

Course Outline

1. COURSE INFORMATION			
Session Offered	Fall 2017		
Course Name	Immunology and Virology		
Course Code	BIOTECH 3IV3		
Date(s) and Time(s) of lectures	Mo 10:30-11:20, Fr 8:30-10:20		
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	Phone: (905) 525-9140 x20285 E-Mail: gengf@mcmaster.ca Office Hours & Location: Monday 12:30-14:20, Wednesday 12:30-14:20 ETB203	
2. COURSE SPECIFICS			
Course Description	In this course, students will learn: (1) the biology of the immune system; (2) the fundamentals of virology; (3) biochemical techniques utilizing antibodies, including their purification and their use in precipitation assays, immunoblotting, immunoprecipitations and ELISAs; (4) manipulation and quantification techniques for bacterial viruses.		
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
	Fundamentals Of Molecular Virology, 2 nd Edition	Acheson, Nicholas H., 2011	978-0-470-90059-8
	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.

	<p>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.</p> <p>Lab A three-hour lab will be performed every week in the Engineering Technology Building, room ETB 311/ B121. 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.</p>	
<p>Departmental Policies</p>	<p>Students must maintain a 3.5/12 GPA 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.</p> <p>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.</p> <p>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.</p> <p>Instructor has the right to submit work to software to identify plagiarism.</p> <p>Instructor is permitted to enforce a preference to shut off all electronic devices during class.</p>	
<p>3. SUB TOPIC(S)</p>		
<p>Week 1</p>	<p>Innate Immune response</p> <ul style="list-style-type: none"> • first line of defense • second line: immune cells, phagocytosis • Inflammatory Response 	<p>Chapter 14 (microbiology textbook)</p>
<p>Week 2</p>	<p>The Nature of Antigen and Antibody</p> <ul style="list-style-type: none"> • antibody chains, regions & classes • antigen binding site recombination • antibody/antigen interactions <p>Quiz1</p>	<p>Chapter 15 (microbiology textbook)</p>
<p>Week 3</p>	<p>Lab Techniques Using Antibodies</p> <ul style="list-style-type: none"> • antigen detection: • in solution (ELISAs) • on membranes (western blots) <p>Presentation written proposal due</p>	<p>Chapter 18 (microbiology textbook)</p>
<p>Week 4</p>	<p>Adaptive Immunity</p> <ul style="list-style-type: none"> • cell-mediated & humoral immune responses 	<p>Chapter 15</p>

	<ul style="list-style-type: none"> • B & T lymphocytes • MHC's & antigen processing Quiz2	(microbiology textbook)
Week 5	Mechanisms of Pathogenesis <ul style="list-style-type: none"> • Microbial Pathogenesis • Viral Pathogenesis Term Test	Chapter 16 (microbiology textbook)
Mid-term Recess: Monday, October 9 to Sunday, October 15, 2017		
Week 6	Immunization and Immune Testing <ul style="list-style-type: none"> • active immunization • passive immunotherapy • Vaccines Quiz3	Chapter 18 (microbiology textbook)
Week 7	Introduction to Virology <ul style="list-style-type: none"> • Virus structure and assembly • Virus classification 	Section I (virology textbook)
Week 8	Presentation	Selected topics
Week 9	Viruses of Bacteria and Archaea <ul style="list-style-type: none"> • Bacteriophage • Microviruses Quiz4	Section II (virology textbook)
Week 10	Positive-strand RNA Viruses and Negative-strand RNA Viruses <ul style="list-style-type: none"> • Cucumber Mosaic Virus and Picornaviruses • Paramyxoviruses and Rhabdoviruses 	Section III&IV (virology textbook)
Week 11	Virus that use a reverse transcriptase <ul style="list-style-type: none"> • Retroviruses • Human Immunodeficiency Virus Quiz5	Section VII (virology textbook)
Week 12	Antiviral agents and Virus vectors <ul style="list-style-type: none"> • Antiviral Vaccine • Eukaryotic Virus Vectors 	Section X (virology textbook)
Classes end: Wednesday, December 6, 2017 Final examination period: Friday, December 8 to Thursday, December 21, 2017 All examinations MUST be written during the scheduled examination period.		
List of experiments		
Lab 1	Introduction	
Lab 2	IgY Purification #1	
Lab 3	IgY Purification #2	
Lab 4	ELISAs #1	
Lab 5	ELISAs #2	
Mid-term Recess: Monday, October 9 to Sunday, October 15, 2017		
Lab 6	Western Blots #1	
Lab 7	Western Blots #2	

Lab 8	Immunofluorescence #1
Lab 9	Immunofluorescence #2
Lab 10	Phage Titering
Lab 11	Analysis of viral protein expression

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 (lecture)	10%
Participation	5%
Midterm	15%
Presentation (written proposal; presentation content and style; project report)	15% (4%; 6%; 5%)
Labs (pre-lab quiz; lab report; lab test)	25% (5%; 15%, 5%)
Final Exam	30%
TOTAL	100%

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

5. LEARNING OUTCOMES

Upon completion of this course, students will be able to:

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. POLICIES

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 required to exhibit honestly and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

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.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, located at: <http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf>.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism. E.g. the submission of work that is not own or for which other credit has been obtained
2. Improper collaboration in group work
3. Copying or using unauthorized aids in tests and examinations.

Requests for Relief for Missed Academic Term Work (Assignments, Mid-Terms, etc.)

The McMaster Student Absence Form is an on-line self-reporting tool for Undergraduate Students to report absences for:

- 1) Relief for missed academic work worth less than 25% of the final grade resulting from medical or personal situations lasting up to three calendar days:
 - Students may submit a maximum of one academic work missed request per term. It is the responsibility of the student to follow up with instructors immediately (within the 3 day period that is specified in the MSAF) regarding the nature of the accommodation. All work due in that time period however can be covered by one MSAF.
 - MSAF cannot be used to meet religious obligation or celebration of an important religious holiday, for that has already been completed or attempted or to apply for relief for any final examination or its equivalent.
- 2) For medical or personal situations lasting more than three calendar days, and/or for missed academic work worth 25% or more of the final grade, and/or for any request for relief in a term where the MSAF has not been used previously in that term:

Students must visit their Associate Dean's Office (Faculty Office) and provide supporting documentation.

E-Learning Policy

Consistent with the Bachelor of Technology's policy to utilize e-learning as a complement to traditional classroom instruction, students are expected to obtain appropriate passwords and accounts to access Avenue To Learn for this course. Materials will be posted by class for student download. It is expected that students will avail themselves of these materials prior to class. 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 account, and program affiliation may become apparent to all other students in the 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 this disclosure please discuss this with the course instructor. Avenue can be accessed via

<http://avenue.mcmaster.ca>.

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.

Turnitin (Optional)

This course will be using a web-based service (Turnitin.com) to reveal plagiarism. Students submit their assignment/work electronically to Turnitin.com where it is checked against the internet, published works and Turnitin's database for similar or identical work. If Turnitin finds similar or identical work that has not been properly cited, a report is sent to the instructor showing the student's work and the original source. The instructor reviews what Turnitin has found and then determines if he/she thinks there is a problem with the work. Students who do not wish to submit their work to Turnitin.com must still submit a copy to the instructor. No penalty will be assigned to a student who does not submit work to Turnitin.com. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, etc.). To see the Turnitin.com Policy, please go to <http://www.mcmaster.ca/academicintegrity/turnitin/students/>

Protection of Privacy Act (FIPPA)

The Freedom of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades and all other personal information at all times. For example, the submission and return of assignments and posting of grades must be done in a manner that ensures confidentiality. <http://www.mcmaster.ca/univsec/fippa/fippa.cfm>

Academic Accommodation of Students with Disabilities Policy

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information consult McMaster's policy for Academic Accommodation of Students with Disabilities <http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf>

Students must forward a copy of the SAS accommodation to the instructor of each course and to the Program Administrator of the B.Tech. Program immediately upon receipt. If a student with a disability chooses NOT to take advantage of a SAS accommodation and chooses to sit for a regular exam, a petition for relief may not be filed after the examination is complete. <http://sas.mcmaster.ca>

Student Code of Conduct

The Student Code of Conduct (SCC) exists to promote the safety and security of all the students in the McMaster community and to encourage respect for others, their property and the laws of the land. McMaster University is a community which values mutual respect for the rights, responsibilities, dignity and well-being of others. The purpose of the Student Code of Conduct is to outline accepted standards of behavior that are harmonious with the goals and the well-being of the University community, and to define the procedures to be followed when students fail to meet the accepted standards of behavior. All students have the responsibility to familiarize themselves with the University regulations and the conduct expected of them while studying at McMaster University. <http://judicialaffairs.mcmaster.ca/pdf/SCC.pdf> and <http://www.mcmaster.ca/policy/Students-AcademicStudies/StudentCode.pdf>