

BASIC INFO AND SYLLABUS (2015)

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WHERE & WHEN: Center Hall 113; Tue/Thu 8:00-9:20 am; March 31 through June 4, 2015.

COURSE GOALS

This course gives a broad introduction to the structural biology of viral pathogens. Viruses ('infection machines') are the subject of intense interest in large part owing to their direct impact on human health, the food supply, and environment, but also because they provide an outstanding means to explore and understand fundamental biological processes.

Virus structure has evolved to facilitate all stages of the viral life cycle, beginning with recognition and binding to host cell receptors, uptake, genome release, replication, assembly and maturation of progeny viruses, budding/lysis/release, transmission from host to host, and host defense mechanisms (e.g. immune recognition). Hence, structure lies at the heart of understanding the mechanisms by which viral nano-machines infect cells.

The composition and basic structures of viruses will be discussed. This will include viruses that are deemed simple (i.e. spherically or helically symmetric) to those that are complex or pleomorphic. Overviews of some of the primary methods by which structural information on viruses is derived will be given and include transmission electron cryo-microscopy, three-dimensional image reconstruction, electron cryo-tomography, and X-ray crystallography.

GRADING

The course includes two midterms (100 points each) and a comprehensive final exam (200 points).

Students in **CHEM 264** and **BGGN 264** who score highest on the midterms will be offered the choice to give an oral presentation **in place of or in addition to the final exam**. This opportunity will most likely be limited to the 4 students who score highest on Midterm #1 and the 4 students with the highest combined score on both Midterms. These talks will be scheduled during the last four lecture periods of the course. Hence, there are a limited number of slots for these talks, which are by invitation only. **Every student in the class** is expected to attend each presentation and fill out an evaluation sheet. You will receive 15 points credit for each evaluation form you complete. Bonus points will likely be awarded to those who complete a critique for every talk given. More details about the oral presentations will be given approximately midway through the course.

There are **NO MAKE-UP EXAMS** in this class. Only the best score of the two midterm exams will be counted toward your total point score for the course. There will be a few opportunities to earn a limited number of bonus points. Listen carefully for announcements.

CLASS HANDOUTS AND OTHER MATERIALS

Pre-lecture PowerPoint presentations will be posted as PDF files on the UCSD TED website at least 12-15 hours before class and a final version will be posted generally within a few hours after each class. This should reduce the need to take copious notes during lecture and allow you to listen carefully and concentrate on understanding the principles being presented. Most announcements, including any required reading assignments, will be included in the PowerPoint presentations.

In addition to the PowerPoint slides, reading materials (some required and some optional) will be posted as PDF documents on the class TED web site. These provide important supplements to the lectures and are intended to provide a deeper understanding of the topics covered and discussed in lecture. Material presented in class lectures and in the assigned reading will be the primary sources for formulating midterm and final exam questions.

SYLLABUS (Tentative Topics and Schedule)

Date(s)	Lec #	Topic(s)
Mar 31 Apr 2	1,2	Course introduction and overview; The virus life cycle; Classifications of viruses; Virus composition; Principles of protein primary, secondary, super-secondary, tertiary, and quaternary structure; Virus size/mass; Virus morphology/symmetry
Apr 7 Apr 9 Apr 14	3-5	Virus structure: Principles of icosahedral symmetry; Triangulation symmetry; Quasi-equivalence Viruses with helical and mixed symmetries; Pleiomorphic viruses Naked (non-enveloped) versus enveloped viruses DNA versus RNA viruses Genome organization
Apr 14		Optional help session in preparation for midterm exam
Apr 16		Midterm #1 Exam (100 pts) – Covers material through lecture #5 (April 14)
Apr 21 Apr 23 Apr 28 Apr 30 May 5	6-10	Virus structure determination: Basics of transmission electron microscopy (TEM) Specimen preparation and TEM of viruses 3D image reconstruction X-ray crystallography of whole viruses and viral components; VIPER database Cryo-electron tomography of viruses
May 5		Optional help session in preparation for midterm exam
May 7		Midterm #2 Exam (100 pts) – Covers material through lecture #10 (May 5)
May 12 May 14	11-12	Virus assembly and maturation
May 19	13	Virus attachment, entry, and genome delivery
May 21	14	Virus budding, exit, and transmission
May 26	15	<i>Oral presentations by CHEM 264 or BGGN 264 students</i>
May 28	16	<i>Oral presentations by CHEM 264 or BGGN 264 students</i>
Jun 2	17	<i>Oral presentations by CHEM 264 or BGGN 264 students</i>
Jun 4	18	<i>Oral presentations by CHEM 264 or BGGN 264 students</i>
Jun 9		Optional help session in preparation for final exam
Jun 11		Comprehensive final exam (200 pts)

OFFICE HOURS: Tuesday and Thursday 9:45-10:45 am in NSB 4-105

Contact Tim Baker or Kristen Walker for appointments at different times.

READ THIS PART VERY CAREFULLY

- Lectures begin **promptly** at 8:00 a.m. and end as close to 9:20 a.m. as possible to maximize the learning experience of all participants. The time allotted to cover concepts that are likely new to many students is very limited. Being seated and ready to proceed at 8:00 a.m. sharp will minimize disruptions and be appreciated by all. As an added incentive for “early birds”, classes will often be preceded by a few short answer questions (e.g. T/F, or multiple choice, or fill-in blank, etc.) that may reappear verbatim or in slightly modified form on a midterm, or the final exam.
- As obvious as it sounds, come to class well prepared. For example, complete any assigned reading and be ready with questions, especially if something from a previous lecture or in the class notes needs clarification.
- Please turn off all electronic devices (e.g. cell phones, iPhones, iPods, iPads, cameras, etc.) that are **NOT** used for note taking during class. **THANKS !!!**