



UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. Course: CMMB 421, Virology – Fall 2019

Lecture 01: MWF 10:00-10:50 in PF 114

| Instructor | Email | Phone | Office | Hours |
|--------------------------|------------------------------------------------------------|-----------------|----------------|----------------------------|
| Dr. Michael Hynes | hynes@ucalgary.ca | 220-8473 | BI 429C | By appointment only |
| Dr. Doug Storey | storey@ucalgary.ca | 220-5274 | BI 286A | |

Course Site: D2L: CMMB 421 L01-(Fall 2019) - Virology

Note: Students must use their U of C account for all course correspondence.

Department of Biological Sciences BI 186 220-3140 biosci@ucalgary.ca

2. Requisites:

See section 3.5.c in the Faculty of Science section of the online Calendar.

Prerequisites: Biochemistry 393 and Cellular, Molecular and Microbial Biology 343; and one of Biology 311 or Medical Sciences 341; and one of Biology 331 or Medical Science 351.

3. Grading:

The University policy on grading and related matters is described in F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

| Component(s) | Weighting % | Date |
|-----------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------|
| Midterm 1 In Class | 15% | October 2, 2019 |
| Midterm 2 In Class | 15% | November 1, 2019 |
| Term Paper (Minireview) | 20 % | October 28, 2019 |
| Student Presentation | 10% | Title and Description due Oct 31, 2019; Talks scheduled in Tutorial sessions November 21, 28, December 5 |
| Final Exam | 40% | Scheduled by the Registrar |

There will be a **3 hour, CUMULATIVE**, final examination scheduled by the registrar.

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a numerical grade, also expressed as a percent. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

| Letter Grade | A+ | A | A- | B+ | B | B- | C+ | C | C- | D+ | D |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Min. Percent Required | 90% | 85% | 80% | 77% | 73% | 70% | 66% | 63% | 60% | 55% | 50% |

Department Approval: ORIGINAL SIGNED

Date: _____

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4. **Missed Components Of Term Work:**

In the event that a student misses the midterm or any course work due to illness, supporting documentation, such as a medical note or a statutory declaration will be required (see [Section M.1](#); for more information regarding the use of statutory declaration/medical notes, see [FAQ](#)). Absences must be reported within 48 hours.

The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in Section 3.6. It is the student's responsibility to familiarize themselves with these regulations. See also Section E.3 of the University Calendar.

5. **Scheduled Out-of-Class Activities:**

There are no scheduled out of class activities for this course.

6. **Course Materials:** There is a required textbook for this course: "Fundamentals of Molecular Virology" by Nicholas Acheson, 2nd Edition (2011). ISBN-10: 0470900598 ISBN-13: 978-0470900598.

7. **Examination Policy:**

No aids (electronic, written notes, or textbooks) will be permitted during exams except non-programmable calculators if required to answer mathematical questions. Permission to use calculators will be clearly indicated on the exams. Some questions on midterm and final exams **may** be assigned ahead of the exam; in this case the student may prepare an answer before the exam (research, reading, discussion with experts), but will be required to write the answer without notes or aids during the exam period. Such questions, if present, will always be optional (i.e. students can choose to answer other questions instead). Students opting not to answer pre-assigned questions will always still have some choice on exams.

Students should also read the Calendar, Section G, on Examinations.

8. **Approved Mandatory And Optional Course Supplemental Fees:**

There are no mandatory or optional course supplemental fees for this course.

9. **Writing Across the Curriculum Statement:**

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section E.2 of the University Calendar.

10. **Human & Living Organism Studies Statements:**

Students will not participate as subjects or researchers in human studies.

See also [Section E.5](#) of the University Calendar.

STUDIES IN THE BIOLOGICAL SCIENCES INVOLVE THE USE OF LIVING AND DEAD

ORGANISMS. Students taking laboratory and field based courses in these disciplines can expect involvement with the experimentation on such materials. Students perform dissections on dead or preserved organisms in some courses. In particular courses, students experiment on living organisms, their tissues, cells or molecules. Sometimes field work requires students to collect a variety of living materials by many methods, including humane trapping.

All work on humans and other animals conforms to the Helsinki Declaration and to the regulations of the Canadian Council on Animal Care. The Department strives for the highest ethical standards consistent with stewardship of the environment for organisms whose use is not governed by statutory authority. Individuals contemplating taking courses or majoring in one of the fields of study offered by the Department of Biological Sciences should ensure

that they have fully considered these issues before enrolling. Students are advised to discuss any concerns they might have with the Undergraduate Program Director of the Department.

Students are expected to be familiar with Section SC.4.1 of the University Calendar.

11. **Reappraisal Of Grades:**

A student wishing a reappraisal, should first attempt to review the graded work with the Course Coordinator/ Instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See Section I.3 of the University Calendar.

- a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within 15 days of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall immediately submit the Reappraisal of Graded Term work form to the department in which the course is offered. The department will arrange for a re-assessment of the work if, and only if, the student has sufficient academic grounds. See sections I.1 and I.2 of the University Calendar.
- b. **Final Exams:** The student shall submit the request to Enrolment Services. See Section I.3 of the University Calendar.

12. **Other Important Information For Students:**

- a. **Mental Health:** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 30, MacEwan Student Centre, Mental Health Services Website) and the Campus Mental Health Strategy website (Mental Health).
- b. **SU Wellness Center:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see www.ucalgary.ca/wellnesscentre or call 403-210-9355.
- c. **Sexual Violence:** The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy <https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf> is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at 403-220-2208 .
- d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K. Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/ fabrication of experimental values in a report. These are only examples.
- e. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.
- f. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#). Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree,

based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head, Undergraduate of the Department of Biological Sciences, Heather Addy by email addy@ucalgary.ca or phone 403 220-6979. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than 14 days prior to the date in question. See Section E.4 of the University Calendar.

- g. Safewalk: Campus Security will escort individuals day or night (See the Campus Safewalk website). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- h. Freedom of Information and Privacy: This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPPA). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see Legal Services website.
- i. Student Union Information: VP Academic, Phone: 403-220-3911 Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: 403-220-3919 Email: sciencerep@su.ucalgary.ca. Student Ombudsman, Email: ombuds@ucalgary.ca.
- j. Internet and Electronic Device Information: Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.
- k. Surveys: At the University of Calgary, feedback through the Universal Student Ratings of Instruction (USRI) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.
- l. Copyright of Course Materials: All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or non-academic misconduct, in addition to any other remedies available at law.

CMMB 421
TERM PAPER AND SEMINAR PROJECT

Term Paper:

A list of topics of this year's term paper will be announced in the first tutorial and posted to D2L before that. Students may also propose their own original topic provided they clear it with Dr. Hynes. The paper will take the form of a minireview, and will normally be 4-6 pages long, double-spaced (not including references or figures and tables (maximum 3 figures and/or tables)). See more detailed explanation given in tutorial or on **D2L**. The paper is due on **October 28th** and is to be submitted electronically and in print. There will be a late penalty of 5 % per 12 hour period or part thereof for assignments not submitted on time.

Student Presentation

Students will be required to give a brief presentation of a recent scientific paper (2017 or later) about a virus of their choice. A title of the presentation, a brief description of the virus, and a short summary in lay terms of what the paper means must be submitted by October 31, 2019. Actual talks will be given during the tutorial sessions, and will be scheduled with input from students as to their schedules. See D2L for complete details and advice.

Tutorials

In addition to providing a time slot for students to present seminars in a small group, informal setting, the tutorial time slots will be used to give guidance on writing the term paper and doing the presentation, and to answer questions and go over material before each midterm and final exam. The following is a **tentative** schedule, and will be confirmed on D2L by the second week of classes.

| | |
|---------|----------------------------------------------------------------------------------|
| Sept 05 | No tutorial |
| Sept 12 | Writing term papers, what is a minireview ?, Referencing, citing, copyright etc. |
| Sept 19 | No tutorial |
| Sept 26 | Exam preparation/Review Session for Midterm 1 |
| Oct 3 | No tutorial |
| Oct 10 | No tutorial |
| Oct 17 | Optional; Help with term paper |
| Oct 24 | Instructions for student presentations and demonstration |
| Oct 31 | Presentation titles due, Schedule talks. Midterm 2 review |
| Nov 7 | No tutorial (MAY be used to accommodate some presentations by volunteers) |
| Nov 14 | READING WEEK |
| Nov 21 | Student presentations |
| Nov 28 | Student presentations |
| Dec 5 | Student presentations, Final exam review |

Course Learning Outcomes

On successful completion of the course, students should be able to:

- Explain and discuss the major principles and concepts of a wide range of viruses including i. bacteriophages ii. Plant viruses iii. Human and animal viruses
- Promote understanding of the interrelationships among fields of inquiry within biology by stressing the connection of Virology to evolution, cell biology, the environment, infectious disease, epidemiology, immunology and molecular biology.
- Make informed decisions on the benefits and drawbacks of vaccination against human viruses.
- Explain and present ideas effectively in an oral presentation, to different groups of people (scientific and non-scientific audiences).
- Communicate scientific information by writing a scientific literature review (with an appropriate bibliography) and in particular be able to recognize and present primary scientific literature.
- Assess, in the field of virology, scientifically based information and critically evaluate the information.
- Recognize members of the U of C community carrying out research on bacteriophages, viruses and prions and be able to describe their findings

Tentative Schedule of Lectures for CMMB 421 F2019. Subject to change in topics/schedule depending on guest lecturers. *Chapter references are to Acheson, "Fundamentals of Molecular Virology"*

MFH = Michael Hynes JC = Jennifer Corcoram DGS= Doug Storey, MC= Markus Czub GvM = Guido van Marle , MB C= Maria Bautista Chavarriaga, SH = Samia Hannaoui

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|-------------------------------------------------------------------|----|---|---------------------------------------------------------|-----|-----------|
| Sept | 6 | F | Introduction to Virology | MFH | Ch 1 |
| | 9 | M | Virus morphology | MFH | Ch 2,3 |
| | 11 | W | Virus morphology | MFH | Ch 2,3 |
| | 13 | F | Isolation, purification, enumeration of viruses | MFH | Ch 1 |
| | 16 | M | Molecular analysis of viruses | MFH | Ch 1 |
| | 18 | W | Viral growth, infection and replication strategies | MFH | Ch 4 |
| | 20 | F | Bacteriophages -History, Importance, Classification | MFH | (Ch 3) |
| | 23 | M | Single stranded RNA phages | MFH | Ch 5 |
| | 25 | W | Single stranded DNA phages -Inoviruses and Microviruses | MFH | Ch 6 |
| Sept | 27 | F | Podoviruses: T7 and relatives | MFH | Ch 7 |
| | 30 | M | Myoviruses: T even phages and relatives | MFH | |
| October 2 | | W | MIDTERM 1 (in class) | | |
| | 04 | F | Temperate phages, Lysogeny, and Biology of Lambda, | MFH | Ch 8 |
| | 07 | M | Viruses of Archaea | MBC | Ch 9 |
| | 09 | W | Abortive infection, CRISPRs and other defenses | MFH | |
| | 11 | F | Giant viruses, virophages and evolution of viruses | MFH | Ch 27 |
| <i>October 14 is Thanksgiving Monday (No Classes)</i> | | | | | |
| | 16 | W | Plant viruses and viroids | MFH | Ch 10 |
| | 18 | F | Plant viruses and viroids | MFH | Ch 10, 31 |
| | 21 | M | Viruses of insects and other invertebrates | MFH | Ch 25 |
| | 23 | W | + strand RNA viruses of mammals: Picornaviruses, | MFH | Ch 11 |
| | 25 | F | + strand RNA viruses: Togaviruses and Flaviviruses | MFH | Ch 12,13 |
| | 28 | M | Coronaviruses | MFH | Ch 14 |
| | 30 | W | Prions | SH | Ch 32 |
| Nov 01 | | F | MIDTERM 2 (in class) | MFH | |
| Nov | 04 | M | Papillomaviruses | MC | Ch 22 |
| | 06 | W | Ebolavirus | MC | Ch 16 |
| | 08 | F | Paramyxoviruses and Rhabdoviruses | JC | Ch 15 |
| <i>November 11-15 Reading Week (Remembrance Day) (No Classes)</i> | | | | | |
| | 18 | M | Retroviruses | GvM | Ch 28 |
| | 20 | W | HIV | GvM | Ch 29 |
| | 22 | F | Orthomyxoviruses, Influenza | JC | Ch 18 |
| | 25 | M | Reoviruses | JC | Ch 19 |
| | 27 | W | Adenoviruses | JC | Ch 23 |
| | 29 | F | Herpes viruses and latency | JC | Ch 24 |
| Dec | 02 | M | Virus immunology and vaccines | DGS | Ch 35 |
| | 04 | W | Virus immunology and vaccines, antiviral drugs | DGS | Ch 35,36 |
| | 06 | F | Epidemiology of virus diseases | DGS | |