MICR*3330 World of Viruses

Fall 2021
Section(s): C01

Department of Molecular and Cellular Biology
Credit Weight: 0.50
Version 1.00 - September 04, 2021

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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 designed to appeal to a generalized audience from a wide range of academic programs. 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 students with a basic and broad foundation in virology through exposure and appreciation of the various types of viruses, their chemical nature, morphology, architecture, genome organization, strategies of genome replication and expression, transmission and their impact on human health, agriculture, the ecosystem, and society. Students will have opportunities to critically evaluate contemporary and historical events, such as viral pandemics (e.g. AIDS, smallpox, influenza, Ebola, SARS, MERS, and yes, COVID-19), emerging viruses, as well as losses of plant crops and livestock animals due to diseases caused by viruses. 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 the use of vaccines, and the potential use of viruses as vectors in gene therapy, oncolytics and biotechnology. These objectives will be achieved through more detailed discussion on select viral families containing viruses that are important pathogens or that have played pivotal roles in life science, immunology and medicine.

To promote active participation and experiential learning, critical thinking, data gathering and

analysis, interpersonal skills and communication, students 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 vast amount of information that is readily available in not only the literature but also on social media and the internet. To promote awareness of self assessment, refine skills in active learning, and to bolster readiness in developing careers upon graduation, students will have the opportunity to write a short essay on self-reflection related to this course and academic life in general.

MICR*3330 is a prerequisite for two advanced courses in virology: Molecular Virology (MICR*4330) and Medical Virology (MICR*4430). MICR*4330 (Molecular Virology) is available in the winter semester and will provide deeper 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. To provide students with more structure and a sense of routine amid the remote learning environment, I intend to deliver the bulk of lectures synchronously over Zoom. A small number of lectures may be delivered asynchronously, to compare the effectiveness in teaching and learning between synchronous and asynchronous delivery.

Tutorials: 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 introduce, for the first time, several tutorial sessions for students. Each tutorial session will be one hour long, and will be offered via Zoom every third week. Specific time arrangement for tutorial sessions will be scheduled and announced over the semester.

1.4 Final Exam

Format: The final exam will be a take-home exam. It will include long essay-type questions that require synthesis and in-depth understanding of course materials learned throughout the course. Specific format and requirement will be provided shortly before the final exam.

Duration: The final exam will be available on Saturday, December 11 at 10 AM and is due for submission on Wednesday Dec 15 at 10 AM.

Submission: You must submit the final exam in BOTH word and pdf format via Dropbox on CourseLink by the deadline.

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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 3:00 – 4:30 pm.
Due to the recent and unexpected rise in COVID-19 cases due to the delta variant of SARS-CoV-2 and the tightened restrictions recommended by public health authorities and the University of Guelph, office hours will be administered online via Zoom. However, I am open to include an in-person component for students who would prefer to ask questions in person or who would like to have personal interactions later in the semester if the situation with COVID-19 becomes better in the future.

You are also welcome to email your questions to me, though I find this is not the most productive way of asking and answering questions. While I will try my best in providing answers to questions submitted via email, you may experience delays in receiving responses to your questions.

2.2 TA

Patrick Lameront: plameron@uoguelph.ca

Catherine Fust: cfust@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, a number of lectures will be assembled from information gathered from other sources. For these latter lectures, key references related to the material covered in the lecture will be listed on the last slide of each lecture and made available in the References section of CourseLink, if available. In order to gain a deeper and more comprehensive understanding of the materials discussed during lectures and 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 periodic announcement on various components and activities of the course. It will be accessible through CourseLink on the UoG home page with your login ID and password as would be required for the central login.

3.2 Additional Resources

Understanding Viruses (Textbook)

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

Principles of Virology (Textbook)

The more recent editions of the text by Jane Flint et al. published by American Society for Virology Press. The most recent edition, edition 5, was published in 2020. You can purchase a copy of it if you are keen and financially able. 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.

Fields Virology (Textbook)

Fields Virology, 6th edition by David M. Knipe and Peter M. Howley (Lippincott Williams Wilkins)

3.3 Note

Two of the additional references (Principles of Virology and Fields Virology) are much more advanced and are better suited for the more advanced virology courses, graduate studies and virology research. While these serve as sources of additional and valuable information pertaining to virology, you but are not required (though welcome) to access them.

It is critically important that you be judicial of the vast amount of information that is available on the internet. Even Wikipedia can be wrong or contains inaccurate or partially correct information. As one of my favourite sayings, the quality of the information available in the internet can only be as good as the person who provides the 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), PHAC and CDC are expected to be more trustworthy.

3.3 Virology Research Programs on Campus

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

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4 Learning Outcomes

4.1 Course Learning Outcomes

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

1. Acquire 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. Develop a basic appreciation of the morphology, structure, chemical composition, biological properties as well as the classification and nomenclature of diverse viruses.
3. Develop an understanding of the diversity of viruses, their genome structure and expression strategies.
4. Learn some of the intervention strategies for the mitigation and control of major viral diseases in humans, livestocks and plant crops.
5. Appreciate 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 social media and the internet.
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.

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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

Oct 11 – 12: Fall break (no class)

Lecture 10: *Orthomyxoviridae* and influenza

Lecture 11: *Papillomaviridae* and cervical cancer

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

Oct 26: Midterm exam

Lecture 13: HIV and AIDS

Lecture 14: Pathogenesis and patterns of viral infection

Lecture 15: Antiviral vaccines and new vaccine technologies

Lecture 16: *Baculoviridae*: its use in biocontrol and vaccine production

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: Bioinformatics in virology and viral phylogenetics (guest lecture, to be determined)

Lecture 21: Evolutionary aspects and emerging viruses

Lecture 22: Class discussion: on hot topics such as public health, vaccines, and public health

The last lecture? Recap of lectures, a quick review? (to be determined through class consultation).

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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. It will be administered online using Respondus Lockdown Browser and Monitor.

Final Exam: The final exam will be a take-home essay type exam with emphasis on the depth of understanding, synthesis of information learned throughout the entire course as well as skills in communication. The purpose for this final format is to test the following: i) Your overall comprehension and depth of understanding of the materials learned throughout the course; ii) your ability to synthesize the knowledge and information pertaining to virology through critical analysis, comparing and contrasting of information you learned from different lectures concerning different topics in virology; iii) your skills in self-driven

learning and analysis of the published literature; and iv) skills in written scientific communication.

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Quiz 1	4
Quiz 2	7
Midterm	30
Final	40
Quiz 3	7
Quiz 4	7
Self-reflection essay	5
Total	100

6.2 Assessment Details

Quiz 1 (4%)

Due: Week 1, Online

This will be a short survey on the course work and preparation for students enrolled in the course. The molecular/cell biology and biochemistry concepts being quizzed are essential for the students to properly comprehand the virology concepts that will be presented to them throughout the course. It is expected that students should have learned these concepts previously, and if you find yourself struggle with them, it would be in your best interest to thoroughly review them in order to better understand the course.

Quiz 2 (7%)

Date: Week 4

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

Midterm (30%)

Date: Tuesday, October 26

The midterm will be administered during the regular class time on Tuesday, October 26 starting at 10 AM and ending at 11:20 AM using Respondus Lockdown Browser and Monitor.

Final Exam (40%)

Date: Sat, Dec 11, 10:00 AM - Wed, Dec 15, 10:00 AM

Format: The final exam will be an open-book, take-home exam to be submitted in the form of an essay.

Duration: Students will have four days (96 hours) to complete it. It will be available on

Saturday, Dec 11 at 10:00 AM.

Submission: you are required to submit the final exam in BOTH word and pdf via Dropbox on CourseLink.

Quiz 3 (7%)

Date: Week 9

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

Quiz 4 (7%)

Date: Week 12

This is the last quiz and will cover all other remaining lecture materials.

Self reflection essay (5%)

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 this course and academic life in general over your undergraduate program. Provide an account on what works well and what does not work for you and suggestions on how to improve your learning experience and effectiveness. 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 3 pages with double spacing.

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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 counselor should be consulted regarding the procedures to be followed. If the final exam is missed and the student requests 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! Like everyone else, they also appreciate kindness and deserve respect. Please use proper salutation when you compose a letter through email to me, or to any instructor you may interact with, for that matter. This serves to demonstrate your appreciation and understanding for mutual respect and professionalism, which is not only

desirable but also key to the success of our students in the real world upon graduation. Emails lacking proper salutation may not be answered.

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 book their exams at least 7 days in advance and not later than the 40th Class Day.

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.
