

**DEPARTMENT OF MICROBIOLOGY AND IMMUNOLOGY
MCGILL UNIVERSITY
VIRAL PATHOGENESIS AND HOST DEFENSES (MIMM466)
COURSE OUTLINE 2023**

I. GENERAL INFORMATION:

COURSE COORDINATOR: Dr. Chen Liang

COURSE CO-COORDINATOR: Dr. Anne Gatignol, Dr. Dalius J. Briedis

LECTURERS: Drs. Jacques Archambault, Dalius Briedis, Laurent Chatel-Chaix, Anne Gatignol, Chen Liang, Qian Liu, Andrew Mouland, Jean-Pierre Routy, Robert Scarborough, Brian Ward.

TEACHING ASSISTANT: TBA

INFORMATION: <http://www.mcgill.ca/lms>

LECTURES: Monday, Wednesday, 8:35am-10:25am
In person, Lyman Duff Amphitheatre, 3775 University Street, Montréal

QUESTIONS: chen.liang@mcgill.ca
Anne.gatignol@mcgill.ca
dalius.briedis@mcgill.ca

OFFICE By email, zoom or in-person meeting (appointment needed)
HOURS: January 2023: Dr. A Gatignol
February 2023: Dr. Dalius Briedis
March/April 2023: Dr. C Liang

II. MCGILL POLICY STATEMENTS:

- A. **“McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures” (see www.mcgill.ca/students/srr/honest) for more information).** (approved by Senate on 29 January 2003)
“L’honnêteté académique est très importante à l’Université McGill. Tous les étudiants doivent comprendre ce que sont tricherie, plagiat et autres infractions académiques et leurs conséquences selon le Code de conduite de l’étudiant et les procédures disciplinaires” (pour plus d’information, voir www.mcgill.ca/students/srr/honest/).
- B. **“In accord with McGill University’s Charter of Students’ Rights, students in this course have the right to submit in English or in French any written work that is to be graded.”** (approved by Senate on 21 January 2009)
“Conformément à la Charte des droits de l’étudiant de l’Université McGill, chaque étudiant a le droit de soumettre en français ou en anglais tout travail écrit devant être noté.”
- C. **The Department of Microbiology and Immunology is taking steps to assist students who need to miss a midterm examination due to medical or analogous reasons in order to**

limit the need to approach multiple professors for accommodations. Students must complete the Missed Midterm Exam Form at <https://www.mcgill.ca/microimm/undergraduate-programs/request-missing-mid-term-exam> within 1 week of the scheduled midterm, or else they will receive a grade of zero for the midterm. We will evaluate any non-medical situations and reserve the right to make final decisions regarding what accommodations are reasonable and appropriate in the circumstances. Please consult the Student Wellness Hub for sources of support (<https://www.mcgill.ca/wellness-hub/>)

III. LEARNING OUTCOMES:

The students are expected to learn the biological and molecular mechanisms of viral pathogenesis, with emphasis on human pathogenic viruses including new emerging human viruses such as Zika virus, Ebola virus, SARS and MERS viruses, Nipah/Hendraviruses and others. The diseases include viral hepatitis, viral respiratory diseases, viral diarrhea, viral haematological diseases, HIV/AIDS, COVID-19, and virus-associated cancers. The involved viruses will be discussed in the context of viral replication, virus-induced pathologies and host immune responses. Antiviral therapies and vaccines against viruses will be covered.

By the end of the course, students will understand how viral diseases are defined, studied, classified, and managed.

IV. COURSE CONTENT:

| Date/Day | Lecture | Topic | Instructor |
|---|---------|---|------------------|
| Section I: Pathogenesis and Medical Aspects | | | |
| Jan. 4/Wed | 1 | Introduction | Dr. Liang |
| Jan. 4/Wed | 2 | Viral Diarrhea | Dr. Liang |
| Jan. 9/Mon | 3 | Viral respiratory diseases and Flu pandemic | Dr. Liang |
| Jan. 11/Wed | 4 | Viruses and haematological diseases I | Dr. Routy |
| Jan. 11/Wed | 5 | Viruses and haematological diseases II | Dr. Routy |
| Jan. 16/Mon | 6 | Nipah/Hendraviruses I | Dr. Briedis |
| Jan. 16/Mon | 7 | Nipah/Hendraviruses II | Dr. Briedis |
| Jan. 18/Wed | 8 | Clinical aspects and epidemiology of Hepatitis Viruses I | Dr. Briedis |
| Jan. 18/Wed | 9 | Clinical aspects and epidemiology of Hepatitis Viruses II | Dr. Briedis |
| Section II: Emerging viruses and Viral Pandemics | | | |
| Jan. 23/Mon | 10 | Evolving and emerging viruses in a global perspective | Dr. Gagnon |
| Jan. 23/Mon | 11 | Evolving and emerging viruses: Filoviruses | Dr. Gagnon |
| Jan. 25/Wed | 12 | Evolving and emerging viruses: Flavivirus I | Dr. Chatel-Chaix |
| Jan. 25/Wed | 13 | Evolving and emerging viruses: Flavivirus II | Dr. Chatel-Chaix |
| Jan. 30/Mon | 14 | Pathogenesis of the SARS Coronaviruses I | Dr. Liang |
| Jan. 30/Mon | 15 | Pathogenesis of the SARS Coronaviruses II | Dr. Liang |
| Feb. 1/Wed | 16 | HIV-1 - the global pandemic: epidemiology, | Dr. Liang |

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| | | transmission and prevention | |
| Feb. 6/Mon | 17 | Pathogenesis of HIV regulatory and accessory genes | Dr. Gatignol |
| Feb. 6/Mon | 18 | Strategies towards an HIV cure | Dr. Gatignol |
| Section III: Innate Immunity and Virus-Host Interactions | | | |
| Feb. 8/Wed | 19 | Detecting viral infection: Toll-like receptors and cytosolic sensors of viral molecular patterns | Dr. Liang |
| Feb. 8/Wed | 20 | Introduction to the interferon system: types of IFN, antiviral activity | Dr. Liang |
| Feb. 13/Mon | 21 | Interferon signaling & Interferon-stimulated genes I | Dr. Liang |
| Feb. 13/Mon | 22 | Interferon signaling & Interferon-stimulated genes II | Dr. Liang |
| Feb. 15/Wed | 23 | Mechanisms of viral evasion | Dr. Liu |
| Feb. 20/Mon | An alternative day for rescheduled lectures | | |
| Feb. 22/Wed | Mid-Term Exam on Lectures 1-15 | | |
| Feb. 27-March 3 | Study Break | | |
| March 6/Mon | 24 | Virus-host interactions I: viral infection and transmission in retroviruses and other viruses | Dr. Mouland |
| March 8/Wed | 25 | Virus-host interactions II: retroviral protein and RNA intracellular shuttling and transport | Dr. Mouland |
| March 8/Wed | 26 | Virus-host interactions III: combating viral infection by intrinsic mechanisms | Dr. Mouland |
| March 13/Mon | | Oral Presentations I | |
| March 15/Wed | | Oral Presentations II | |
| March 20/Mon | | Oral Presentations III | |
| March 22/Wed | 27 | Genomic alterations in HPV-associated cancers I | Dr. Archambault |
| March 22/Wed | 28 | Genomic alterations in HPV-associated cancers II | Dr. Archambault |
| Section IV: Antiviral Therapies and Preparedness for Future Pandemics | | | |
| March 27/Mon | 29 | Antiviral drug discovery I | Dr. Archambault |
| March 27/Mon | 30 | Antiviral drug discovery II | Dr. Archambault |
| March 29/Wed | 31 | RNA-based antiviral therapies | Dr. Scarborough |
| March 29/Wed | 32 | Viral vectors for gene therapy. | Dr. Scarborough |
| April 3/Mon | 33 | Viral vaccines - some are easy... | Dr. Ward |
| April 3/Mon | 34 | Viral vaccines - ... others not so much | Dr. Ward |
| April 14-30 | Final Exam (lectures 16-34) | | |

V. INSTRUCTIONAL METHOD:

Didactic material will be provided by lecturers.

Students, via an assigned project, will work in small groups to develop their skills in the interpretation, critical analysis and presentation of data related to problems in viral pathogenesis.

VI. COURSE MATERIALS:

THERE ARE NO REQUIRED TEXTS.

SUGGESTED REFERENCES SOURCES:

Principles of Virology: Molecular Biology, Pathogenesis, and Control of Animal Viruses, 3rd edition, 2009. Flint, S.J., Enquist, L.W., Racaniello, V.R., Skalka, A.M. ASM Press, Washington, DC, USA. CDN\$ 140-170 (<http://ebooks.asmpress.org/product/principles-virology-3e-bundle>)

(<http://www.amazon.com/Principles-Virology-Set-Jane-Flint/dp/1555814433>)

Fundamentals of Molecular Virology. 2nd edition. by Nicholas H. Acheson (Author). Price: CDN\$ 147.95 Publisher: John Wiley & Sons (August 2011) (<http://ca.wiley.com/WileyCDA/WileyTitle/productCd-EHEP002152.html>)

eTextbook (Price: US\$ 69.50): (<http://www.coursesmart.com/fundamentals-of-molecular-virology-second/acheson-nicholas-h/dp/9780470900598>)

VII. ASSIGNMENTS AND EVALUATIONS:

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| MID-TERM EXAMINATION (MCQ and/or essay Qs) | 30% OF FINAL GRADE |
| TERM GROUP PROJECT PRESENTATION | 30% OF FINAL GRADE |
| FINAL EXAMINATION (MCQ and/or essay Qs) | 40% OF FINAL GRADE |

“Because of the ongoing COVID-19 pandemic, exam conditions are subject to changes depending on government's and university's guidelines.”