

GENETICS 631-ADVANCED MOLECULAR BIOLOGY I Fall 2019

Lectures: CLASS WILL BE HELD IN THE SECOND FLOOR OF MARSICO

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Instructor for the first block of lectures

Jack Griffith

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Goals: This is a campus-wide graduate level course for students who will be using molecular biology in their thesis work. The purpose is to familiarize the students with classical work as well as important new results in the field. The focus of this fall course is on DNA transactions and the course is coupled with a course in the spring which covers RNA related molecular biology.

Topics: The course (fall) covers DNA structure, telomeres, and chromosomes, DNA recombination, replication, transposition, mutagenesis, repair, and somatic recombination and cellular damage response reactions. Each lecturer will give more detailed outlines.

Schedule: Dr. Jack Griffith (DNA structure): August- September
Dr. Dale Ramsden (DNA function): September- November
Dr. Aziz Sancar (Damage response): November- December

Text/Papers: The course will be entirely based on original papers; therefore, there will be no required text. Entering students are expected to have solid undergraduate training in either molecular genetics or biochemistry. Any one of the following four textbooks could be helpful as sources of background material for the specific areas covered in the course:

The Molecular Biology of the Cell by Alberts et al.
Molecular Cell Biology by Lodish et al.
Genes VIII by Lewin
The Cell by Cooper

The main reading material will be the sets of reviews and papers that will be provided by each instructor. The papers will be posted as PDFs at the Sakai site on the web in the Assigned Papers section.

Format: Lectures will provide reviews of the fields covered. However, the emphasis of the lecture will be on the analysis of scientific papers on the reading lists. Students are expected to have read the relevant papers before coming to class.

Exams: The exams will be based on papers discussed in class. Each instructor will give 1-2 exams and assign a letter grade for his section of the course. The final grade will be the average of the three letter grades given by each instructor.

Code of Conduct: Interactions among students to discuss the lecture topics and analyze the papers is encouraged before exams. The following are not permitted in the exams:

- Discussing the exam questions with other students.
- Direct quotations from papers without attribution.
- Dictating answers to a second person (spouse or friend).
- Turning in the answers after the due date.

Violation of any of these rules is considered dishonorable conduct

SAKAI: We will use Sakai to post announcements and papers in PDF format. To access it , you first need to have an Onyen. Once you have a PID number, you can create an Onyen at <http://onyen.unc.edu>. If you have trouble signing in to Sakai, don't have a PID number, or don't see GNET 631 (or Micro 631) listed as a course, please e-mail the teaching assistants for help.

#1 Aug. 21 Weds Genetic diseases of DNA structure 1
Class notes, G₄C₂ Huang, Goodwin, Swanson and Ranum; GGGGCC
and ALS review, triplet slides

#2 Aug. 23 Friday Genetic diseases of DNA structure 2
Grims and Ranum; new: Ranum 2019 annual review

#3 Aug. 26 Monday Genetic diseases of DNA structure 3
DNA supercoiling
New: Bacterial DNA super coiling in E., coli; Hsieh topo review; ;
supercoiling notes

#4 Aug. 28 Weds DNA supercoiling, R-loops

New papers: Cimprich-- Rloops and damage; 1; Hagerman --R loops
and Frax; ; Cimprich R-loops and transcription; 2; Andrei review; Saige R loops
review

#5 Aug. 30 Friday telomeres 1
Doksani et al; Griffith et al; Telomere review-- Bianchi and Shore
review; Palm and de Lange
slides #1
LABOR DAY MONDAY—no class

#6 Sept 4 Weds telomeres 2
new Arora 2014; Tomaska et al 2019; Cesare, 2018 Mol Cell; Selig, R loops
at telomere

#7 Sept 6 Friday Telomeres summary, Global view of chromatin
Structure of TERT; Kar 2016; new: Lee and Azzalin, all telomere
slides

#8 Sept. 9 Monday Chromatin structure
#9 Sept 11 Weds Chromatin continued, histone code
Andrews and Luger; Germond; all chromatin slides

#10 Sept 13 Friday Mechanics of replication: Cesare talk
Adams; Griffith Science; histone slides; Tyler

#11 Sept 16 Monday Enzymes of replication

New: Steve K Bell and Dutta; Benkovic; DNA rep review, E. coli slides

#12 Sept 18 Weds T7 and T4 replication

McHenry; slides

#13 Sept 20 Friday Herpes replication

Hamdan and Oijen; Lee and Richardson 2011; Nossal 2007; Tanner 2008; Van Oijen review

#14 Sept. 23 Monday Mitochondrial DNA replication

Weller and Coen

New: Nichols, Falkenberg, RITOLS; topos in mt; Gustaffson review ; Larsson