VIROLOGY
MCB493
SYLLABUS

TuTh from 2-3:20pm; Materials Science & Eng Bld 119

INSTRUCTOR:
Christopher Brooke, Ph.D.
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Phone: 217-265-0991
Email: cbrooke@illinois.edu
Office hours: by appt. (48 hrs minimum notice required)

Course website - https://learn.illinois.edu/course/view.php?id=62415

ABOUT ME:
I run a research group that studies how RNA viruses replicate, evolve, and cause disease. In particular, we explore how heterogeneity and collective interactions within virus and host cell populations shape the dynamics of influenza virus infection. We also study how the unique structure of the influenza virus genome influences how the virus evolves.

COURSE DESCRIPTION:
Viruses are everywhere. They are intimately involved in the lives of all major life forms on earth and impose enormous public health and economic burdens upon human society, as has been made painfully obvious this year. This course will focus on the common fundamental biological concepts that underlie and connect the replication strategies of diverse virus families and will examine host interactions between viruses and the host influence infection outcome. Group discussion of primary literature will be used to illustrate experimental approaches for exploring fundamental questions in virology.

COURSE OBJECTIVES:

1. Understand the general challenges and processes involved in viral infection and replication
2. Identify the strategies used by diverse viral families to overcome common challenges.
3. Explore the factors that influence whether exposure to a virus results in infection, disease, recovery or death.
4. Understand the fundamental concepts that explain viral persistence, pathogenesis, and emergence.
5. Critically read primary scientific literature and evaluate experimental data and design.

TEXTBOOK:
Required: Assorted articles that will be provided as PDFs


COVID-19 POLICIES
Following University policy, all students are required to engage in appropriate behavior to protect the health and safety of the community. Students are also required to follow the campus COVID-19 protocols.

Students who feel ill must not come to class. In addition, students who test positive for COVID-19 or have had an exposure that requires testing and/or quarantine must not attend class. The University will provide information to the instructor, in a manner that complies with privacy laws, about students in these latter categories. These students are judged to have excused absences for the class period and should contact the instructor via email about making up the work.

Students who fail to abide by these rules will first be asked to comply; if they refuse, they will be required to leave the classroom immediately. If a student is asked to leave the classroom, the non-compliant student will be judged to have an unexcused absence and reported to the Office for Student Conflict Resolution for disciplinary action. Accumulation of non-compliance complaints against a student may result in dismissal from the University.

EVALUATION:
The following breakdown of scoring for the course applies to both undergraduate and graduate students.

**Exams:** There will be three exams, including the final exam, each of which will be worth 100 points and will in total contribute 70% of the final grade (Exam I = 20% of final grade, Exams II and III 25% of final grade each). These exams will be a mix of short answer and multiple-choice questions, and will cover material from the lectures, required readings, and the papers discussed in class. The final exam will cover the new material from the last third of the course. All exams will require that students be familiar with all the concepts introduced up to that point in the course.

Make-up exams will be given ONLY in cases where there is a documented reason (e.g., doctor’s note for significant illness/injury), and must be taken within two weeks of the original exam date.

**Participation in paper discussions:** There will be 6 in-class discussion sessions where we will discuss primary research papers in depth. The class will be broken into 6 groups, each group will be responsible for presenting one of the papers to the rest of the class and leading discussion. Presenting groups must:

1) Provide relevant background information.
2) Explain the overarching question of the paper
3) Present and explain the individual figures, with a focus on the specific questions asked by the authors, the experimental method(s) they used to answer the question, key controls, and what conclusion the authors arrived at and why.
4) Convey the main or “take-home” conclusion of the study
5) Highlight one thing they especially liked and one thing they especially didn’t like about the paper
6) Address and engage the class in discussion of the discussion questions provided

Doing all of this within 1 class period will be a challenge so groups will have to be well prepared and organized in advance so as not to run over time. Evaluation of the presentation will contribute 15% of the final grade.
Participation: Participation in class discussion will make up 5% of the final grade.

Quizzes: Grades from 5 of 6 in-class quizzes will contribute the remaining 10% of the final grade (Lowest quiz grade will be dropped). Quizzes will be administered through moodle and will consist of short answer and/or multiple-choice questions. Quizzes will be available for the 24 hour period up until the indicated class meeting and will have a 10 minute time limit once initiated.

There will be no extra credit opportunities.

Challenging an Exam Grade: You will have one week after an exam is handed back to the class to challenge the grading of the exam. To challenge a grade, you must return the exam to me with (on a separate sheet of paper) a clearly written explanation of your reason for challenging the grade (specifically state which questions you want me to regrade), and I will seriously consider it. Except for score calculation errors, I will NOT re-grade questions that do not have a written explanation/justification attached. All requests must be made in writing within one week of being returned - no exceptions. Use a different color pen (not blue or black) for marking on your returned exams if you think that you might be requesting a regrade.

Total grade breakdown:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Exam I</td>
<td>20</td>
</tr>
<tr>
<td>Exam II</td>
<td>25</td>
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<tr>
<td>Exam III</td>
<td>25</td>
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<tr>
<td>Quizzes</td>
<td>10</td>
</tr>
<tr>
<td>Paper discussion presentation</td>
<td>15</td>
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<tr>
<td>Discussion participation</td>
<td>5</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
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APPROXIMATE LECTURE SCHEDULE:

Week 1:
- (8/24): Class intro / What is a virus? / Viral structures I (Vol.1 Chapter 1, 4)
- (8/26): Viral structures II / Life cycle overview (Vol.1 Chapter 2, 4)

Week 2:
- (8/31): Entry/attachment (Vol. 1 Chapter 5)
- (9/2): Genome replication (Vol. 1 Chapters 6, 7, 9)

Week 3:
- (9/7): **PAPER DISCUSSION (DOI: 10.7554/eLife.43599)**
- (9/9): **QUIZ 1** and Protein translation

Week 4:
- (9/14): Assembly/egress (Vol. 1 Chapter 13)
- (9/16): **PAPER DISCUSSION**

Week 5:
- (9/21): **QUIZ 2** and Routes of infection/transmission and **REVIEW** (Vol. 2 Chapter 2)
- (9/23): **NO CLASS**
Week 6:
(9/28): **EXAM I**
(9/30): Pathogenesis overview (Vol. 2 Chapter 5)

Week 7:
(10/5): Innate defenses / Interferon (Vol. 2 Chapter 3)
(10/7): **PAPER DISCUSSION**

Week 8:
(10/12): Sensing and priming (Vol. 2 Chapter 3)
(10/14): **QUIZ 3** and MHC / T cells (Vol. 2 Chapter 4)

Week 9:
(10/19): B cells / antibody (Vol. 2 Chapter 4)
(10/21): Immune antagonism/evasion

Week 10:
(10/26): **PAPER DISCUSSION**
(10/28): **QUIZ** and Vaccines and **REVIEW** (Vol. 2 Chapter 8)

Week 11:
(11/2): **EXAM II**
(11/4): Importance of viral evolution (Vol. 2 Chapter 10)

Week 12:
(11/9): Viral diversity/recombination (Vol. 2 Chapter 10)
(11/11): Viral genomics (Vol. 2 Chapter 10)

Week 13:
(11/16): **PAPER DISCUSSION**
(11/18): **QUIZ 5** and Inter-host transmission/emergence (Vol. 2 Chapter 11)

Week 14:
(11/23): **NO CLASS**
(11/25): **NO CLASS**

Week 15:
(11/30): Endogenous retro-elements
(12/2): **PAPER DISCUSSION**

Week 16:
(12/7): **QUIZ 6** and Virus origins and **REVIEW**