

BIOS 4570 Syllabus

Section A, 3 Credits
Fall 2026

Faculty Information

Instructor

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General Course Information

Description

Students will be able to explain genetic and biochemical basis of antigen specificity, tolerance and memory in adaptive immune responses. Students will also learn how innate immune responses relate to adaptive immune responses and be able to explain the role of immune system components in medical applications such as transplantation, vaccination, allergy, autoimmunity, and immunotherapy

Course Learning Outcomes

- Analyze the molecular structure and antigen-recognition mechanisms of B-cell receptors (BCRs), T-cell receptors (TCRs),
- Evaluate the processes of B- and T-cell development, including V(D)J recombination, positive and negative selection, clonal expansion, and mechanisms that establish central and peripheral tolerance.
- Compare and interpret endogenous (MHC I) and exogenous (MHC II) antigen processing pathways, including cross-presentation, and predict their roles in CD4 and CD8 T-cell activation.
- Differentiate and explain the cellular and molecular effector functions of innate and adaptive immune responses, including antibody-mediated immunity, cytotoxic T-cell activity, NK cell function, type I interferon responses, and barrier defenses.
- Analyze how pattern-recognition receptors, Toll-like receptors, GPCR signaling, and complement pathways initiate inflammation, enhance phagocytosis, and mediate pathogen lysis.
- Apply knowledge of co-stimulation, metabolic reprogramming, T–B cell collaboration, and adhesion molecule function to explain lymphocyte activation, effector differentiation, and tissue homing.

- Evaluate the cellular, molecular, and microbial factors that regulate intestinal immunity, including secretory IgA production, TGF- β -mediated tolerance, and immune cell homing.
- Integrate and analyze core immunological mechanisms to explain pathogen immune evasion, immunopathology (autoimmunity, allergy, immunodeficiency), and the scientific basis of vaccines and immunotherapies.

Required Course Materials

Janeway's *Immunobiology*, Murphy, Weaver, and Berg, 2022, 10th edition, W.W.Norton & Company

Go to **Ebook link (Ebook and Resources module) in Canvas (NOT Norton website)** for purchasing options. Yellow tab at the top right says "purchasing options." The Ebook is linked to Immunology course in Canvas. Register using your Georgia Tech email. InQuizitive comes with the book regardless of how you purchase the text.

We will NOT use Inquizitive as an assessment. However, I may use questions from Inquizitive as part of your in-class worksheet assignments.

Ebook ISBN 978-0-393-88487-6: \$98.95

Paperback- ISBN 978-0-393-88489-0: \$160.79 (used print), \$214.38 (new print)

Grading Policy:

Your final grade will depend on the following combination of grades:

Exams	60%
Case Studies	20%
In-Class Worksheets	20%

A: $\geq 90.0\%$

B: $\geq 80.0\%$ and $< 90.0\%$

C: $\geq 70.0\%$ and $< 80.0\%$

D: $\geq 60.0\%$ and $< 70.0\%$

F: < 60.0

Description of Graded Components

Exams: 60% of the Course Grade

Students are required to take three Midterm Exams and a Final Exam. Midterm exams and Final exam will be administered online in Gradescope. **Students will take the exam in class using their laptop (closed book).** Exams will be mostly multiple choice with a few short answer questions. You will be provided with a Study Guide to help you prepare for the exam. The Midterm exams will be spaced evenly throughout the semester and will cover the material in that quarter (exam dates in schedule). The Final Exam will cover

the last section of the course only. The final exam will be given during Finals week on the day and time specified by the Registrar's office.

Case Studies: 20% of course grade.

Purpose of case studies is to facilitate group discussion and critical analysis of current topics discussed in each unit. Assessments will be based on participation, completion of assigned questions, and accuracy. Each student will submit case study responses **by case study deadline**. Completed Case Studies will need to be scanned and uploaded into Canvas Assignment (Instructions provided in Canvas). Late assignment will result in a **point reduction**. Grades for each case study will be posted for each student in Canvas gradebook. Case study analysis and discussion will take place during class time (see Canvas schedule). All members of case study group must participate in case study analysis. **My TA will take attendance. Case study will be posted the DAY OF scheduled case study.**

Case Study rubric: (0-3)

0: Not completed

1: Minimal effort made

- majority of answers are incorrect
- more than 50% of questions unanswered

2: Some effort

- at least 50% of questions answered correctly

3: Good job

In-Class Worksheets: 20% of your course grade.

The assignments are **graded based on participation**, not assignment grade. Students will be expected to work on the activity during class. Assignments do not have to be complete before submission (**partial completion is ok**). I will **drop one** in-class worksheet without penalty. In-class worksheets promote student engagement, peer learning, and review of lecture topics. The worksheet may include a review chart, analysis questions, or experiment analysis. In-class worksheets will need to be scanned and uploaded into Canvas Assignment by the **end of class (3:30pm)**. In-class worksheets folder located in each Unit module.

Attendance and/or Participation

Students apply topics during class with **in-class review worksheets**. Peer learning provides students with opportunities to ask and respond to questions.

Attendance is required and will be recorded for **case study participation** (see Canvas schedule). Attendance is strongly encouraged during lecture for in-class worksheet participation, review of course topics, and to promote class engagement.

Canvas Resources

- PowerPoint slides will be posted on Canvas. **However, you will need to fill in additional information during class.** I will post links and supplementary resources on Canvas. Class reminders and changes will be communicated in Canvas announcements
- **Course Schedule** located in the Canvas Syllabus Module
- **Unit Study Guide:** Located in each Unit folder
- **Ebook by topic:** Located in each Unit folder. List of textbook headings covered in each Unit.
- **Office hours:** Canvas Home Page

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review [Georgia Tech's Honor Code](#) and the student [Code of Conduct](#).

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodation for Students with Disabilities

If you are a student with learning needs that require special accommodation, [contact the Office of Disability Services](#) (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also email me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. [The Student-Faculty Expectations](#) articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Prerequisites

BIOS 2600 OR BIOS 2610 OR BIOS 3450 OR BIOL 2344 OR BIOL 2354

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

In-class worksheets: Extensions of one day with documentation provided (medical documentation or approved institute activities). Documentation must be sent to Prof. Datta within 24 hours of scheduled activity.

Make up exam policy: If you know you will miss an exam, please coordinate with Prof. Datta at least one week in advance to set up a time to take a makeup exam ahead of the scheduled exam date. If you miss an exam without notifying Prof. Datta, you will receive a grade of 0 (zero) unless you have a legitimate reason for missing the exam. Examples of legitimate reasons to miss an exam include illness, illness or death in your immediate family, and participation in official university activities. **Documentation is required** for any exam to be considered excused; medical documentation should be submitted to the Dean of Students (<https://studentlife.gatech.edu/request-assistance>) and not to Prof. Datta. Makeup exams will be arranged **within 3 business days** of the missed exam.

Missed lecture notes: If you miss class and have an excuse (illness, university approved absence, etc), please send me an email with documentation (reason for absence). I will then send an email to you and one of my TAs for missed lecture notes and assistance.

Case Study Absence: Please notify me at least 24 hours in advance if you are unable to participate in a case study. You will be assigned a make-up case study. You must have an excused absence (approved by me) to receive credit for a make-up case study.

Inclement Weather and Digital Learning Days

I will move class to online, synchronous zoom session during inclement weather. I will communicate changes to class schedule using Canvas Announcement.

Student Use of Mobile Devices in the Classroom

Students may use mobile devices for instructional purpose (ie polling question in Point Solutions). Laptops and iPads are permitted for group work (in-class worksheets) and taking notes if needed.

Undergraduate Student Academic Success Resources:

Academic Support: Academic Success and Advising (a unit in the Office of Undergraduate Education & Student Success) provides free support for your courses. Students can attend scheduled supplemental review (PLUS) sessions, stop by Drop-In Tutoring, or schedule a one-on-one appointment through Knack. To explore what options work best for you, please visit us online at success.gatech.edu/tutoring, email us at tutoring@gatech.edu, or come see us at Clough Undergraduate Learning Commons, Suite 283.

Student Well-Being:

“At Georgia Tech, we are concerned about your overall physical, social, and mental well-being.” A [comprehensive list](#) of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being (student-resource-guide.gatech.edu)