ENGINEERING
McMaster-Mohawk
Bachelor of Technology
Partnership

McMaster University

Course Outline

1. COURSE INFORMATION

Session Offered	Fall 2021	
Course Name	Immunology and Virology	
Course Code	BIOTECH 3IV3	
Date(s) and Time(s) of lectures	Mo 14:30-16:20, Th 13:30-14:20	
Program Name	Biotechnology	
Calendar Description	Structure and function of antibodies, antibody diversity and interactions, immune system and immunity, immunological responses to disease, antibodies production and applications, structure of viruses, methods to study viruses, virus transcriptions and interactions.	
Instructor(s)	Dr. Fei Geng Dr. Fawwaz Al Joudi	Office Hours & Location: Phone: (905) 525-9140 x20285 E-Mail: gengf@mcmaster.ca Office Hours & Location: Monday 12:30-13:20, Wednesday 12:30-13:20 ETB203

2. COURSE SPECIFICS

Course Description

Instruction Type

Code	Type	Hours per term
C	Classroom instruction	34
L	Laboratory, workshop or fieldwork	36
T	Tutorial	0
DE	Distance education	0
	Total Hours	70

Resources

ISBN	Textbook Title & Edition	Author & Publisher
978-0-073-37531-1	Microbiology: A Human Perspective, 7th Edition (The same textbook used for BIO TECH 2MB3)	Nester, et al, 2012
978-0-470-90059-8	Fundamentals Of Molecular Virology, 2nd Edition	Acheson, Nicholas H., 2011

Other Supplies	Source
Lab goggles, lab coat and lab notebook	Titles Bookstore

Prerequisite(s)	BIOTECH 2GT3, 2MB3
Corequisite(s)	N/A
Antirequisite(s)	N/A
Course Specific Policies	**Electronic Resources** This course will be using a range of software. Students should be aware that, when they access the electronic components of this course, private

information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor. The instructor may also use other software including: e-mail, Avenue, LearnLink, web pages, capa, Moodle, Thinking Cap, etc.

Assignments

All assignments must be submitted to the instructor, online or in person depending on the assignment, on the stated deadline dates at the stated deadline times. Assignments submitted after that will not be accepted and will receive a mark of 0.

Lectures

Lectures are an integral part of this course, and regular attendance at lectures will be expected throughout the semester. Lectures will not cover all the required material from the textbook. Students will also be required to know all lecture material, even if it is not available elsewhere, e.g. in the textbook, posted on Avenue, etc.

Textbook Reading

Textbook reading will be assigned, and will be expected to be completed before the related assignments, quizzes and tests.

Tests

There will be one test administered in the lecture period during the term. They will each cover material from the lectures and reading from the previous approximately one month, up until the test.

All tests must be written at the times announced, unless alternative arrangements have been made previously between the student and the professor to cover exceptional circumstances. Students with special needs must inform the professor through the Centre for Student Development of their requirements at least one week prior to the test date so that alternative arrangements can be made. If you miss a test because of an emergency, you must follow university policy with respect to reporting absences on the online McMaster Student Absence Form (see below). No make-up policy for this course. In the event of an allowable absence, the weighting of any missed test over the term will be compensated in the final exam.

Quizzes

Several quizzes will be given periodically throughout the term during the lecture period on recently covered material in the lectures and reading. The lowest single quiz mark will be dropped from the final marks. No make-up quizzes will be allowed. Unexcused absences will result in a mark of zero. Such quizzes may involve more traditional written evaluations as well as electronic CRS's (classroom response systems) such as iClicker, iClicker2 or TopHatMonocle, which will be discussed during the lectures.

Presentations

Students will give a group presentation to the class with time for questions afterward. Marks will be divided between an earlier written

	proposal, presentation content and style and participation in discussion and marking of others' presentations. **Final Exam** The final exam will be cumulative and will cover material from the lectures, reading, laboratories, assignments and presentations. The exam will be three hours in length. Students must pass the final exam to pass the course. Students must pass both components of the course – labs and lectures to pass the course. **Lab** A three-hour lab will be performed every week on Zoom. Students are expected to attend all labs and to submit lab reports one week after the lab is completed. Failure to attend labs and/or submit a lab evaluation without a suitable explanation will result in a grade of zero. Late submissions of lab assignments and reports without a suitable explanation will incur a penalty of 20% per school day. Students must provide their own lab coat and lab notebook as instructed.	
Departmental Policies	Students must maintain a GPA of 3.5/12 to continue in the program. In order to achieve the required learning objectives, on average, B.Tech. students can expect to do at least 3 hours of "out-of-class" work for every scheduled hour in class. "Out-of-class" work includes reading, research, assignments and preparation for tests and examinations. Where group work is indicated in the course outline, such collaborative work is mandatory. The use of cell phones, iPods, laptops and other personal electronic devices are prohibited from the classroom during the class time, unless the instructor makes an explicit exception. Announcements made in class or placed on Avenue are considered to have been communicated to all students including those individuals that are not in class. Instructor has the right to submit work to software to identify plagiarism.	
3. SUB TOPIC(S)		
Week 1	Innate Immune response • first line of defense • second line: immune cells, phagocytosis • Inflammatory Response	Chapter 14 (microbiology textbook)
Week 2	The Nature of Antigen and Antibody • antibody chains, regions & classes • antigen binding site recombination • antibody/antigen interactions **Quiz1**	Chapter 15 (microbiology textbook)
Week 3	Lab Techniques Using Antibodies • antigen detection: • in solution (ELISAs) • on membranes (western blots)	Chapter 18 (microbiology textbook)

	Presentation written proposal due	
Week 4	Adaptive Immunity • cell-mediated & humoral immune responses • B & T lymphocytes • MHC's & antigen processing **Quiz2**	Chapter 15 (microbiology textbook)
Week 5	Mechanisms of Pathogenesis • Microbial Pathogenesis • Viral Pathogenesis **Term Test**	Chapter 16 (microbiology textbook)
Mid-term Recess: Monday, October 11 to Sunday, October 17, 2021		
Week 6	Immunization and Immune Testing • active immunization • passive immunotherapy • Vaccines **Quiz3**	Chapter 18 (microbiology textbook)
Week 7	Introduction to Virology • Virus structure and assembly Virus classification	Section I (virology textbook)
Week 8	**Presentation**	Selected topics
Week 9	Viruses of Bacteria and Archaea • Bateriophage • Microviruses **Quiz4**	Section II (virology textbook)
Week 10	Positive-strand RNA Viruses and Negative-strand RNA Viruses • Cucumber Mosaic Virus and Picornaviruses • Paramyxoviruses and Rhabdoviruses	Section III&IV (virology textbook)
Week 11	Virus that use a reverse transcriptase • Retroviruses • Human Immunodeficiency Virus **Quiz5**	Section VII (virology textbook)
Week 12	Antiviral agents and Virus vectors • Antiviral Vaccine Eukaryotic Virus Vectors	Section X (virology textbook)
Classes end: Wednesday, December 8th, 2021 Final Examination Period: Thursday, December 9 to Wednesday, December 22 All examinations MUST be written during the scheduled examination period.		
List of experiments		
Week 2	Introduction	
Week 3 – Week 4	ELISAs	
Week 5 – Week 6	Western Blots #1	
Mid-term Recess: Monday, October 11 to Sunday, October 17, 2021		
Week 7 – Week 8	Western Blots #2	

Week 9 – Week 10	Immunofluorescence #1
Week 10 – Week 11	Immunofluorescence #2

Note that this structure represents a plan and is subject to adjustment term by term.
The instructor and the University reserve the right to modify elements of the course during the term. The University may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes.

4. ASSESSMENT OF LEARNING *including dates*	Weight
Quizzes and case studies	**10%**
Midterm I	**15%**
Midterm II	**15%**
Presentation	**5%**
Labs	**25%**
Final Exam	**30%**
TOTAL	**100%**

Percentage grades will be converted to letter grades and grade points per the University calendar.

5. LEARNING OUTCOMES

1. Explain the fundamentals of immunology, including:
   - an overview of the innate and, especially, the adaptive immune systems,
   - antibody structure and function,
   - immune cells and signaling molecules,
   - and clinically relevant aspects of immunology, including autoimmunity, immunodeficiency, and cancer

2. Explain the fundamentals of virology, including:
   - an overview of virus structure and lifecycle,
   - an examination of bacterial, insect and mammalian viruses,
   - details of the biochemistry & physiology of one bacterial and one human virus.

3. Describe the purposes, technical details, and advantages and disadvantages of laboratory biochemistry experiments using antibodies, including the following techniques:
   - ELISAs,
   - western blots,
   - antibody purification,
   - precipitation assays,
   - immunohistochemistry,

4. Safely perform the first five of the above techniques in the laboratory.

5. Characterize and quantify bacteriophage in the laboratory.

6. COURSE OUTLINE – APPROVED ADVISORY STATEMENTS

ANTI-DISCRIMINATION

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible.
http://www.mcmaster.ca/policy/General/HR/Discrimination_Harassment_Sexual_Harassment-Prevention&Response.pdf

ACADEMIC INTEGRITY

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. It is your responsibility to understand what constitutes academic dishonesty.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/

The following illustrates only three forms of academic dishonesty: The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

AUTHENTICITY / PLAGIARISM DETECTION

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

COURSES WITH AN ON-LINE ELEMENT

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

ONLINE PROCTORING

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

COMMUNICATIONS

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University

communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their @mcmaster.ca alias.

- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

CONDUCT EXPECTATIONS

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the Code of Student Rights & Responsibilities (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, whether in person or online.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's Academic Accommodation of Students with Disabilities policy.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK

McMaster Student Absence Form (MSAF): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work".

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests. http://www.mcmaster.ca/policy/Students-AcademicStudies/Studentcode.pdf

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, including lectures by University instructors

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.