

MDSC 321
Introduction to Immunology

Instructors:

Course Coordinator

Dr. Craig Jenne HRIC 2C64 220-3471 cnjenne@ucalgary.ca
<http://www.ucalgary.ca/microinfect/faculty/primary-members/craig-jenne>

Instructors

Dr. Craig Jenne HRIC 2C64 220-3471 cnjenne@ucalgary.ca
Dr. Bjorn Petri bpetri@ucalgary.ca

Office Hours/Policy on Answering Student Emails

Office hours for Dr. Jenne are Mondays and Fridays from 10am-12pm. Appointments are encouraged. Effort will be made to check course-related email daily; however, delays may occur if the instructor is traveling or attending scientific meetings.

Teaching Assistants:

Rachelle Davis HRIC 4C49 210-8692 rpDavis@ucalgary.ca

This will be updated to include 2 additional TAs based on selection of applicants

Time and Location:

Lectures M,W,F 15:00-15:50 ES 162 September 06, 2019 → December 06, 2019

Prerequisite/Co-Requisite:

BIOL 241 and BIOL 243 OR consent of the instructor

Course Description:

This introductory course is designed to expose students to the study of how the immune system encounters, recognizes, and responds to various infectious and pathogenic conditions. Emphasis will not solely focus on how components of the immune system interact with each other to generate an effective host response but also will be placed on how this immune response may be used to generate new therapies for human disease, how evolving and emerging pathogens interact with, and challenge the immune system, and how our knowledge of immunity has impacted society.

Overarching Theme

This course is designed to introduce students to the study of how the immune system maintains health and prevents disease. Additionally, students will learn about the tools used to study the immune system and basic experimental design. To achieve these goals, students will participate

in a series of lectures and a semester-long group project. This initial introduction to immunology will help position students for future courses in microbiology, virology and advanced immunology.

Global Objectives

- To introduce a broad array of students to the field of immunology.
- To develop a basic knowledge of immunological terms and concepts
- To encourage students to approach immunological questions from both a basic science and a clinical (human disease) perspective
- To learn about both historically significant and recent advancements/problems in the field of immunology
- To develop the skills needed to critically evaluate and understand topics related to immune function

Learning Objectives

By the end of this course, students will be able to:

- Describe the characteristics and functions of innate and adaptive immunity
- Understand how immune receptors are generated and how these molecules recognize pathogens
- Develop an understanding of how new pathogens “emerge” and evade the immune system
- Compare and contrast various immune effector mechanisms for the clearance of pathogens
- Understand the consequences of and insufficient or inappropriate immune response
- Understand the concepts and effects of medical interventions such as vaccination and immunotherapy
- Develop a comprehensive understanding of basic laboratory and clinical immune assays
- Identify, understand, extract and synthesis critical information from current literature

Required Textbooks

Murphy, Kenneth, Janeway’s Immunobiology 9th edition 2016, Garland Science

Recommended Textbooks/Readings

Kindt, et al. Kuby Immunology. 7th Edition 2013. W.H. Freeman & Co.

Evaluation

The University policy on grading and related matters is described in section F of the 2019-2020 Calendar.

In determining the overall grade in the course, the following weights will be used:

Midterm Exam I	20 %
Midterm Exam II	20 %
Small Group Report	25%
Final Exam	35 %

****MIDTERM EXAMS** - These are closed book exams. These exams will be scheduled for 1h and will consist of a mix of multiple choice, fill-in-the-blank, short answer (1-2 sentences) and short answer type questions (1-2 paragraphs). These exams will be cumulative but will be heavily focused on the material covered since the previous exam.

****SMALL GROUP REPORT** - This assignment will take place throughout the term and will culminate in a written report submitted to the course coordinator. This report will be 8-10 pages, double-spaced, in length and will need to be appropriately referenced (references and pertinent figures will be in addition to the 10 page (maximum) report). Students will be assigned to small groups in week 3 of the semester and will be responsible for completing the assignment by the end the lecture schedule. Changes to these groups will only be made by the course coordinator and only under exceptional circumstances (i.e. group member(s) withdrawing from the course). These assigned groups are designed to get students from various backgrounds working together, bringing together various points of view.

The small group report is designed to encourage the students to choose a topic of interest from one of three special focus areas that will be covered in the lecture schedule. The students are free to choose any aspect of immunology from one of these special focus areas and will further their knowledge beyond the scope of the lecture material (i.e. new frontiers in immunology, the impact of specific advances on society as a whole, the impact of a changing society/climate on immunological challenges).

These special focus topics form the basis of small interchangeable lecture blocks that will be presented as self-contained modules. These modules will allow for the lecture material to venture beyond the scope of the textbook. By incorporating material from other sources, we will be better able to demonstrate how immunology impacts and integrates into many aspects of society. Emphasis will be placed on how society perceives immunology and how advances in immunology will shape medical treatments and society as a whole.

The current course outline contains three special focus blocks; **1) Pandemics and Emerging Disease, 2) Vaccines, 3) Antibody Engineering and Therapies.**

All three special focus areas will be introduced in the first weeks of lectures to provide the students with an overview of the potential topics for further study. Students will then be encouraged to meet early and frequently with the course coordinator to discuss and define potential report topics and will be required to schedule a formal meeting with the course coordinator to finalize a report topic by **the end of the 9th week (Nov 8th)** of lectures. Additionally, four in-class lecture slots have been reserved for group work. During these time slots, students are expected to report to the lecture room to work with their groups. These in-class group work time slots allow the students direct access to the instructor and TA and will serve to keep the research projects progressing in accordance with expected timelines. During these four in-class time slots, each group is required to meet with the instructor and an evaluation of these progress meetings will contribute towards the overall grade of the small

group report. It is anticipated that an additional 10-12 hours of group study and preparation time would be required to produce a report worthy of a high grade.

Students will select a topic that corresponds to a special focus area but will be expected to expand their selected topic beyond the scope of the course text and lectures. Potential research topics might include;

Pandemics and Emerging Disease

- Critical review of the response to/public perception of the recent H1N1 pandemic.
- Re-emerging diseases (polio, TB)
- Effect of climate change or population demographics on pathogen/disease distribution
- Linkage between developed societies and autoimmunity

Vaccines

- Compare/contrast vaccine strategies
- Public perception of vaccines (H1N1, MMR and Autism)
- Effect of vaccination on disease patterns (chicken pox and shingles)
- Vaccination and the development of the modern society (cities, population density, etc)

Antibody Engineering

- Development of therapeutic antibodies (successes and failures)
- Use of non-classical Ab structures from non-rodent/non-primate species
- Immunotoxins
- Antibody-mediated immunomodulation

This small group report will require the students to search and access primary literature in addition to current press and historical information on their topic of interest. Part of the mark attributed to the written report will reflect how well the students utilize material external to what is covered in the course lectures.

As this component of the course requires a written report please refer to the University's Writing Across the Curriculum statement at <http://www.ucalgary.ca/pubs/calendar/current/e-2.html>.

Furthermore, as this assignment is a group task, the students will be asked to evaluate their working group peers. This mark, although small (5% of the overall course mark) represents a significant portion of the assignment mark (25%) and will help ensure all members in the group contribute to the final report. **Additionally, this peer review mark will be used to determine what percentage of the overall Small Group Report mark (In-class progress meetings and final report) each student receives (see below).**

Small Group Report Mark Breakdown (percentage of final course mark)

- **In-class Progress Meetings 5%** (mark assigned to all students in the group by the course coordinator)
- **Final Report 15%** (mark assigned to all students in the group by the course coordinator)
- **Peer Evaluation 5%** (Rubric is appended to the end of this course outline. The rubric scores student performance out of 20, a mark for each student will be averaged from the mark assigned by the other members of their group and scaled to be out of 5 (i.e. 16 out of 20 = 4). **NOTE: A peer evaluation of 0 will NOT be accepted as a mark unless concerns are expressed by the group prior to the report deadline (i.e. concerns must be raised with the TAs or the Instructor during one of the in class group work sessions)**)

If a student's peer evaluation mark is >2 (out of 5), they will receive 100% of the group mark

If a student's peer evaluation mark is >1 and ≤2 they will receive 75% of the group mark

If a student's peer evaluation mark is >0 and ≤1 they will receive 50% of the group mark

If a student's peer evaluation mark is 0 they will receive 0% of the group mark

These small group reports are due by 5 pm on the final day of lecture, Dec 6th, 2019.

****FINAL EXAM** - There will be a final exam scheduled by the Registrar's office. This exam will follow a similar format to the midterm exams. The final exam will be a closed book exam and will be scheduled for 2h. This exam will consist of a mix of short answer (1-2 sentences) and short essay type questions (3-4 paragraphs). The final exams will be cumulative but will be focused on the material covered after the second midterm exam. Calculators are permitted, if needed.

****FINAL GRADES** - Each piece of work (small group report, midterm examination or final examination) submitted by the student will be assigned a percentage score. The student's average percentage score for the various components listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade. Only the final average grade will be used in determining pass/fail for this course.

A Note regarding Writing Assignments:

Writing skills are important to academic study in all disciplines. In keeping with the University of Calgary's emphasis on the importance of academic writing in student assignments (section E.2 of 2019-20 Calendar), writing is emphasized, and the grading thereof in determining a student's mark in this course. The Bachelor of Health Sciences values excellence in writing. Competence in writing entails skills in crafting logical, clear, coherent, non-redundant sentences, paragraphs and broader arguments, as well as skills with the mechanics of writing (grammar, spelling, punctuation). The University of Calgary offers a number of instructional services through the Students' Success Centre's Writing Support Services (<http://www.ucalgary.ca/writingsupport/>) for students seeking feedback on assignments or seeking to improve their general writing skills. Students are **strongly encouraged** to take advantage of these programs.

Grading Scheme:

Letter Grade	Description	Percentage
A+	Outstanding performance	97-100
A	Excellent performance	90-96
A-	Approaching excellent performance	85-89
B+	Exceeding good performance	80-84
B	Good performance	75-79
B-	Approaching good performance	70-74
C+	Exceeding satisfactory performance	65-69
C	Satisfactory performance	60-64
C-	Approaching satisfactory performance	57-59
D+	Marginal pass	54-56
D	Minimal pass	50-53
F	Did not meet course requirements	0-49

Missed Components of Term Work:

Students will lose 5% per day late past the deadline for all assignments. Additionally, **assignments will NOT be accepted more than 72 hours after the posted deadline** and students failing to submit any assignment within this time frame will receive a mark of zero. **Students who miss a midterm exam will receive a mark of zero unless the instructor has been previously notified. There will be NO exceptions to this policy.**

It is the agreement of all Faculty and Staff involved in MDSC321 that extensions will NOT be granted on any assignment or quizzes. The only exceptions to this are those in keeping with the University Calendar (illness, religious conviction, or domestic affliction) that are received in writing and with supporting documentation.

Brightspace by Desire2Learn (D2L)

Brightspace (by D2L) is located on the University of Calgary server and will be used extensively for communication with students. **It is the student's responsibility to ensure that they receive all posted communications and documents and that they receive emails sent by instructors or fellow students through D2L.** Only your @ucalgary.ca email address may be linked to D2L. Please ensure that you are regularly checking your @ucalgary.ca account.

A laptop, desktop, tablet or mobile device is required for D2L access. If you need help accessing or using D2L, please visit the Desire2Learn resource page for students:
<http://elearn.ucalgary.ca/d2l-student/>.

Policies Governing the Course:

Attendance

Attendance for all lectures is strongly recommended and is required for all group work sessions.

Conduct During Lectures

The classroom should be respected as a safe place to share ideas without judgement - a community in which we can all learn from one another. Students are expected to conduct themselves in a mature and courteous manner during ALL lectures. Students are expected to frame their comments and questions to lecturers in respectful and appropriate language, always maintaining sensitivity towards the topic.

Students are expected to take notes during class and should not rely solely on material supplied by the instructors.

Electronic Devices

The Bachelor of Health Sciences program aims to create a supportive and respectful learning environment for all students. The use of laptop and mobile devices is acceptable when used in a manner appropriate to the course and classroom activities. However, research studies have found that inappropriate/off-topic use of electronic devices in the classroom negatively affects the learning of both the user and those sitting nearby. Students are to refrain from accessing websites that may be distracting for fellow learners (i.e. personal email, Facebook, YouTube).

Students are responsible for being aware of the University's Internet and email use policy, which can be found at <https://www.ucalgary.ca/policies/files/policies/electronic-communications-policy.pdf>

Cell phones (or similar devices) should **be turned off** (not merely silent) upon entering the classroom. Sending/receiving text messages or leaving the class to take calls is disruptive to the entire class and will not be tolerated unless absolutely necessary. Students who disregard this rule during lectures or tutorials will be asked to leave. These items are not permitted under any circumstance during exams/quizzes, etc.

Copyright

It is the responsibility of students and professors to ensure that materials they post or distribute to others comply with the Copyright Act and the University's Fair Dealing Guidance for Students (library.ucalgary.ca/files/library/guidance_for_students.pdf). Further information for students is available on the Copyright Office web page (<http://library.ucalgary.ca/copyright>)

A Note Regarding Instructor Intellectual Property

Generally speaking, course materials created by professor(s) (including course outlines, presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the professor(s). These materials may **NOT** be reproduced, redistributed or copied without the explicit consent of the professor. **The posting of course materials to third party websites such as note-sharing sites without permission is prohibited.**

Sharing of extracts of these course materials with other students enrolled in the course **at the same time** may be allowed under fair dealing.

Academic Accommodations Based on Disability or Medical Condition

Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/.

Accommodations on Protected Grounds other than Disability

Students who require an accommodation in relation to their coursework based on a protected ground other than disability, should communicate this need, preferably in writing, to their instructor or to the designated BHSc program contact, Mrs. Jennifer Logan (jljlogan@ucalgary.ca), or to Dr. Ebba Kurz, Associate Dean, Undergraduate Health and Science Education, Cumming School of Medicine. The full policy on Student Accommodations is available at <http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf>.

Academic Misconduct

The University of Calgary is committed to the highest standards of academic integrity and honesty. The University of Calgary has created rules to govern all its members regarding the creation of knowledge and the demonstration of knowledge having been learned. For information on academic misconduct and its consequences, please see the University of Calgary Calendar at <http://www.ucalgary.ca/pubs/calendar/current/k.html>. Students are expected to be familiar with these standards and to uphold the policies of the University in this respect. Please know that the University and the Cumming School of Medicine take these rules seriously. **All incidences of academic dishonesty in this course, such as cheating and plagiarism, will be reported to the Associate Dean for investigation;** infractions will be noted on the record of a student found to be guilty.

Recording of Lectures

Audio or video recording of lectures is prohibited except where explicit permission has been received from the instructor.

Other Important Information

Freedom of Information and Protection of Privacy Act

Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary

Appeals

If there is a concern with the course, academic matter or a grade, first communicate with the instructor. If these concerns cannot be resolved, students can proceed with an academic appeal, as per Section I of the University Calendar. Students must follow the official reappraisal/appeal process and may contact the Student Ombuds' Office

(<http://www.ucalgary.ca/ombuds>) for assistance with this and with any other academic concerns, including academic and non-academic misconduct. Students should be aware that concerns about graded term work may only be initiated **within 10 days** of first being notified of the grade. <https://www.ucalgary.ca/pubs/calendar/current/i-2.html>

Resources for Support of Student Learning, Success, Safety and Wellness

Student Success Centre	http://www.ucalgary.ca/ssc/
Student Wellness Centre	http://www.ucalgary.ca/wellnesscentre/
Distress Centre	http://www.distresscentre.com/
Library Resources	http://library.ucalgary.ca

Wellness and Mental Health Resources

The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the excellent mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370 MacEwan Student Centre, <https://www.ucalgary.ca/wellnesscentre/services/mental-health-services>) and the Campus Mental Health Strategy (<http://www.ucalgary.ca/mentalhealth/>).

Student Ombuds' Office

The Student Ombuds' Office supports and provides a safe, neutral space for students. For more information, please visit www.ucalgary.ca/ombuds/ or email ombuds@ucalgary.ca

BHSc Student Faculty Liaison Committee (SFLC)

The BHSc SFLC, with elected representatives from all majors, serves to raise issues of interest to BHSc students to the program administration, including items pertaining to curriculum, scheduling and events. A list of current representatives can be found on the BHSc website.

Student Union (SU) Information

The SU Vice-President Academic can be reached at (403) 220-3911 or suvpaca@ucalgary.ca; the SU representatives for the Cumming School of Medicine can be reached at medrep1@su.ucalgary.ca or medrep2@su.ucalgary.ca.

Student Success Centre: The Student Success Centre provides services and programs to ensure students can make the most of their time at the University of Calgary. Our advisors, learning support staff, and writing support staff assist students in enhancing their skills and achieving their academic goals. They provide tailored learning support and advising programs, as well as one-on-one services, free of charge to all undergraduate and graduate students. For more information visit: <https://www.ucalgary.ca/student-services/student-success>

Emergency Evacuation/Assembly Points

As part of the University of Calgary Emergency Evacuation plan, students, faculty, and staff should locate the closest Assembly Point in case of Fire Alarm. Safety signage is posted throughout the campus showing the locations and the possible route to these locations. All students, faculty, and staff are expected to promptly make their way to the nearest Assembly Point if the Fire Alarm is activated. No one is to return into campus facilities until an all clear is given to the warden in charge of the Assembly Area. For more information, see <http://www.ucalgary.ca/emergencyplan/node/55>
<https://www.ucalgary.ca/emergencyplan/building-evacuation/assembly-points>

Safewalk

Campus security will escort individuals, day or night, anywhere on campus (including McMahon Stadium, Health Sciences Centre, Student Family Housing, the Alberta Children's Hospital and the University LRT station). Call 403-220-5333 or visit <http://www.ucalgary.ca/security/safewalk>. Use any campus phone, emergency phone or the yellow phone located at most parking lot pay booths. Please ensure your personal safety by taking advantage of this service.

Class Schedule

Week	Day	Month	Date	Topic	Instructor	
1	Fri	Sep	6	Introduction	Dr. Jenne	
1	Mon	Sep	9	Immunity - define, describe, history, evolution		
	Wed	Sep	11	Overview of special focus topics and expectations for group report		
	Fri	Sep	13	Pandemics and emerging disease		Special Focus Area #1
2	Mon	Sep	16	Pandemics and emerging disease		
2	Wed	Sep	18	Innate vs. Adaptive Immunity		
	Fri	Sep	20	Humoral vs. Cellular Immunity		
3 (groups assigned)	Mon	Sep	23	Innate - Barriers (skin, mucosa, commensal, anti-microbial molecules)		
	Wed	Sep	25	Innate - Pathogen Recognition		
	Fri	Sep	27	Innate – Cells		Dr.
4	Mon	Oct	30	Innate – Cells	Surewaard	
	Wed	Oct	2	Innate – mechanisms	Dr. Petri	
	Fri	Oct	4	Innate – mechanisms		
5	Mon	Oct	7	In-Class Group Work Session 1	Dr. Jenne	
	Wed	Oct	9	Midterm 1 - 20%		
	Fri	Oct	11	Antigens		
6	Mon	Oct	14	Thanksgiving – no class		
	Wed	Oct	16	Adaptive Immunity - pathogen recognition		
	Fri	Oct	18	Adaptive Immunity - pathogen recognition		
7	Mon	Oct	21	Vaccines - what are they, how do they work?		Special Focus Area #2

	Wed	Oct	23	Vaccines - how do you make them?		
	Fri	Oct	25	Vaccines - impact on society		
8	Mon	Oct	28	In-Class Group Work Session 2		
	Wed	Oct	30	Antibodies – Structure and Function	Special Focus Area #3	
	Fri	Nov	1	Antibodies – Structure and Function		
9 (report topics due)	Mon	Nov	4	Antibodies as a tool		Dr. Petri
	Wed	Nov	6	Antibodies engineering/therapy		
	Fri	Nov	8	Midterm 2 - 20%		
						Dr. Jenne
10	Mon	Nov	11	Reading Days		
	Wed	Nov	13	Reading Days		
	Fri	Nov	15	Reading Days		
11	Mon	Nov	18	In-Class Group Work Session 3		
	Wed	Nov	20	Complement		Dr. Jenne
	Fri	Nov	22	Experimental Models		
12	Mon	Nov	25	T cell receptor / MHC - structure and function		Dr. Deniset
	Wed	Nov	27	T cell receptor / MHC - structure and function		
	Fri	Nov	29	In-Class Group Work Session 4		
13 (reports due)	Mon	Dec	2	Immunity - too much or too little – autoimmunity & immunodeficiency		Dr. Jenne
	Wed	Dec	4	Immunity - too much or too little – autoimmunity & immunodeficiency		
	Fri	Dec	6	Coordinated immunity - humoral, cellular, innate and adaptive		
				Final - 35%		

Peer-evaluation Rubric:

Peer evaluation is an important part of your participation grade. You must fill in one evaluation per group member for each presentation. Students will receive only an average group rating and will NOT be aware how each team member rated them.

Use the following criteria for evaluating your group members:

Category	4	3	2	1
Responsibility and Engagement	Performs all assigned duties and does work without being reminded. Attends all meetings on time.	Performs nearly all assigned duties and/or rarely needs reminding. Attends all meetings on time.	Performs few assigned duties and/or often needs reminding. Attends most meetings, sometimes late.	Does not perform assigned duties and relies on others to do the work and/or does not attend meetings.
Quality of Contributions	Routinely provides useful ideas when participating in the group and in classroom discussion. A definite leader who contributes a lot of effort. Provides work of the highest quality.	Usually provides useful ideas when participating in the group and in classroom discussion. A strong group member who tries hard. Provides high quality work.	Sometimes provides useful ideas when participating in the group and in classroom discussion. A satisfactory group member who does what is required. Provides work that occasionally needs to be checked/redone by other group members to ensure quality.	Rarely provides useful ideas when participating in the group and in classroom discussion. May refuse to participate. Provides work that usually needs to be checked/redone by others to ensure quality.
Time-management	Routinely uses time well throughout the project to ensure things get done on time. Group does not have to adjust deadlines or work responsibilities because of this person's procrastination.	Usually uses time well throughout the project, but may have procrastinated on one thing. Group does not have to adjust deadlines or work responsibilities because of this person's procrastination.	Tends to procrastinate, but always gets things done by the deadlines. Group does not have to adjust deadlines or work responsibilities because of this person's procrastination.	Rarely gets things done by the deadlines AND group has to adjust deadlines or work responsibilities because of this person's inadequate time management.
Cooperation	Never argues. Provides constructive criticism when appropriate. Is never publicly dismissive of the project or the work of others. Responds positively to feedback.	Rarely argues unproductively. Sometimes provides constructive criticism when appropriate. Rarely is publicly dismissive of the project or the work of others. Responds	Sometimes argues unproductively. Occasionally is publicly dismissive of the project or the work of other members of the group. May not	Usually argues unproductively. Often is publicly dismissive of the project or the work of other members of the group. Does not respond to feedback positively.

		positively to feedback.	respond positively to feedback.	
Working with Others	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares, with, and supports the efforts of others. Does not cause "waves" in the group.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.

Adapted from: MDSC308 and Carver TL, Stickley A: Teamwork in First Year Law Units: Can It Work? Journal of University Teaching & Learning Practice. 2012, 9:1-33.

Peer-evaluation Form:

Your Name:

Group number:

	NAME	Responsibility and Engagement	Quality of Contributions	Time-management	Cooperation	Working with others	TOTAL (/20)
Group member							
Group member							
Group member							
Group member							

Adapted from: MDSC308 and Carver TL, Stickley A: Teamwork in First Year Law Units: Can It Work? Journal of University Teaching & Learning Practice. 2012, 9:1-33.