

MOLECULAR BIOLOGY OF VIRUSES, MCB*6330, (W-2016)

COURSE OUTLINE Winter 20016 (Jan 12) (tentative)

Department of Molecular and Cellular Biology, UNIVERSITY OF GUELPH

COURSE OBJECTIVES:

The course will cover molecular aspects of virus replication strategies and host-virus interactions particularly strategies of virus infection, genome replication and expression, assembly, release and interactions with the host, of both DNA and RNA viruses. The objective is to provide the students with an advanced and more detailed concept of the molecular aspects of virus infection, intracellular replication, virus-host interactions and the scientific and experimental approaches used to study these. Students will also learn how to read and evaluate scientific manuscripts. Critical reviews of recently published virological literature, experimental design and interpretation of experimental data will be emphasized. Students will also hone their oral/written communication skills and learn how to defend their scientific points of view.

TEACHING TEAM

INSTRUCTORS	Dr Peter Krell	SCIE4252	ext 53368
	Dr Baozhong Meng	SCIE 4255	ext 53876
	Guest Speakers TBA		

Prerequisites: Upper level undergraduate courses in Virology, Cell Biology and Molecular Biology

AREA OF EMPHASIS: We will concentrate on the mechanism of replication of some RNA and DNA viruses, with emphasis on two virus families, covered in the student presentations and review papers. In this offering of the course the students will select a theme such as intracellular replication strategies as well as other aspects of virus-host interactions with concentration on viruses belonging to two families.

COURSE STRUCTURE

LECTURES/SEMINARS: Tuesdays 2:00 to 5:00 pm in SCIE 4440

The instructors will give an overview lecture in virology followed by research seminars on the work in their labs. This will serve to demonstrate the formulation of hypotheses, design of experimental approach, generation and interpretation of data and formulation of future questions typical of an active molecular virology program.

STUDENT PRESENTATIONS:

Students will participate directly in the course by giving general overview seminars and also focusing on a critical review of publications on a selected molecular virology topic.

A suggested schedule is appended to the end of the outline with more specific details discussed during the first lecture.

LEARNING OUTCOMES:

By the end of this course students should be able to:

1. Understand the basics of molecular virology at a general level for several viruses and at a more specific level of one or two viruses chosen for presentation.
2. Be able to read, understand and critique the published literature.
3. Be able to suggest further research based on the literature
4. Be able to communicate the contents and critique of a paper in both written and oral forms.
5. Be able to Chair a scientific presentation

COURSE RESOURCES

TEXTBOOK: The highly recommended reference is Flint et al., Principles of Virology 4th Edition (2015). Fields Virology 6th Edition (Online version in library) (2013), Basic Virology 3rd Edition by Edward K. Wagner (2008), Fundamentals of Molecular Virology by Nicholas Acheson (Canadian) (2011), Introduction to Modern Virology by Nigel Dimmock (2016) and Virology Principles and Applications, 2nd Edition by John Carter and Venetia Saunders (2013) are helpful. These and other virology textbooks are available on a 2 hour reserve in the library (for MICR*4330). Ninth Report of the International Committee on Taxonomy of Viruses (Ed AMQ King) and Encyclopedia of Virology are also available online at

<http://www.sciencedirect.com/science/book/9780123846846> (Virus Taxonomy)

<http://www.sciencedirect.com/science/referenceworks/9780123744104>. (Encyclopedia of Virology)

The web site <http://viralzone.expasy.org> is a good beginner source for virology and virus schematics.

COURSE LINK: Course materials, grades and announcements will be posted to our D2L Courselink at <https://courselink.uoguelph.ca>

There are many review articles available from the published literature which can give you some background, but do not rely on a single source. Do not reference online resources in your reports except for well recognized scientific journals (including volumes and page numbers wherever possible).

COURSE EVALUATION

Component Graded	%	Learning Objectives
I. Summaries of Instructor Research Seminars	10%	1, 2, 3
II. Seminars and participation	25%	1 to 5
III. Term Review/Critique paper (due April 6)	25%	2 to 4
IV. Final exam (Thursday April 10, 1:00 to 4:00)	40%	1 to 4

Overview of Course format:

Students will choose a theme for the course and develop it through their own presentations. For example they could pick two virus families and select one virology topic for one general overview seminar and one research seminar focused on at least two recent (2013 to 2016) original journal publications on that theme for one of the virus families chosen. Since science is based on “peer-review” this course is structured to be a highly interactive one. Students are responsible for their own background reading and are expected to discuss material covered during each of the presentations (including those by the instructors/guest speakers). While for each presentation, one student will be responsible for chairing the session and leading the discussion, the rest are expected to have read and critically reviewed the relevant papers and to actively participate with their own question/comments.

Each student could select one aspect of virus replication (A to C below) for one review seminar (see pages 3 and 5) and one related research seminar based on at least two current (2013 to 2016) full length original research (not review articles) and approved by the instructors dealing with the topic. Each student will also submit a written review of the topic including at least **five** original research papers (including two used for the seminars). Before submission of the written review, each student paper will have been reviewed and feedback provided by another student (designated by the instructor). The quality of this feedback will also be evaluated.

Choice of theme

This is up to the class to choose. Suggestions below assume the class will choose as a theme one or two virus families. But the theme can be changed.

The student seminars could focus on one or two virus families. Each student will also choose a review/research paper topic (A to C) from those listed in the table at the end as the basis for their seminars and their review paper.

Active participation (or lack of it) in all seminars and class discussions will be duly noted and graded accordingly.

I. INSTRUCTOR PRESENTATIONS AND SUMMARIES (10% of final grade)

There will be research seminars from the instructors and/or guest speakers. Each student will prepare a two page written summary (double spaced, 1" margins, minimum 12 point font) of each UoG research presentation submitted one week after the presentation. This summary will be evaluated to provide the student with the opportunity for reviewing and better understanding the material presented, developing writing skills, including a demonstration of comprehension of the material covered and the ability to show that in a concise manner. These summaries collectively will constitute 10% of the final mark. The feedback from these can help the student improve their written communication skills and ensures the student has a basic understanding of the material.

II. STUDENT PRESENTATIONS (25% of final grade)

Student Seminars

Each student (designated A to C) will first give an **Overview Seminar** and then one **Research Seminar** according to a schedule to be confirmed. Each seminar will be about 45 minutes long with 15 minutes reserved for discussion. The seminars will constitute 25% of the mark and the degree and quality of the participation (e.g. actively contributing to the discussions) will be a component of that mark, so **don't be shy** (marks can be lost for lack of adequate participation). For all presentations, students and other presenters will provide handouts of material used for projection (e.g. 6 slides per page printout) just prior to the presentation. For each seminar one instructor or student (for student presentations) will be designated as Chair to introduce the speaker, topic and lead the discussion.

More details on the Overview and Research Seminars follows on page 5

NOTES:

The only AV equipment available will be a white board and markers and a multimedia projector. Students should bring their own laptop to ensure that their presentations appear as they should (e.g. MAC presentations do not show well on a PC laptop). The students are expected to know or learn how to use literature search techniques and data bases (e.g. Agricola, PubMed, Medline, Entrez, NCBI etc.). The library has resources on how to use these as well as automatic referencing.

You are strongly advised to use textbook or, better yet, recent review articles (i.e. print) from reliable (journal) sources for the overview and to not rely on non journal based Web Sources. As good as Wikipedia is, it is not peer reviewed, and expresses the opinion of the last person "updating" it. It is not permanent (like print sources). Feel free to use the Web, BUT be skeptical of online resources and always validate any information from other reliable sources. Most on line Web Sources are not peer reviewed, may be dated and may contain unintended errors, or even intended misinformation. Use your best judgment. Most government sites like those for PHAC (Public Health Agency of Canada) (e.g. <http://www.phac-aspc.gc.ca/id-mi/index-eng.php>), CDC (Centers for Disease Control and Prevention) (e.g. <http://www.cdc.gov/diseasesconditions>) NIH (National Institutes of Health); (e.g. <http://health.nih.gov/topic/ViralInfections>), WHO (World Health Organization) (e.g. <http://www.who.int/topics/en>), and University Web Sites are reliable, but always be circumspect.

III. TERM REVIEW/CRITIQUE PAPER (25% of Final Grade)

(submitted to Instructor BY Wednesday **April 6 at 5:00 pm**; NO extensions!!)

Each student will prepare an overview/critique of 20-pages (for text only, not including cover page) plus an appendix with relevant figures, tables and references (typed, double spaced, 1" margins, minimum 12 point font. References can be single spaced but with a one line space between them). The topics (A to C) for these will be those chosen for the two seminars presented by the student. The review paper will be an overview and critique of at least 5 recent (2013 to 2016), full-length, journal articles (approved by the course instructor), including those used for the oral presentations. The papers chosen cannot have been used for other purposes such as for other courses and journal clubs. They should all be on one topic and should build on the papers covered in the oral presentations. This review should start with a one page abstract of your review and a one page introduction to the virus family. Use standard referencing as used in the journal "Virology" (i.e. author(s), year, title, journal, volume number, page numbers). In the text of your papers use author-year format (author 1 and author 2, year; author 1 et al, year). This review will be formally evaluated and will count for 25% of the course evaluation. Two weeks prior (i.e. by Wednesday **March 23**) to the due date (**April 06**) a draft will be submitted to the instructor who will send it out for blind review within one week (reviewer will not be identified). The student can then revise their manuscript accordingly (and rebut any suggestions they disagree with).

Theme/topics for review

Below are suggested broad topics for the basis for student seminars. Each student will pick one topic below (A to C) and present both an overview seminar and a research paper seminar (2 papers) on that same topic. Do **not** choose a topic too close to your own research area. Whatever topic you choose, both seminars must be on the same topic. E.g. If you choose Topic B, then you will do seminars B1 and B2. Indicate to the course instructor your first, second and third choice of topics A to C by Thursday Jan 14. While we will try to accommodate your top choices they cannot be guaranteed.

Use current and approved virus taxonomy throughout

As boring as viral taxonomy seems, it ensures accuracy in virus designations and communication. For all taxa use Virus Taxonomy Ninth Report of the International Committee on Taxonomy of Viruses, Edited by AMQ King et al 2013 Elsevier Academic Press. You can also access <http://www.ICTVonline.org> for the current official taxonomy. Check under Taxonomy then Current Taxonomy Release 2013. Use italics for taxa names. In any communication it is convention that the full taxonomy of the virus being studied is mentioned early in the Introduction. Thereafter you need to refer only to the virus name.

Below is simply a suggestion for topics you could choose from. During the first lecture, feel free to suggest other topics the class can agree on. E.g. Topic B could be divided into two topics one on transcription one on translation

Topic	Replication Strategies Overview Topic	Research Paper Seminar (2 research papers)
A	A1 Virus structure and taxonomy. Attachment, penetration, uncoating (e.g. cell receptors, virus attachment proteins, localization) and assembly/release	A2 Virus entry and exit
B	B1 Transcription, modification and regulation (e.g. transcriptional regulation, mRNA synthesis and transcript modification). Translation (e.g. regulation, post translational modification, protein targeting, post translational mechanism)	B2 Viral transcription and translation
C	C1 Genome replication (e.g. nature of template, proteins needed, sequences important for genome replication)	C2 Viral genome replication

Overview seminar:

The overview seminar will compare replication strategies for two virus families, but should also provide an overview of the topic for other viruses (DNA and RNA). For example, if different viruses use other strategies in replication of their genomes, then these strategies should be briefly described.

Research seminar:

Choose two **full length**, (i.e. no short communications) recent (e.g. 2013 to 2016), original research articles which relate to at least one aspect of the topic chosen. They will be selected for critical evaluation (e.g. the hypothesis, methodology, results, conclusions drawn, etc.) and to provide suggestions of future directions for research. The papers should themselves be closely related (e.g. results from one lead to the experimental studies of the second) and should preferably be published in either of the three major virology journals (J. Virol., J. Gen. Virol. or Virology) or other high impact sources, all in consultation with the Instructor. The instructor must approve the papers. Print or pdf copies of the papers should be provided to the other students and the instructor **one week in advance of your seminar**. All students are expected to be familiar with all articles in preparation for the seminars **before** the class and are expected to participate in the discussions and offer their own critique, comments and questions and engage actively in lively class discussions. Questions and comments can be directed to either the presenter or to any other student. Theoretically, anyone in the class, in addition to the presenter, should be able to give any presentation (e.g. if the presenter is sick).

Schedule of Classes: Tuesdays, 2:00 to 5:00 SCIE 4440

A1 to C1 below are overview seminars and A2 to C2 are journal article seminars. The student who does the “A” overview seminar A1 also does the journal article seminar A2. The topics listed presume students will select a virus family to concentrate on.

Primary family: *Xviridae* Secondary Family *Yviridae*

Note the Overview Topic Chair will Chair the Research Seminar of the same topic

Date	Topic (TENTATIVE to be discussed in Class)	Presenter	Chair
Jan 12	Introductory Meeting Overview Virus Taxonomy, Structure/Replication Cycle	Dr. P. Krell	
Jan 19	Baculovirus Research (Krell Lab)	Dr Peter Krell	Dr. B. Meng
Jan 26	Independent work as group to select virus family and topic		
Feb 02	Plant Virus Research (Meng Lab) Note, summary due one week after presentation	Dr. B. Meng	Dr. P. Meng

Student Overview Seminars (A1 to C1)

Feb 9	A1 Virion characteristics, attachment, penetration, uncoating, assembly release maturation	A	C
Feb 16	Spring Break, no formal class (lab/library work)		
Feb 23	B1 Transcription and translation	B	A
Mar 01	C1 Genome Replication	C	B
Mar 08	Library Seminar Preparation Break		

Journal Article Seminars (A2 to E2)

Mar 15	A2 Virus entry and exit	A	C
Mar 22	B2 Transcription and translation	B	A
Mar 29	C2 Genome replication	C	B
Apr 06	Review/critique of draft paper due to PJK by 5:00 pm to be returned to original author for their consideration		

Other important Dates

Mar 23	Draft of Paper due to PJK by 17:00 (to be sent for friendly review)		
April 14	Final Examination 1:00 to 4:00 (Room TBA)		

IV FINAL EXAMINATION (Thursday April 10, SCIE 3440)

The final examination (40%) will be mainly essay style and will cover material from all student seminars (70 to 90%) and the UoG research seminars (10-30%). A total time of 3 hrs will be reserved.

Additional Course Information

Virology Affiliated Research Programs at University of Guelph

<u>Name of Faculty</u>	<u>Affiliation</u>	<u>Research Interest</u>
Dr. Peter Krell	Mol Cell Biol	Baculovirus transcription/replication
Dr. Baozhong Meng	Mol Cell Biol	Plant virus replication/genomics/diagnostics
Dr. Ray Lu	Mol Cell Biol	Herpesvirus/host transcription
Dr. John Dawson	Mol Cell Biol	Use of viruses as expression vectors
Dr. Eva Nagy	Pathobiology	Adenovirus based vaccines/genomics
Dr. Dorothy Bienzle	Pathobiology	Feline leukemia virus
Dr. Sarah Wootton	Pathobiology	Retrovirus and cancer
Dr. Byram Bridle	Pathobiology	Oncolytic viruses
Dr. Leonardo Susta	Pathobiology	Avian Virology

Course and University Policies (refer to the University Calendar)

Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs: <http://www.uoguelph.ca/registrar/calendars/index.cfm?index>

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. See the graduate calendar for information on regulations and procedures for Academic Consideration.

For the assignments and reports a late penalty of a loss of 10% of the assignment value per day (including weekends) will apply. As you are expected to be working on your assignments and reports throughout the semester, it is expected that students will submit their assignments in advance of the due date instead of at the last minute. As such, it is unlikely that any accommodation will be given for late submissions, except for longer term issues prior to the due date.

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students Accessibility Services (SAS) as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: <https://www.uoguelph.ca/csd/>

Academic Misconduct

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 discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Plagiarism is cheating and will be dealt with accordingly. Expulsion is one option. An example of plagiarism in this course is to re-use an assignment you have prepared for another course, including this one, or to use all or part of an assignment submitted or prepared by someone else.

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 prior to submission.

E-mail Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly. E-mail is the official route of communication between the University and its students. If the instructor wishes to communicate to the whole class, it will be through the course D2L and/or by email through their University of Guelph email address available on the D2L web site for the course.

The preferred (and often most efficient) route of communication between the student and instructor is to meet directly with the instructor. Nevertheless short questions with short yes or no answers can be done through email. Professional Email communication is not the same as texting. Thus in email communication with faculty and staff, professionalism and common courtesy applies and students are encouraged to be formal in their salutation and to use full sentences, proper Capitalization (I not i) punctuation and paragraph structures. The **subject line** should be informative and include MICR4330. This will allow the instructor to retrieve relevant emails easily and decrease the possibility of deletion without opening. Emails from only UoG accounts will be considered.

Drop Date

The last date to drop one-semester courses, without academic penalty, is the 40th class day. To confirm the actual date, please see the schedule of dates in the Undergraduate Calendar. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Copies of midterm exams and out-of-class assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments and examinations if returned to you: you may be asked to resubmit work at any time.

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material presented in class is considered as intellectual property. Permission may be granted under certain circumstances (e.g. for someone who is hearing challenged). Anything recorded with documented (e.g. by email) permission is restricted to use for that course and only that person unless further permission is granted. All recorded material should be deleted after the course is completed.

Cell Phones and Laptops

Use of cell phones/tablets/phablets etc in a public space like the lecture hall, is intrusive and will distract you from learning and disturb those around you. If you have to bring them with you, turn them off while in class. Using your cell phone during lecture is not only counterproductive and intrusive, but will only distract you and your classmates from paying attention and learning. Do not try to text and learn during lecture.

There is little reason to use your laptop during lectures. For example you do not need to access the slides on your computer as these will be projected during class. While you may bring your laptop to lectures, again recognize that it is in a public space, visible by others and using the laptop can disturb those around you if used improperly. Please do not use your laptop during lecture for anything other than activities (e.g. taking notes) related directly to this virology course.

There is an expectation of professional conduct and courtesy on electronic discussion groups and email communications. The instructor will not monitor the discussion board as it is meant as a forum for free student exchange. However, if someone feels a particular posting is inappropriate you can inform the poster directly or bring it to the attention of the instructor.

Campus Resources

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

- make an appointment with a program counsellor in your degree program.
<http://www.bsc.uoguelph.ca/index.shtml> or
<https://www.uoguelph.ca/uaic/programcounsellors>

If you are struggling to succeed academically:

- 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/>

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.uoguelph.ca/~ksomers/>

If you have a documented disability or think you may have a disability:

- The Centre for Student Accessibility Service (CAS) can provide confidential services and support for students with a documented learning or physical disability. They can also provide information about how to be tested for a learning disability. For more information, including how to register with the centre please see: <https://www.uoguelph.ca/csd/>