MICR*3330 World of Viruses

01

Fall 2022
Section(s): 01

Department of Molecular and Cellular Biology
Credit Weight: 0.50
Version 1.00 - September 30, 2022

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1 Course Details

1.1 Calendar Description

Viruses infecting many organisms will be covered in the context of their global impact on disease and history, beneficial uses of viruses, and their role in advances of molecular theory. A fundamental virology background will be achieved by understanding the diversity of viruses, their replication strategies and their interactions with the host in disease. The relevance of viruses in society will be highlighted by discussion of historical accounts and contemporary news articles.

Pre-Requisites: MCB*2050

1.2 Course Description

This course is intended to appeal to a general audience from diverse academic programs with the ultimate goal of providing students with a broad foundation in virology through exposure to, and appreciation of, the various types of viruses, their chemical nature, morphology, architecture, genome organization, strategies of genome replication and expression. Many of these viruses have played key roles in the development of molecular biology, cell biology and immunology. We also discuss viral transmission, epidemiology and the impact of viral diseases on human health, agriculture, the ecosystem, and society. This goal is achieved through its broad treatment of viruses that infect humans, livestock animals, and crop plants among others. Its ultimate goal is to provide our students with a basic and broad foundation in virology. You will have opportunities to critically evaluate contemporary and historical events, such as the numerous pandemics caused by viruses (e.g. AIDS, smallpox, Spanish flu, Ebola, SARS, MERS, and yes, COVID-19), emerging viruses, as well as losses of plant crops and livestock animals due to viral diseases. In addition, we will also discuss intervention strategies against viral diseases as well as some of the beneficial applications of basic knowledge gained from studying viruses, such as the global eradication or near eradication of viral diseases through global vaccination, and the use of viruses as vectors in vaccines, gene therapy, cancer treatment and biotechnology. These objectives will

be accomplished through detailed discussion on select viral families containing viruses that are important pathogens or that have been used as model systems for scientific discoveries, including many Nobel-winning research.

To foster active participation and experiential learning, critical thinking, data gathering and analysis, interpersonal skills and communication, you will have the opportunity to engage in group discussions followed by in-class presentations by a select member of the group. Topics may include various aspects of the COVID-19 pandemic, vaccine technologies, the mass use of new vaccine platforms for the control of COVID-19, as well as how to critically evaluate the overwhelmingly vast amount of information that is readily available not only in peer-reviewed literature but also on social media and the internet. To promote awareness of self assessment, refine and improve skills in real and productive learning, and to bolster readiness in developing careers upon graduation, students will have the opportunity to write a self-reflection essay on the strategies you have developed toward learning, especially with regards to virology.

Virology is unique in that it is a relatively new and fast evolving discipline that encompasses a wide range of topics and viral groups that differ greatly in the nature of their genomes, structural design, genome expression and replication strategies, and virus-host interactions. Consequently, it is expected that many students may find it rather challenging to grasp some of the terminologies, concepts and processes related to viral replication and infection. To facilitate learning, we will continue to implement several tutorial sessions besides lectures to help students' learning. Based on feedbacks from students in the previous two years since we first introduced tutorials, these tutorial sessions are highly beneficial to students' learning. It is critical that you attend as many tutorial sessions as possible. Should you miss certain tutorial sessions due to conflict in schedule, ensure that you watch the video recordings that will be made available on Stream of Office 365.

MICR*3330 is a prerequisite for two advanced virology courses: Molecular Virology (MICR*4330) and Medical Virology (MICR*4430). MICR*4330 (Molecular Virology) is available in the winter semester and will provide more in-depth discussion of select topics and viral families with emphasis on the molecular biology, cell biology and virus-host interactions.

1.3 Timetable

Lectures: Tuesdays and Thursdays from 10:00 to 11:20 AM in MacNaughton 113. This fall semester, lectures will be delivered in person. Should the situation of the Covid-19 pandemic changes for the worse that would require an alteration in the format of lectures delivery, you will be notified.

Tutorials: Each tutorial session will be one hour in length, and will be offered via Zoom every third week. Specific time arrangement for tutorials will be scheduled and announced on CourseLink over the semester, so stay tuned.

1.4 Final Exam

Format: The final exam is cumulative and will cover all materials discussed in the course.

However, emphasis will be on the lecture materials discussed after the midterm. It will include multiple choice questions, definition of virology terms and acronyms commonly used in virology, short answer questions as well as a long essay-type question that would test on the synthesis and in-depth understanding of course materials learned throughout the semester.

Time: December 16, 2:30 - 4:30 PM.

Location: The location for the final exam will be made available later in the semester by the Registrar's office. Check WebAdvisor for such information in the latter part of the semester.

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2 Instructional Support

2.1 Instructional Support Team

Instructor:	Baozhong Meng
Email:	bmeng@uoguelph.ca
Telephone:	+1-519-824-4120 x53876
Office:	SCI 4255
Office Hours:	Thursdays 3:30 – 5:00 pm.

You are strongly encouraged to take advantage of the office hours to ask any questions you may have or to share any thoughts, ideas and experiences you may have pertaining to virology and your journey as an undergraduate student at the University of Guelph. I also welcome, with open arms, those who may encounter difficulties in learning virology or the general course work and would like to reach me out for advice.

Please refrain from asking questions through emails unless this is the only option for your situation. While I will do my best in providing answers to questions submitted via email, you may experience delays in receiving my responses. As per the university policy in promoting barriers between work and personal wellbeing, I may choose not to answer emails in evenings or weekends. To avoid delays that would like occur in answering questions raised through email, please make an effort in taking advantage of the weekly office hours for your questions. Of course, you are most welcome to talk with me right after lectures if you have questions.

2.2 TA

Catherine Fust: cfust@uoguelph.ca

Patrick Lameront: plameron@uoguelph.ca

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3 Learning Resources

3.1 Required Resources

Fundamentals of Molecular Virology (Textbook)

Fundamentals of Molecular Virology, 2nd edition by Nicholas H. Acheson (John Wiley and Sons, Inc. 2011).

Note: Among the several textbooks that are currently available, this textbook is the better choice for a third year level course. However, while a majority of lectures will be based on the different chapters of this text, numerous lectures will be assembled from information gathered from other sources. For these latter lectures, key references related to the lecture material will be listed on the last slide of each lecture and made available in the References section on CourseLink. In order to gain a deeper and more comprehensive understanding of the materials discussed during lectures so as to excel in the course, it is necessary to carefully read the related materials (mostly book chapters and review papers, occasionally primary research publications).

Courselink (Website)

https://courselink.uoguelph.ca

The Course Website contains important information and materials related to this course as well as announcements pertaining to various components and activities of the course. CourseLink can be accessed by using your central login ID and password.

3.2 Additional Resources

Understanding Viruses (Textbook)

Understanding Viruses by Teri Shors (Jones and Bartlett Learning 2013).

Principles of Virology by J. Flint et al. (Textbook)

This is another highly useful text in virology. Five editions are currently available, with the most recent edition (the 5th edition) published in 2020. The most recent edition is published in two volumes, with the first focusing on fundamental aspects of virology, while the second dealing with pathogenesis, epidemiology and vaccines.

Fields Virology (Textbook)

Fields Virology, David M. Knipe and Peter M. Howley (Lippincott Williams Wilkins). Its 7th edition, the latest version, comprises four volumes as follows:

Volume 1: Emerging viruses (already published 2020).

Volume 2: DNA viruses (already published 2021).

Volume 3: RNA viruses (not yet available).

Volume 4: Fundamental viruses (not yet available).

3.3 Note

Two of the additional references (Principles of Virology and Fields Virology) are at much more advanced levels and are better suited for the more advanced virology courses, graduate studies and virology research. Both texts may be a bit too difficult for the majority of students at the third year level. However, it will be a useful reference not only for this course but, more importantly, for advanced virology courses, graduate studies in virology and related fields, and virology research. So, if you have a burning interest in virology, it would be a good idea to purchase a copy of the most recent edition as a reference and for future use.

It is critical that you be judicial of the vast amount of information that is available on the internet. With the democratization of the internet, anyone can post information. As such, the information you will find on the internet may not be reliable or complete. Even Wikipedia can be wrong or contains inaccurate or partially correct information. As one of my favourite sayings, the quality of the information available on the internet can only be as good as the level of understanding of the person who provides such information.

On the other hand, some websites such as the ICTV database (http://www.ICTVonline.org, the official site on virus taxonomy) and the All Virology on the WWW site (http://www.virology.net), and public health agencies such as CDC and PHAC are expected to be more trustworthy.

3.3 Virology Research Programs on Campus

Name of Faculty	Affiliation	Research Interest
Ray Lu	MCB (CBS)	Herpesvirus transcription, virus-host interactions.
Sarah Wootton	Pathobiology (OVC)	Viral vectors; retroviruses; vaccines
Leonard Susta	Pathobiology (OVC)	Avian viruses (surveillance, genomics, diagnostics, molecular biology)
Baozhong Meng	MCB (CBS)	Plant viruses (molecular biology, virus-host interactions, genomics, evolution biology and diagnostics)

4 Learning Outcomes

4.1 Course Learning Outcomes

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

1. Have acquired a broad and general understanding of the importance of viruses as a subject of scientific inquiry and as causal agents of major infectious diseases in humans, livestock animals and agricultural crops.
2. Have developed a basic appreciation of the morphology, structure, chemical composition, biological properties as well as the classification and nomenclature of diverse viruses.
3. Having developed an understanding of the diversity of viruses, their genome structure and expression strategies.
4. Have learnt some of the intervention strategies for the mitigation and control of major viral diseases in humans, livestocks and plant crops.
5. Have developed an appreciation for the relevance of viruses to history, and their impact on society.
6. Refine interpersonal skills and collaboration via group discussion and in-class presentation in the form of breakout rooms in Zoom calls.
7. Refine critical thinking and discernment of the vast amount of information available on the internet and social media.
8. Practice self-reflection to assess your strengths and weaknesses in learning in the context of this course and academically in general. This is an essential component of experiential learning and personal development of learning skills required for graduate school, professional schools, and employment.

5 Teaching and Learning Activities

5.1 Schedule of Lectures (tentative, subject to change)

Lecture 01: Introduction and course organization

Lecture 02: Discovery, morphology, chemical composition of viruses

Lecture 03: Classification, taxonomy and nomenclature of viruses

Lecture 04: Virus replication cycle overview, part 1

Lecture 05: Virus replication cycle overview, part 2

Lecture 06: Tobacco mosaic virus and contributions to life science

Lecture 07: *Picornaviridae*: Polio, and Foot and Mouth Disease

Lecture 08: *Flaviviridae*: yellow fever and hepatitis C virus

Lecture 09: *Coronaviridae:* SARS, MERS and COVID-19

Fall break and study break day (no class): Oct 7 – 11

Lecture 10: *Orthomyxoviridae,* Spanish flu, 2009 Swine flu and seasonal influenza

Lecture 11: *Papillomaviridae* and cervical cancer

Lecture 12: *Herpesviridae*: herpes, chickenpox/shingles, mononucleosis, Epstein-Barr virus

Midterm exam: Oct 25 (Tuesday)

Lecture 13: HIV and AIDS

Lecture 14: Pathogenesis and patterns of viral infection

Lecture 15: Antiviral vaccines and new vaccine technologies

Lecture 16: Place holder lecture slot, topic to be decided

Lecture 17: Plant viruses, an overview

Lecture 18: Virus research: grapevine virology and research in the Meng laboratory

Lecture 19: Beneficial uses of viruses: RNA silencing & genetic engineering for viral resistance

Lecture 20: Evolutionary aspects and emerging viruses

Lecture 21: Class discussion: on hot topics such as pandemics, public health and public health policy-making, vaccines and vaccine mandates, the greater impact of pandemics to society

Lecture 22: Recap of lectures, a brief review

6 Assessments

To achieve a fair assessment of students, evaluation of students will be based on a combination of online quizzes, a midterm exam, a final exam, as well as an essay on self-reflection.

Midterm Exam: The midterm exam will cover lectures and assigned materials presented in the first half of the course, and the final exam will cover the entire course. The midterm exam will be a combination of essay style questions requiring the integration of material and short answer questions, plus "Multiple Choice" and “Fill in the Blanks” type of questions.

Final Exam: Final exam will be cumulative but with emphasis on the lecture materials discussed after the midterm. It will be composed of multiple choice questions, definition questions, short answer questions and a long answer essay type question.

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Quiz 1	7.5
Quiz 2	7.5
Midterm	30
Final	40
Quiz 3	7.5
Quiz 4	7.5
Total	100

6.2 Assessment Details

Quiz 1 (7.5%)
Due: Week 1, Online

The first quiz will test your foundations in molecular biology, cell biology and biochemistry concepts that are essential for students to properly comprehend key concepts used in virology. It is expected that students would have learned these concepts through coursework previously taken. If you find yourself struggling with them, it would be in your best interest to thoroughly review them in order to better understand the course. You are advised to review some of the important chapters of the text you used for the key courses that are foundation materials for this course, such as MBG*2040, MCB*2050, and BIOC*2580.

Quiz 2 (7.5%)

Date: Week 4, Online

The second quiz will assess your mastery and understanding of the foundation materials in virology, including the chemical composition, morphology, and structural design of virions, as well as taxonomy and nomenclature of viruses.

Midterm (30%)
Date: Tuesday, October 25

The midterm will be administered in class during the regular class time on Tuesday, October 25 starting at 10 AM and ending at 11:20 AM.

Final Exam (40%)
Date: Fri, Dec 16, 2:30 PM
Location: TBA

Format: The final exam will be cumulative, with emphasis on the lecture materials discussed after the midterm. It will be composed of multiple choice questions, short answer questions, as well as a long answer essay type question.

Quiz 3 (7.5%)
Date: Week 9, Online

Quiz 3 will cover select families of viruses discussed after quiz 2, including RNA viruses, DNA viruses, and retroviruses.

Quiz 4 (7.5%)
Date: Week 12, Online

This is the last quiz and will cover all remaining lecture materials not covered by quiz 3.

Self-reflection essay on strategies of learning (0%)
Date: Week 8

This is a short and freestyle essay intended as a self-reflection on the learning experience, as well as assessment of strategies, methods and practices of learning in virology and academic life in general over your undergraduate program. Provide an account on what works well and what does not work for you. Come up with ways you can think of that would further improve the experience and effectiveness of your own learning in the rest of the semester and your degree program at the university. To discover how your peers learn, you are highly encouraged to talk with other students enrolled in this course. There is no

specific page limit on the essay but you should not exceed 2 pages with double spacing.

Please note: Bonus points will be given to students whose essays are considered excellent in quality after marking.

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7 Course Statements

7.1 Disclaimer

Please note: this is a draft course outline and is subject to change up to the first day of classes, in keeping with the policy described in the University of Guelph Academic Calendar.

7.2 Policies on Absence

Students absent from class are expected to make up for classes missed through discussions with fellow students and independent reading. Any student wishing academic consideration must obtain supporting documentation as outlined under "Academic Consideration and Appeals" in the University Calendar. Your program counsellor should be consulted regarding the procedures to be followed. If the final exam is missed and the student wishes to request for academic consideration, the student must appeal to the Academic Review Subcommittee as outlined in the current calendar. Academic consideration at this point is **NOT** the responsibility of the instructor. The Registrar's office sets the date and location of the final exam.

7.3 General Courtesy

Professors are people too! Just like everyone else, they also appreciate kindness and respect. Please use proper salutation when you email me, or any instructor you may need to interact with, for that matter. This serves to demonstrate your attitude and understanding for mutual respect and professionalism, which is not only desirable but also key to the success of our students once you enter the real world upon graduation. I may choose NOT to answer emails that lack proper salutation, if I deem it appropriate.

8 Department of Molecular and Cellular Biology Statements

8.1 Academic Advisors

If you are concerned about any aspect of your academic program:

- Make an appointment with a program counsellor in your degree program. B.Sc. Academic Advising or Program Counsellors

8.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. http://www.learningcommons.uoguelph.ca/
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: http://www.lib.uoguelph.ca/get-assistance/studying/chemistry-physics-help and http://www.lib.uoguelph.ca/get-assistance/studying/math-stats-help

8.3 Wellness

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. https://www.uoguelph.ca/counselling/
- Student Health Services is located on campus and is available to provide medical attention. https://www.uoguelph.ca/studenthealthservices/clinic
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. http://www.selfregulationskills.ca/

8.4 Personal information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) http://www.e-laws.gov.on.ca/index.html. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes.

For more information regarding the Collection, Use and Disclosure of Personal Information policies please see the Undergraduate Calendar. (https://www.uoguelph.ca/registrar/calendars/undergraduate/current/intro/index.shtml)

8.5 Course Offering Information Disclaimer

Please note that course delivery format (face-to-face vs online) is subject to change up to the first-class day depending on requirements placed on the University and its employees by public health bodies, and local, provincial and federal governments. Any changes to course

format prior to the first class will be posted on WebAdvisor/Student Planning as they become available.

9 University Statements

9.1 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.

9.2 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

9.3 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

9.4 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.

9.5 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

9.6 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

9.7 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.

9.8 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

9.9 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.

9.10 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).

9.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

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

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