

BASIC INFO AND SYLLABUS (2013)

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WHERE & WHEN: York 4080-A; Tue/Thu 8:00-9:20 am from April 2 through June 6, 2013.

COURSE GOALS

This course gives a broad introduction to the structural biology of viral pathogens. Viruses (sometimes referred to as '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, including those that are 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. These include: X-ray crystallography, transmission electron cryo-microscopy, three-dimensional image reconstruction, and electron cryo-tomography. Other structural methods such as solution X-ray scattering, X-ray fiber diffraction, NMR, mass spectroscopy, and hydrogen-deuterium exchange may also be discussed if time permits.

GRADING

The course includes one midterm (150 points), a comprehensive final exam (300 points), and an undetermined number of brief, in-class quizzes (based generally on the previous class lecture or assigned reading for that class). The quizzes will likely not count more than 100 total points towards the final grade. Some component of each quiz may be awarded as bonus points.

Students in CHEM 264 or BGGN 264 have the option of giving a 25-30 minute oral presentation in place of or in addition to the final exam. These talks will be scheduled during the last four or five lecture periods of the course. Hence, there are a limited number of slots (≤ 10) for these talks and this will be handled on a first-come, first-serve basis. Everyone is expected to attend each presentation and fill out an evaluation sheet to critique the presentation. You will receive 10 points credit for each evaluation form you complete. A minimum number of critiques are required (probably 7): any others will count as bonus points towards the final grade. More details about the oral presentations will be given after the midterm exam is completed.

There are **NO MAKE-UP QUIZZES or EXAMS** in this class.

CLASS HANDOUTS AND OTHER MATERIALS

Lecture PowerPoint presentations are posted on the UCSD TED website as soon as possible after each class. This should minimize the need for frantic note taking 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 but most 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)
Apr 2	1	Course introduction and overview; The virus life cycle; Classifications of viruses; Principles of protein primary (1°), secondary (2°), super-secondary, tertiary (3°), and quaternary (4°) structure
Apr 4	2	Virus structure: Composition; Principles of icosahedral and helical symmetries;
Apr 9	3	Triangulation symmetry; Quasi-equivalence
Apr 11	4	Virus structure: Viruses with mixed symmetries; Pleiomorphic viruses
Apr 16	5	Virus structure: Naked (non-enveloped) versus enveloped viruses; DNA versus RNA viruses
Apr 18	6	Virus structure determination: Basics of transmission electron microscopy (TEM)
Apr 23	7	Virus structure determination: Specimen preparation and TEM of viruses
Apr 25	8	Virus structure determination: 3D image reconstruction
Apr 30	9	Virus structure determination: X-ray crystallography of whole viruses and viral components; VIPER database
May 2	10	Virus structure determination: Cryo-electron tomography of viruses; other structural methods for examining viruses
May 3		Optional recitation session (Help session to prepare for midterm exam)
May 7		Midterm Exam (150 pts) – Covers material through May 2nd lecture
May 9	11	Assembly and maturation of viruses
May 14	12	Assembly and maturation of viruses
May 16	13	Attachment, entry, and genome delivery of viruses
May 21	14	Budding, exit, and transmission of viruses
May 23	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>
May 30	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 6	19	<i>Oral presentations by CHEM 264 or BGGN 264 students</i>
Jun 13		Comprehensive final exam (300 pts)

OFFICE HOURS: Tuesday and Thursday 9:30-10:30 am in NSB 4-105

Call or email Tim Baker or Irene Acosta 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. Unfortunately, York 4080A has only one entrance at the front of the classroom, which almost assures that latecomers will disrupt the 'peace and tranquility' of the lecture. As an added incentive for "early birds", classes will often be preceded by one or more short answer questions (e.g. T/F, or multiple choice, or fill-in blank, etc.) that may be included verbatim or in slightly modified form on a quiz, midterm, or final exam. You may freely discuss these questions amongst yourselves or with the instructor prior to class. They will NOT be posted with the other lecture material on the TED website.
- 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 !!!**