



ANSC*4650 Comparative Immunology

Winter 2023

Section(s): C01

Department of Animal Biosciences

Credit Weight: 0.50

Version 1.00 - January 13, 2023

1 Course Details

1.1 Calendar Description

This course gives an overview of the immune defense mechanisms of domestic species, and to compare common and unique defense strategies developed for resisting microbial and viral infections. Topics include innate and acquired immunity, evolution of the immune system, immunoregulation, and the host response to pathogen invasion.

Pre-Requisites: ANSC*3080

1.2 Course Description

This course is designed to give an overview of the immune defense mechanisms of domestic species, and to compare common and unique defense strategies developed for resisting microbial and viral infections. Topics include innate and acquired immunity, evolution of the immune system, immunoregulation, and the host response to pathogen invasion.

1.3 Timetable

1:30 p.m. - 2:20 p.m. Monday, Wednesday, Friday GRHM 2310

Timetable is subject to change. Please see WebAdvisor for the latest information.

1.4 Final Exam

Final Exam: Tues. April 25, 7:00pm-9:00pm

Please check WebAdvisor to confirm exam time and date details.

2 Instructional Support

2.1 Instructional Support Team

Instructor: Niel Karrow
Email: nkarrow@uoguelph.ca
Telephone: +1-519-824-4120 x53646
Office: ANNU 123

Office Hours: Office hours will be held on Zoom 8:00 p.m. - 9:00 p.m.
Tuesdays

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Tuesdays

Office Hours:

2.2 Teaching Assistants

Teaching Assistant (GTA): Yuancheng (Starry) Liu
Email: yuanchen@uoguelph.ca
Office Hours: Arrange meeting by email

2.3 Communicating with your Instructor

During the course, your instructor will interact with you on various course matters on the course website using the following ways of communication:

- **Announcements:** The instructor will use **Announcements** on the Course Home page to provide you with course reminders and updates. Please check this section frequently for course updates from your instructor.
- **Ask Your Instructor Discussion:** Use this discussion forum to ask questions of your instructor about content or course-related issues with which you are unfamiliar. If you encounter difficulties, the instructor is here to help you. Please post general course-related questions to the discussion forum so that all students have an opportunity to review the response. To access this discussion forum, select **Discussions** from the **Tools** dropdown menu.
- **Email:** If you have a conflict that prevents you from completing course requirements, or have a question concerning a personal matter, you can send your instructor a private message by email. The instructor will attempt to respond to your email within 24 hours.
- **Video Call:** If you have a complex question you would like to discuss with your instructor, you may book a video meeting on Teams (or alternate platform being used by your instructor). Video meetings depend on the availability and are booked on a first come first served basis.

2.4 Netiquette Expectations

Online Behaviour

Inappropriate online behaviour will not be tolerated. Examples of inappropriate online behaviour include:

- Posting inflammatory messages about your instructor or fellow students
- Using obscene or offensive language online
- Copying or presenting someone else's work as your own
- Adapting information from the Internet without using proper citations or references
- Buying or selling term papers or assignments

- Posting or selling course materials to course notes websites
 - Having someone else complete your quiz or completing a quiz for/with another student
 - Stating false claims about lost quiz answers or other assignment submissions
 - Threatening or harassing a student or instructor online
 - Discriminating against fellow students, instructors and/or TAs
 - Using the course website to promote profit-driven products or services
 - Attempting to compromise the security or functionality of the learning management system
 - Sharing your user name and password
 - Recording lectures without the permission of the instructor
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3 Learning Resources

3.1 Additional Resources

Other Resources (Other)

- An "Example IBL.doc" will be made available through Courselink.
- Lecture slides will be made available through Courselink.
- List of abbreviations

3.2 Course Technology and Technical Support

System and Software Requirements

This course will use a variety of technologies including;

- CourseLink (main classroom)
- Zoom

To help ensure you have the best learning experience possible, please review the list of system and software requirements.

<https://opened.uoguelph.ca/student-resources/system-and-software-requirements>

CourseLink System Requirements

You are responsible for ensuring that your computer system meets the necessary system requirements. Use the browser check tool to ensure your browser settings are compatible and up to date. (Results will be displayed in a new browser window).

<http://spaces.uoguelph.ca/ed/system-requirements/>
<https://courselink.uoguelph.ca/d2l/systemCheck>

Course Technologies

CourseLink

This course is being offered using CourseLink (powered by D2L's Brightspace), the University of Guelph's online learning management system (LMS). By using this service, you agree to comply with the University of Guelph's Access and Privacy Guidelines. Please visit the D2L website to review the Brightspace privacy statement and Brightspace Learning Environment web accessibility standards.

<http://www.uoguelph.ca/web/privacy/> <https://www.d2l.com/legal/privacy/>
<https://www.d2l.com/accessibility/standards/>

Technical Support

If you need any assistance with the software tools or the CourseLink website, contact CourseLink Support.

Email: courselink@uoguelph.ca

Tel: 519-824-4120 ext. 56939 Toll-Free (CAN/USA): 1-866-275-1478

Support Hours (Eastern Time):

Monday thru Friday: 8:30 am–8:30 pm

Saturday: 10:00 am–4:00 pm

Sunday: 12:00 pm–6:00 pm

Zoom

This course will use Zoom for office hours and maybe some lectures. Check your system

requirements to ensure you will be able to participate.

<https://opened.uoguelph.ca/student-resources/system-and-software-requirements>

3.2 Technical Skills

As part of your learning experience, you are expected to use a variety of technologies for assignments, lectures, teamwork, and meetings. In order to be successful in this course you will need to have the following technical skills:

- Manage files and folders on your computer (e.g., save, name, copy, backup, rename, delete, and check properties);
- Install software, security, and virus protection;
- Use office applications (e.g., Word, PowerPoint, Excel, or similar) to create documents;
- Be comfortable uploading and downloading saved files;
- Communicate using email (e.g., create, receive, reply, print, send, download, and open attachments);
- Navigate the CourseLink learning environment and use the essential tools, such as Dropbox, Quizzes, Discussions, and Grades (the instructions for this are given in your course);
- Access, navigate, and search the Internet using a web browser (e.g., Firefox, Internet Explorer); and
- Perform online research using various search engines (e.g., Google) and library databases.

3.2 Library Access

As a student, you have access to the University of Guelph's library collection, including both physical and electronic materials. For information on checking out or couriering physical library items, accessing electronic journals and returning items to the library, visit the library's website.

If you are studying off campus and would like to access the library's electronic resources, use the Off Campus Login and login using your Single Sign On credentials or using your last name and library barcode.

<https://www.lib.uoguelph.ca/>

<https://www.lib.uoguelph.ca/campus-login>

4 Learning Outcomes

Students will attend three hours of lecture per week, and the following learning objectives will be assessed through two midterms, inquiry-based learning (IBL) assignments, and a final exam. By the end of this course you should have completed the following specific learning objectives that are designed to get you to think and communicate as immunologist.

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Students will be expected to **explain** the concepts of innate and acquired immunity and **recall** examples of humoral and cellular components provided in the instructor's course material. Assessment will be carried out by midterm and a final exam.
2. Students will be expected to **distinguish** innate and acquired immune system differences across vertebrate species that were provided in the instructor's course material. Assessment will be carried out using a midterm and a final exam.
3. Students will be expected to **recall** examples of cross-talk between the innate and acquired immune systems provided in the instructor's course material. Assessment will be carried out using a midterm and a final exam.
4. Students will be expected to **explain** how the immune response is regulated by **recalling** examples provided in the instructor's course material, and **predict** how immune dysregulation can lead to disease. Assessment will be carried out using a midterm and a final exam.
5. Students will be expected to **illustrate** how genetic diversity contributes to variation in the host immune response by **recalling** examples provided in the instructor's course material. Assessment will be carried out using a midterm and a final exam.
6. Students will be expected to **apply** the course material to **predict** how the immune system specifically targets parasitic, viral, fungal and bacterial infections. Assessment will be carried out using a midterm and final exam.
7. Inquiry-based learning (IBL) topics will be covered in class, and students will be expected to **recall** and **clarify** the assigned *questions*. In a class setting, students will be expected to **discuss** *prior knowledge* of the topics, and to **identify** *knowledge uncertainties*.

Students will then be expected to individually create hypotheses to address the questions, then **research** only peer-reviewed literature to **identify pertinent information** to address knowledge uncertainties. Students will then be expected to individually summarize and **critically evaluate** these *research findings*, **attempt** to answer the question, and **reflect** on *remaining uncertainties* and the *learning process*. When composing this IBL summary, please use the "Example Inquiry Based learning Summary.doc" posted on Courselink as a formatting template document; including reference format. If you exceed 600 words (references not included in the word count), you will be penalized 10%.

5 Teaching and Learning Activities

5.1 Lecture

Topics:

Lecture Content:

Unit 1. Introduction to body defense

Unit 2. Physical barriers at the host-microbe interface

Unit 3. Danger signals and pattern recognition receptors/molecules

Unit 4. Sentinel cells

Unit 5. Sentinel cell products

Unit 6. The complement system

Unit 7. Effector cells of the innate immune system: neutrophils

Unit 8. Effector cells of the innate immune system: macrophages

Unit 9. The acute phase response

Unit 10. Antigens and sites of antigen presentation

Unit 11. Antigen presenting cells and antigen presentation

Unit 12: Antigen receptor diversity: MHC

Unit 13. Effector and regulatory T cells

Unit 14. B cells and immunoglobulins

Unit 15: Antigen receptor diversity: BCR and TCR

6 Assessments

6.1 Marking Schemes & Distributions

Marking Scheme - Inquiry-based Learning (IBL) topics

5% Question being addressed

10% Summarize class knowledge prior to research

20% Identify knowledge uncertainties to be researched (listed in point form)

5% Create a testable hypothesis to address the question

20% Summarize research findings to address knowledge uncertainties

15% Critical evaluation

10% Reflect on remaining uncertainties and learning process

10% Spelling and Grammar

5% References (Include at least 3)

Name	Scheme A (%)
Course Assignments and Tests	0
IBL Assignment #1	10
Midterm Exam #1	15
IBL Assignment #2	10
Midterm Exam #2	20
IBL Assignment #3	10
IBL Assignment #4	10
Final Exam	25
Total	100

6.2 Assessment Details

Course Assignments and Tests (0%)

Course Assignments and Tests:

Assignment or Test	Due Date	Contribution to Final Mark (%)	Units Assessed
Unit 1	Jan. 9		
Unit 1	Jan. 11		

Assignment or Test	Due Date	Contribution to Final Mark (%)	Units Assessed
Unit 2	Jan. 13		
Unit 2	Jan. 16		
Unit 3	Jan. 18		
Unit 3	Jan. 20		
Unit 3	Jan. 23		
Unit 4	Jan. 25		
Unit 4	Jan. 27		
Midterm 1 (50 min)	Jan. 28 9:00 am ANNU156	15	1-3
Unit 5	Jan. 30		
Unit 5	Feb. 1		
Unit 5	Feb. 3		
Unit 5	Feb. 6		
Unit 6	Feb. 8		
Unit 6	Feb. 10		
Unit 7	Feb. 13		
Unit 7	Feb. 15		
Unit 7	Feb. 17		

Assignment or Test	Due Date	Contribution to Final Mark (%)	Units Assessed
Winter break	Feb. 20-26		
Unit 8	Feb. 27		
Unit 8	Mar. 1		
Unit 9	Mar. 3		
Unit 9	Mar. 6		
Unit 10	Mar. 8		
Unit 10	Mar. 10		
Midterm 2 (50 min)	Mar. 11 12:00 pm ANNU156	20	4-8
Unit 10	Mar. 13		
Unit 11	Mar. 15		
Unit 11	Mar. 17		
Unit 12	Mar. 20		
Unit 13	Mar. 22		
Unit 13	Mar. 24		
Unit 13	Mar. 27		
Unit 14	Mar. 29		
Unit 14	Mar. 31		
Unit 14	Apr. 3		

Assignment or Test	Due Date	Contribution to Final Mark (%)	Units Assessed
Unit 15	Apr. 5		
Unit 15	Apr. 10		
Final exam	Apr. 25	25	9-15

Inquiry-based Learning Assignment #1 (10%)**Date:** Wed, Jan 25**Learning Outcome:** 7

Unit(s) assessed: 1-3

Midterm Exam (15%)**Date:** Sat, Jan 28, 9:00 AM**Learning Outcome:** 1, 2, 3, 4, 5, 6

Units assessed: 1-3

Inquiry-based Learning Assignment #2 (10%)**Date:** Mon, Feb 13**Learning Outcome:** 7

Unit(s) assessed: 4-6

Inquiry-based Learning Assignment #3 (10%)**Date:** Mon, Mar 6**Learning Outcome:** 7

Unit(s) assessed: 7-8

Midterm Exam #2 (20%)**Date:** Sat, Mar 11, 12:00 PM**Learning Outcome:** 1, 2, 3, 4, 5, 6

Units assessed: 4-8

Inquiry-based Learning Assignment #4 (10%)**Date:** Mon, Apr 10**Learning Outcome:** 7

Unit(s) assessed: 9-15

Final Exam (25%)**Date:** Tue, Apr 25, 7:00 PM - 9:00 PM, Online**Learning Outcome:** 1, 2, 3, 4, 5, 6

Unit(s) assessed: 9-15

Please check WebAdvisor to confirm exam date/time details

7 Course Statements

7.1 Grading Policies

Assignments are due at the beginning of the class scheduled above. Students submitting late assignments will receive a 5% late penalty per day.

7.2 Course Policy on Group Work

While students are encouraged to participate in an individual- and group-learning environment to better understand the course material, all assignments must reflect the work of each individual student.

7.3 Course Policy regarding use of electronic devices and recording of Lectures

Since electronic recording of classes is useful for reviewing course material, it will be allowed with the consent of the course instructor. These recordings are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

7.4 Dropbox Submissions

Assignments should be submitted electronically via the online **Dropbox** tool. When submitting your assignments using the **Dropbox** tool, do not leave the page until your assignment has successfully uploaded. To verify that your submission was complete, you can view the submission history immediately after the upload to see which files uploaded successfully. The system will also email you a receipt. Save this email receipt as proof of submission.

Be sure to keep a back-up copy of all of your assignments in the event that they are lost in transition. In order to avoid any last-minute computer problems, your instructor strongly recommend you save your assignments to a cloud-based file storage (e.g., OneDrive), or send to your email account, so that should something happen to your computer, the assignment could still be submitted on time or re-submitted.

It is your responsibility to submit your assignments on time as specified on the Schedule. Be sure to check the technical requirements and make sure you have the proper computer, that you have a supported browser, and that you have reliable Internet access. Remember that **technical difficulty is not an excuse not to turn in your assignment on time.** Don't wait until the last minute as you may get behind in your work.

If, for some reason, you have a technical difficulty when submitting your assignment electronically, please contact your instructor or CourseLink Support.

<http://spaces.uoguelph.ca/ed/contact-us/>

8 University Statements

8.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

8.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions

<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

8.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

8.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

8.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website

<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website

<https://www.ridgetownc.com/services/accessibilityservices.cfm>

8.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

8.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

8.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars

<https://www.uoguelph.ca/academics/calendars>

8.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website

(<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

8.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

8.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.
