Immunology
BIOL 3553/3550L X1

Instructor: Dr. Melanie Coombs
Office: BIO 312
Office hours: Wed 8:20-10:20 am or by appointment
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Note: *Please note that your emails to me should only come from your Acadia email address. Other email addresses may not come directly to my inbox.*

Lecture:
MWF, HSH 141, 10:30 - 11:20 am

Lab: BIO 3550L Wed, Carnegie Hall 207, 1 - 3:50 pm

Evaluation	Percentage	Date
Test 1	15%	Sep 23
Test 2	15%	Oct 28
Weekly online quizzes	10%	Weekly
Tutorial/lab activities & assignments	30%	Weekly
Final exam (Full term)	30%	Scheduled by the registrar

Part 1: Course Information

Course Description

This course is an introduction to the fundamental concepts of the defences of mammals and other organisms at the molecular, cellular and system levels. Topics include the organisation and regulation of the immune system, cellular interactions among immune system components, immune dysfunction, and specific immune responses against pathogenic viruses, bacteria, fungi, and protozoan and metazoan parasites.

Course Pre-requisites

BIOL-2013 and BIOL-2053 with minimum grade C- required - Must be completed prior to taking this course.
BIOL-3550L - Must be taken at the same time as this course.

Course Textbook

Kuby Immunology: Eighth edition, Punt, Stranford, Jones and Owen, W.H. Freeman, 2019

Student Learning Outcomes

1. Understand which cells and tissues are involved in the innate and adaptive immune response.
2. Understand the development of immune cells.
3. Understand the activation of an immune response (innate and adaptive).
4. Examine the role of the immune response in disease (hypersensitivity, autoimmunity, transplantation, immunodeficiencies, inflammation and cancer).

How to Meet the Learning Outcomes

1. Come to lectures on a regular basis, take notes, and ask for clarification when something is unclear.
2. Take part in weekly class activities. These will give you insight as to how well you understand the information being presented. A phone, tablet or laptop will be needed for class/lab/tutorial activities to measure understanding/retention weekly.
3. Access the course MOODLE page each week. Lecture images, course outline and contact info will be available on MOODLE (https://Moodle.acadiau.ca).

4. Reading the textbook each week.
5. Study on a regular basis (for each hour of lecture students should be spending 2-3 h studying, on a regular basis).
6. Complete tests (2 tests, 1 final exam) and practice quizzes.
7. Participate and ask questions during the Lab/tutorial case studies.

Part 2: Course Plan

The instructor reserves the right to amend the course plan with reasonable notice to the class.

Lecture:
Sep 4 – Introduction and Overview of the Immune System (Ch 1)
Sep 6 – Introduction and Overview of the Immune System (Ch 1)
Sep 9 – Cells, Organs, and Microenvironments of the Immune system (Ch 2)
Sep 11 – Recognition and Response (Ch 3)
Sep 13 – Innate Immunity (Ch 4)
Sep 16 – Innate Immunity (Ch 4)
Sep 18 – Innate Immunity (Ch 4)
Sep 20 – **Review**
Sep 23 – **Test I (material covered in class and labs/tutorials Sep 4 – Sep 20, 2024, inclusive)**
Sep 25 – The Complement System (Ch 5)
Sep 27 – The Complement System (Ch 5
Sep 30 – National Day for Truth and Reconciliation - No class
Oct 2 – The Complement System (Ch 5)
Oct 4 – The Organization and Expression of Lymphocyte Receptor Genes (Ch 6)
Oct 7 – The Major Histocompatibility Complex and Antigen Presentation (Ch 7)
Oct 9 – The Major Histocompatibility Complex and Antigen Presentation (Ch 7)
Oct 11 – T cell Development (Ch 8)
Oct 14 – **Thanksgiving day – No Class**
Oct 16 – **Fall study day – No Class**
Oct 18 – **Fall study day – No Class**
Oct 21 – T and B cell Development (Ch 8&9)
Oct 23 – B cell Development (Ch 9)
Oct 25 – Review
Oct 28 – **Test II (material covered in class and labs/tutorials Sep 25 – Oct 25, 2024, inclusive)**
Oct 30 – T cell Activation, Helper Subset Differentiation and Memory (Ch 10)
Nov 1 – T cell Activation, Helper Subset Differentiation and Memory (Ch 10)
Nov 4 – B cell Activation, Differentiation and Memory Generation (Ch 11)
Nov 6 – B cell Activation, Differentiation and Memory Generation (Ch 11)
Nov 8 – Effector Responses: Antibody- and Cell-Mediated Immunity (Ch 12)
Nov 11 – **Remembrance day observed – No Class**
Nov 13 – Effector Responses: Antibody- and Cell-Mediated Immunity (Ch 12)
Nov 15 – Effector Responses: Antibody- and Cell-Mediated Immunity (Ch 12)
Nov 18 – The Adaptive Immune Response in Space and Time (Ch 14)
Nov 20 – Allergy, Hypersensitivities and Chronic Inflammation (Ch 15)
Nov 22 – Allergy, Hypersensitivities and Chronic Inflammation (Ch 15)
Nov 25 – Tolerance, Autoimmunity and Transplantation (Ch 16)
Nov 27 – Tolerance, Autoimmunity and Transplantation (Ch 16)
Nov 29 – Tolerance, Autoimmunity and Transplantation (Ch 16)
Dec 2 – Cancer and the Immune System (Ch 19)
Dec 4 – Review

Lab/Tutorial Schedule:

Sep 4 – No lab
Sep 11 – Innate Immunology case study
Sep 18 – Review concepts
Sep 25 – Histology lab
Oct 2 – Complement case study
Oct 9 – MHC case study
Oct 16 – **No lab - study break**
Oct 23 – Review concepts
Oct 30 – Immunodeficiency case study (Ch 18)
Nov 6 – Vaccines and misconceptions activity (Ch 17)
Nov 13 – Transplant case study (Ch 10/11)
Nov 20 – Allergy & Autoimmunity case studies
Nov 27 – **Review concepts**
Dec 4 – No lab

Part 3: Assessment and Grading

You are required to pass the lab/tutorial to pass the course.

Grading scheme

A+: 90-100	B+: 77-79	C+: 67-69	D+: 57-59	F: <50
A : 85-89	B : 73-76	C : 63-66	D : 53-56	
A-: 80-84	B-: 70-72	C-: 60-62	D-: 50-52	

Part 4: Course Policies

Students need to contact the instructor with a valid reason for missing a test in advance of the test. Students will also need to fill out a Declaration of Cause form to the Registrar. Make-up tests for poor performance, will not be provided as an option. In the event that you have a *valid* excuse for missing either of the tests, the weight from the missed test(s) will be distributed to the final exam. Missed tests without a valid excuse from the registrar will result in a mark of zero. University policies on missing classes, etc. can be found here:

https://registrar.acadiau.ca/RecordsandOtherRequests.html

Attend Class (Lectures)

Students are expected to attend all class sessions as listed above. Studies have shown, that students who take notes by hand (rather than typing on a computer) perform significantly better in their ability to retain information. While you will be using laptops or tablets during lectures, please limit their use to classroom material only. Using them for other purposes (i.e. social media) will negatively impact your ability to learn.

Attend Labs/Tutorials

Attendance in labs is mandatory. If you are unwell, please do not attend lab in-person and email me before the lab/tutorial begins.

Lab/Tutorial activities

30% of your final mark will be based on grades and participation in completing case studies, short assignments/reports, discussions, quizzes, periodic questions to determine understanding of concepts, and polls to gauge retention/understanding during lab/tutorial. Attendance will be taken. A missed activity will result in '0', once the activity closes you will not be allowed to submit the activity, and there will be no make-up for the activities unless you have contacted me in advance describing the valid reason for not participating in the lab/tutorial activity.

Graded MOODLE quizzes

10% of your final mark will be based on your final grade in weekly quizzes in MOODLE. These quizzes will help your understanding of concepts. You will be able to re-try the quizzes an unlimited amount of times up until the deadline (approximately 1 week after posted). The highest grade attained will be used. Please note quizzes will occur regularly each week and you will be responsible for completing them on time. A missed quiz will result in a '0'. Once the quiz closes you will not be allowed to submit the quiz, and there will be no make-up for the quizzes unless you have contacted me in advance describing the valid reason for requesting an extension.

BONUS in-class live quizzes/activities

Participation in in-class live quizzes/activities will be recorded and result in a proportion of a bonus mark which will give you up to an additional 3% on your final grade. These live quizzes/activities will help your understanding of concepts. Please note these quizzes/activities may occur in any lecture class. There will be no make-up for the live in-class bonus quizzes/activities.

Late assessments

Late class or lab/tutorial activities or assessments of any kind are not accepted after the deadline. A late assessment will result in a grade of '0' unless there is a discussion in advance with me describing the valid reason for requesting an extension.

Part 5: University Policies

University policies are available in the Acadia University Academic Calendar or through the Registrar's website: https://registrar.acadiau.ca/welcometotheregistrarsoffice.html

Equity, Diversity and Inclusion

In this course, we are committed to fostering an inclusive and equitable learning environment where the principles of human rights and social justice are paramount. We recognize and respect the diverse backgrounds, identities, and experiences of all students. Our collective goal is to create a space where every individual feels valued, heard, and supported. All students are encouraged to contribute to and uphold an atmosphere of mutual respect and empathy. Discrimination, harassment, or any form of intolerance will not be tolerated. If you have any concerns or require accommodations to ensure your full participation in this course, please do not hesitate to reach out. Together, let's work towards understanding and advancing human rights and equity, both within and beyond the classroom.

Acadia's Human Rights and Equity Office is responsible for the management and implementation of Acadia's Policy Against Harassment and Discrimination. This Policy is underpinned by a commitment to deconstructing the problematic structures of systemic racism and discrimination within the University Community. Acadia upholds a commitment to fostering a culture within the University Community that is welcoming and reflective of the diverse individuals that comprise this community and to fostering cultural safety, anti-oppression and anti-racism within the University Community, making it our goal to achieve a culture where our diversity is our strength.

For more information, please contact the Human Rights and Equity Office at equity@acadiau.ca. The policy against harassment and discrimination, and resources for students who believe they may have experienced, or witnessed, discrimination or harassment, are available here: https://www2.acadiau.ca/student-life/equity-judicial/equity.html

Last Drop Day

Last day to drop a course and receive a "W". Please check the Acadia University calendar dates, which are available here: https://registrar.acadiau.ca/AcademicCalendars.html

Inform Your Instructor of Accommodations

Acadia University is dedicated to improving access to campus life for all students with disabilities. While we attempt to ensure that all courses are accessible, we recognize that there are barriers that need to be addressed on an individual basis. Students who require accommodations to complete coursework or otherwise fully participate in class should contact Accessible Learning Services directly as soon as possible. https://www2.acadiau.ca/student-life/accessiblelearning.html

The Use of Animals in Teaching and Research

The use of animals in teaching and research at Acadia University is done in accordance with guidelines on the care and use of animals published by the Canadian Council on Animal Care (CCAC). For more information on the CCAC, please visit their website at http://www.ccac.ca

Commitment to Integrity

It is standard practice in Biology to check exams and assignments for cheating and plagiarism. Cheating in the class and/or lab, including plagiarism, will not be tolerated. Please read the appropriate sections of the current Acadia University Academic Calendar: https://registrar.acadiau.ca/AcademicCalendars.html

Information on copy-write and course content from Acadia University is available through the Vaughan Memorial Library: http://libguides.acadiau.ca/c.php?g=433650&p=5027078

The spoken and written course content (including the syllabus, handouts, lectures, presentations, labs, assignments, quizzes, tests, and exams) are the intellectual property of the instructor and may only be copied for personal use. Sharing these materials or uploading them where they may be accessed by others is a

violation of copyright. If you wish to make audio, video, or photographic recordings in class, you must first obtain the consent of the instructor and of any other persons (e.g., guest speakers, other students) who may be captured in such recordings. In the case of personal use by students with disabilities, the instructor's consent shall not be unreasonably withheld.

Part 6: Program Learning Outcomes

Foundations of knowledge		**Course specific examples**	**Proficiency** 1-Introduction 2-Reinforcement 3-Proficient **NA-not applicable**
Scientific method, inquiry and hypothesis testing	Find, understand and apply information from the literature; understand how to use the scientific method to examine problems from different perspectives	Case studies based on published work, data analysis and critical interpretation of data/findings	2
Historical concepts and contributions by important figures	Explain foundational concepts in biology, Two-eyed Seeing, and ethical implications of scientific discoveries	Many historical figures in Immunology are discussed and celebrated with an emphasis on scientists who historically faced challenges.	2
Biodiversity and ecology	Understand the genetic, taxonomic and ecosystem levels of biodiversity; focus on SW Nova including the Acadian Forest and Bay of Fundy ecosystems	NA	NA
Genetics and evolution	Understand the chemical basis of heredity, genetics and genomics; integrate concepts across disciplines to understand evolution	Immunology discusses unique aspects of genetics when considering B & T cell gene rearrangement. Impacts of mutations are explored as relevant to immune functions. MHC molecules inherited impact antigen presentation and immune cell capabilities.	3
Human and environmental health	Understand form and function in health and disease within a One Health framework, integrating human and environmental health	Impacts of the immune system on human health.	2
Lab and field skills			
Experimental design	Gain experience in applying the scientific method	Designing experiments that explore vaccine development are discussed.	2
Safety	Work safely and productively in lab and field settings	NA	NA
Lab skills	Gain experience with basic and advanced lab techniques and understand their application in research, health science and industry	NA	NA
Field skills	Gain experience in basic and advanced field skills and understand their application in ecology, conservation biology and environmental change	NA	NA
Data acquisition, analysis and interpretations	Collect data, present results both qualitatively and quantitatively, and interpret outcomes in light of the literature	Students will examine data in published articles and discuss/critique interpretations.	2
Statistical analysis	Use R and or other programs to analyze biological data	NA	NA
Professional skills			
Ethical practices	Demonstrate ethical conduct, apply principles of academic integrity and understand the principles of EDI in science	Historically society has not recognized contribution of scientists from underrepresented groups. Several of these figures are highlighted and discussed.	2
Collaboration and group work	Work effectively in groups within and across disciplines	Students work in groups during case study sessions and activities.	2
Critical thinking	Analyze and evaluate information to make science-based decisions	Students engage in discussions on misconceptions in the public. Solving case studies.	2
Computer proficiency	Use common and discipline- specific software	NA	NA
Scientific communication	Communicate science effectively to both scientific and general audiences	Students participate in discussions and case studies.	2