

BASIC INFO AND SYLLABUS (2016)

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WHERE & WHEN: Solis 104; Tue/Thu 12:30-1:50 pm; March 29 through June 2, 2016.

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).

Eight students in **CHEM 264** and **BGGN 264** who score highest on the first midterm exam will be offered the choice to give an oral presentation **in place of or in addition to the final exam**. 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 student-led oral presentation and fill out an evaluation sheet. You will receive **6 points** credit for each evaluation form you complete. Bonus points will be awarded to those who complete at least seven critiques. 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 TritonEd 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 TritonEd 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 for 2016)

Date(s)	Lec #	Topic(s)
Mar 29 Mar 31	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 5 Apr 7 Apr 12	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 12		Optional help session in preparation for midterm exam
Apr 14		Midterm #1 Exam (100 pts) – Covers material through lecture #5 (April 12)
Apr 19 Apr 21 Apr 26 Apr 28 May 3	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 3		Optional help session in preparation for midterm exam
May 5		Midterm #2 Exam (100 pts) – Covers material through lecture #10 (May 3)
May 10 May 12	11-12	Virus assembly and maturation
May 17	13	Virus attachment, entry, and genome delivery
May 19	14	Virus budding, exit, and transmission
May 24	15	<i>Oral presentations by CHEM 264 or BGGN 264 students</i>
May 26	16	<i>Oral presentations by CHEM 264 or BGGN 264 students</i>
May 31	17	<i>Oral presentations by CHEM 264 or BGGN 264 students</i>
Jun 2	18	<i>Oral presentations by CHEM 264 or BGGN 264 students</i>
Jun 3		Optional help session in preparation for final exam
Jun 6		Comprehensive final exam (200 pts)

OFFICE HOURS: Tuesday and Thursday 2:10-3:10 pm in NSB 4-105

If neither of these office hours times work for you, contact Tim Baker or Amy Tran for a different appointment time.

FINAL (IMPORTANT) NOTES

- Lectures begin **promptly** at 12:30 p.m. and end as close to 1:50 p.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 12:30 p.m. sharp will minimize disruptions and be appreciated by all.
- 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 !!!**