PLP/MIC 333  
General Virology 3 units  
TU-TH 8:00-9:15 am

Syllabus
Spring 2020

Location: Animal and Comparative Biomedical Sciences (ACBS) Building Room # 129
Instructor: Dr. Judith Brown, Professor, School of Plant Sciences
Office Hours: Forbes Bld 431 by appointment
Email: jbrown@ag.arizona.edu Office phone: 621-1402

Suggested Prerequisites
BIOL 181/182L; Chemistry 103A/B or151/152; MIC205A/B and/or PLP 305.

Course Description: This course will be offered every other year in the spring semester. The course will provide a general introduction to Virology of bacterial, animal /human, and plant viruses.

Learning objectives:
Upon completion of the course students will be able to:
1. Appreciate the early history of contemporary virology, and provide examples in which preferred host-virus study systems arose primarily because they were among the most tractable for testing a particular hypothesis or addressing a specific question of interest.
2. Understand ‘historical’ and ‘virological’ bases of the Baltimore Virus Classification System, become familiar with taxonomy and nomenclature systems developed under the guidance of the International Committee of Taxonomy of Viruses (ICTV), and understand how to access the latest information at the ICTV website.
3. Explain general structural levels of nucleic acids and proteins in virus particles, and gain an appreciation for the diverse viral-encoded proteins and how they influence virus structures and models of virus assembly.
4. Be familiar with the generalized virus ‘life’ or infection cycles for the different genome types of viruses, including diverse mechanisms involved in cell entry into different types of hosts (animal, plant, bacteria and archaeabacteria).
5. Be familiar with chemical, biochemical, molecular methods and assays for studying viruses in the laboratory, including genomic and metagenomic sequence data and applications to epidemiology and studying the evolution and origins of viruses.
6. Understand principles of arthropod vector transmission of plant and human viruses, and be able to cite case studies or examples illustrating diverse associated epidemiology and interventions.
7. Be familiar with terminology and processes used to study the epidemiology of new and emerging viral diseases, including general clinical terminology; understand the roles of the Centers for Disease Control and World Health Organization in national and global human health and disease management; Be aware of the corollary organizations in the U.S. that oversee plant and livestock emerging virus diseases.
8. Master general approaches and logic implemented in studying and elucidating the human-animal viral pathogenesis, immunity and defenses, patterns of spread of different kinds of viruses, including role of climate and other mitigating factors, associated with tissue and organ tropisms, and how such knowledge can aid in disease management and/or abatement at levels of infection, systemic spread, or transmission.
9. Be familiar with the differences and similarities between plant and human-animal defense responses to viral infection, including localized and systemic responses at the cellular level, and molecular responses including RNA interference in plants and animals, and CRISPR-systems used by bacterial against phages and other nucleic acid forms. Be able to explain several examples of how knowledge about host defenses
and viral counter-defenses translate to strategies and caveats in management of virus diseases in animals and plants.

10. Understand and begin to integrate basic concepts about viral evolution, and the evolutionary mechanisms and factors acting on viral genomes in terrestrial and aquatic/ocean environments.

11. Master initial the steps, considerations, and time-management skills required to develop a scientific presentation (virology-related topic of choice), beginning with literature search, preparing an outline with supporting references, developing a summary explaining the problem with expanded main points, and major conclusion or summary and/or future steps or needs. Using this process, students developed a Powerpoint presentation to deliver in class at the end of the semester. Most students worked with a partner, but some chose to work alone.

12. Learn how to question and interpret information available in the news media, research articles, and other sources of information available about virus diseases and discoveries in the field of virology.

**Format:** Two 1 hour and 15 min hour lectures, per week

**Optional: Textbooks – Supplemental reading can be determined by topic from the Table of Contents**

**This class Begins:** Thursday January 16, 2020 (first day of UA classes, January 15, 2020)

**Last Day of this Class:** Tuesday May 5, 2020 (last day of UA classes May 6, 2020)

**Class Attendance Policy**
Class attendance is **MANDATORY**. Learning comprises assimilating material and skills from many sources, including the textbooks, handouts, and lecture material. Highly relevant material will be presented in lectures. Prepared lecture outlines will not be handed out. Pagers and cell phones must be turned off in class. ‘Threatening behavior’ policies apply to everyone. If these rules are not followed, the student will be told to leave the class. All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Advance notice of such an anticipated absence is required. Absences approved by the UA Dean of Students (or Dean's designee) will be honored.

**University Holidays:** **Martin Luther King Day** Jan 20, 2020 (Monday)
**Spring Break Recess**.............. March 9-13, 2020

**Written Exams**
Three (3) examinations will be given in class
Examination #1 ------------------ Tuesday February 11
Examination #2 ------------------ Thursday March 24
Examination #3 ------------------ Thursday April 9

**Make-up examinations:** will be permitted under **exceptional** circumstances: Physician documented illness received before or on the day of the exam, or evidence or direct conflict with an official university scheduled activity. Both must be requested **before** the examination. When a make-up exam is granted, the make-up examination may be given on "dead day" if not possible to schedule otherwise.

**Final Examination Grade:** **In-class oral presentation**. Note that there are three assignments ‘in preparation for’ your presentation, due during the semester. Students must attend all presentations and participate to earn full credit for the final exam grade.
**Oral Presentation for Final Exam:** The research/oral presentation assignment will be a ‘professional’ Powerpoint presentation presented in class: **25 minute**, and Q&A: **5min (100 points)**.

**ITEMS DUE prior to presentation:**

- **Presentation Topic Title:** Due in class TUES February 11, 2020
- A one-page Outline of the research project, with list of 8-10 References Consulted, will be due **TUES February 25, 2020** (25 pts)
- A one-page Summary and with final Reference List, due **TUES March 31, 2020** (25 pts)

**Presentations will be delivered in class April 14-May 5, 2020.** Students are expected to be present for all presentations. Students will prepare and submit one question to ask a speaker each day presentations are delivered (5 points/class meeting).

**PRESENTATION RUBRIC**

- In-depth nature of research: 40 pts
- Organization; Effective format and style: 30 pts
- Delivery: 25
- References (*at least 8, required): 5 pts*
- Total points possible: 100

Sources of information must include professional journals, historical documents, and Internet articles only if a citation (authored, dated) can be found for the information. Wiki-Pedia may be used to research a topic, but references should be those followed up directly by each student based on background or other information found there. Information used directly from Wiki or anything written by another is plagiarism. Figures, tables, photos from the Internet may be used and incorporated into the presentation, using proper citations of the source.

**Grading**

- The three written exams are weighted equally at 100 points each = **300 points**.
- Periodic Quiz & discussion; beginning or during class @ 10 pts each x 5 = **50 points**.
- **EXTRA CREDIT** Virology in the News (submit item/your name/date) = **10 points** (two per student)

**Oral presentation** (last four weeks of class) = **150 points**

- Outline is worth **25 points**
- Summary with Reference List is worth **25 pts**.
- Oral Presentation is the Final Exam and worth **100 points** (submit PPT or other media).
- Submit one Question pertaining to each presentation (absence from class = **minus 5 points from grade**).
- **Total = 500 points**

Grades are assigned with a basis in the mean score: 90-100%, "A"; 79-89%, "B"; 69-78%, "C"; 59-68%, "D"; below 59%, "E". The grade of "I" (Incomplete) requires instructor approval and will be awarded only when all but a minor portion of the course work has been satisfactorily completed. Withdrawal ("W"): prior to the end of the fourth week of classes, official withdrawal (drop) cancels the registration for the course. During weeks five through eight, the grade of W is awarded to students who are passing at the time of withdrawal. A grade of E is awarded to students not passing at time of withdrawal. Students wishing to audit must be registered.

**Classroom Behavior and Academic Integrity**

Courtesy is required in the classroom; you will be treated with respect and you are expected to be respectful of your fellow classmates. All cell phones and pagers must be turned off in the classroom, and
conversation should be limited unless you have been instructed to participate in an active discussion. Threatening behavior as described at http://policy.web.arizona.edu/%7Epolicy/threaten.shtml is prohibited. Students are encouraged to share intellectual views and freely discuss the principles and applications of the course work. However, examinations must be written independently. This course operates under the UA Code of Academic Integrity available on line at http://dos.web.arizona.edu/uapolicies/. All forms of academic dishonesty are prohibited, including (but not limited to): cheating, fabrication, academic dishonesty, plagiarism, modifying any academic work to obtain additional credit without approval of instructor, or attempting to carry out any of the above. Committing any of the above will result in sanctions being imposed on the student's scores or grade up to and including the assignment of an "E".

Special Needs and Accommodations Statement
Students who need special accommodation or services should contact the Disability Resources Center, 1224 East Lowell Street, Tucson, AZ 85721, (520) 621-3268, FAX (520) 621-9423, email: uadrc@email.arizona.edu, http://drc.arizona.edu/. Please register, and request that the Center or DRC provide to me an official notification of your accommodations needs as soon as possible. Please meet with me by appointment to discuss accommodations, and how course requirements may influence your ability to fully participate. The appropriate office must document the need for an accommodation.

Student Code of Academic Integrity
Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/codeofacademicintegrity

Absences
Participating in the course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures and discussion section meetings. Absences may affect a student’s final course grade. If you anticipate being absent, are unexpectedly absent, or are unable to participate in class online activities, please contact me as soon as possible. To request a disability-related accommodation to this attendance policy, please contact the Disability Resource Center at (520) 621-3268 or drc-info@email.arizona.edu. If you are experiencing unexpected barriers to your success in your courses, the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office is located in the Robert L. Nugent Building, room 100, or call 520-621-7057.

Confidentiality of Student Records http://www.registrar.arizona.edu/ferpa/default.htm

Subject to Change Statement
Information contained in the course syllabus may be subject to change with advance notice, as deemed appropriate by the instructor. This course will be offered every year in the Spring semester.
COURSE SCHEDULE Spring 2020

**Week 1**
**THURS** [Jan 16]
History of viruses
Syllabus-review

**Week 2**
**TUES** [Jan 21]
Introduction to Viruses

**THURS** [Jan 23]
Taxonomy and nomenclature of viruses
Baltimore system; contemporary species concepts

**Week 3**
**TUES** [Jan 28]
Structural and non-structural viral components; basics of assembly

**THURS** [Jan 30]
General infection cycle animal viruses; overview, replication-genome types groups

**Week 4**
**TUES** [Feb 4]
Attachment & entry of animal viruses; comparison with plant viruses

**THURS** [Feb 6] **DUE TODAY** Turn in: *Student Presentation Topic*
Entry of plant viruses and cell to cell movement

**Week 5**
**TUES** [Feb 11] [take home **EXAM #1**]
Working with viruses I

**THURS** [Feb 13]
Working with viruses II

**Week 6**
**TUES** [Feb 18] [**EXAM #1 due**]
Plant viruses: ss-circular DNA viruses; Case study: Geminiviruses

**THURS** [Feb 20]
Plant viruses: dsDNA gapped genome; Case study: Badnaviruses

**Week 7** *Due TODAY: **Outline and 8-10 References (25 pts)-no late papers accepted**
**TUES** [Feb 25]
Concepts and principles of arthropod-mediated transmission of plant viruses

**THURS** [Feb 27]
Mechanisms of arthropod-mediated plant virus transmission

**Week 8**
**TUES** [Mar 3]
Arbovirus biology and genetics: Dr. M. Riehle, Entomology (Guest lecture)

**THURS [Mar 5] [Take home EXAM #2]**

**Week 9** **SPRING BREAK March 9-13**

**Week 10**
**TUES [Mar 17]**
14-Concepts and principles of epidemiology

**15-THURS [Mar 19] [EXAM #2 Due]**
Epidemiology and case studies, human viruses

**Week 11**
**16-TUES [Mar 24]**
Epidemiology and case studies, human viruses

**17-THURS [Mar 26]**
Viruses in a changing world: effects of climate and disease outbreaks

**Week 12**  *Due TODAY One page summary of presentation & Final reference List (25 pts)*
**TUES [Mar 31]**
18-Plant-virus interactions; host resistance, RNAi

**THURS [Apr 2]**
19-Plant-virus interactions; RNAi, CRISPR, viral suppressors

**Week 13**
**TUES [April 7]**
20-Evolution of viruses I: concepts, musings, mechanisms, quasi-species

**THURS [Apr 9]**
21-Evolution of viruses II: molecular systematics, phylogenies, metagenomics, phylodynamics

**Week 14**
**TUES [April 14]**
22-Bacteriophages, plasmids, transposons; CRISPR technology

**THURS [April 16] [take home Exam #3; due April 23]**
23-Marine viruses, giant viruses, ocean health

**Weeks 15-17:** April 21-23; April 28-30; May 5
Oral Presentations 3-4 teams/ per day
- Attendance mandatory
- Submit one question for each presentation (participation)
- Ask three questions during presentations April 21-May 5

**Sign-up sheet circulated:** TUES/THURS [Apr 21, 23] TUES/THURS [April 28, 30] TUES [May 5]

(Maintained by College of Agriculture and Life Sciences, Office of Academic Programs, Forbes # 201, 621-3613.)