students submit for this course to be their own. I have carefully designed all assignments and class activities to support your learning. Doing your own work, without human or artificial intelligence assistance, is best for your efforts in mastering course learning objectives. For this course, I expressly forbid using ChatGPT or any other artificial intelligence (AI) tools for any stages of the work process, including brainstorming. Deviations from these guidelines will be considered a violation of UT Tyler's Honor Code and academic honesty values. b. Example 2: To best support your learning, you must complete all graded assignments by yourself to assist in your learning. This exclusion of other resources to help complete assignments includes artificial intelligence (AI). Refrain from using AI tools to generate any course context (e.g., text, video, audio, images, code, etc.) for an assignment or classroom assignment. c. Example 3: The work submitted by students on this course will be generated by themselves. This includes all process work, drafts, brainstorming artifacts, editing, and final products. This extends to group assignments where students must collaboratively create the project. Any instance of the following constitutes a violation of UT Tyler's Honor Code: a student has another person/entity do any portion of a graded assignment, which includes purchasing work from a company, hiring a person or company to complete an assignment or exam, using a previously submitted assignment and/or using AI tools (such as ChatGPT).