

Biology 423L Syllabus 2011**Laboratory Experiments in Genetics**

Lecture: Monday at 12:00 noon in Wilson Hall 128

Laboratories: **Section 001:** Tuesday at 2:00 p.m. in Wilson room 242
Section 002: Wednesday at 2:00 p.m. in Wilson room 242

Course materials available on Blackboard

Text book: Hartwell et al 4th ed. I strongly recommend buying the text but one copy will be on the text book cart at the reserve circulation desk in the undergraduate library available for two hours at a time. I will also note pages in the syllabus below for the 3rd edition of the same text book, which is also available at the reserve desk.

There is no course pack. All lab protocols, reading lists and most reading materials will be available on blackboard. A new version of the protocol will be available one week before each lab. Print out the protocol, read it carefully and bring it to class.

Instructor: Sarah Grant

Email: sgrant@email.unc.edu

Telephone: 919 962-0684

Office hours: by appointment (email me if you want to set up a meeting). Friday afternoons are optimal.

TA:

Email:

Office hours: by appointment.

TA:

Email:

Office hours: to be announced.

Reports: Due in laboratory period 2 weeks after exercise finished. Penalty for handing in late: 50% off if handed in by 5:00 Wednesday for Section 001 and Thursday for section 002. Otherwise your report will not be graded and your grade will be recorded as 0 points. Exceptions can be made in unusual circumstances by arrangement (email to TA or instructor **before** due date)

Reports will be handed back one week after being turned in. Lab reports will make up 50% of the final grade. They will be graded out of 25 points: 5 for participation, 5 for abstract and introduction, 10 for methods and results and 5 for discussion.

See Course Information on web site for instructions on how to prepare lab reports.

Exams etc: 1 midterm for 15% of final grade.

1 research paper: 10% of final grade
 Final exam 25% of final grade

Syllabus

Date Topic

August 23/24: No labs - classes and labs will start next week

August 29 First Lecture: Mendelian Genetics

Readings for class: Genes, and alleles: Hartwell Chapter 2 pp. 13-27,
 Chi-square test: Hartwell Chapter 5 pp. 127-130,
 Complementation: Hartwell Chapter 7 pp. 225-226.

Aug. 30/31. First lab exercise: Mendelian Genetics using Fast Plants.

Report on Mendelian Genetics due Sept 13/14.

Sept. 5 Labor Day no lecture

Sept . 6/7 Pipetteman and Titration Exercise; Alleles in Yeast.

You will need to come back on day 2 after the lab to check results.

Report on Yeast Alleles due in lab Sept 20/21.

Sept. 12. Mouse Models and Epistasis (research paper goals)

Readings for class: Hartwell Chapter 3 pp. 56-71.

For discussion in class: Bowman et al 1991 Development 112:1-20.
 PDF available on Blackboard.

Sept. 13/14 Epistasis using Mice

Report on Epistasis in Mice due Sept 27/28 in lab period.

Report on Mendelian Genetics due in lab this week.

Start thinking about research paper topics.

Sept. 19 Yeast as a Model System and mutation

Reading: Mutagenesis: Hartwell Chapter 7 pp.208-224,

PDFs on Blackboard:

The Response of Yeast to Radiation

A Closer Look at Biological Consequences of UV exposure

A Closer Look at Repair of DNA

Sept. 20/21 Mutation in Yeast

You will need to come back on day 3 after the lab to check results.

Plant Arabidopsis seeds

Report on Mutation in Yeast due Oct. 4/5 in lab period.

Report on Yeast Alleles due in lab this week.

Sept. 26 Bacterial Genetics: Class

Readings for class: Bacterial Genetics: Hartwell Chapter 15 pp. 543-562,
For discussion in class: Lederberg and Tatum 1946 J. Bact. 53: 673-684. PDF available on Blackboard

Sept. 27/28 Conjugation Lab

You will need to come back on day 3 after the lab to check results.

Report on Conjugation Lab due Oct. 11/12.

Report on Epistasis in Mice due this week.

Oct. 3 *C. elegans* as a Model System and Epigenetics

Readings for class: *C. elegans*: Hartwell Chapter 8 pp. 255-256,
Epigenetics: Hartwell Chapter 18 pp. 665-668, 726-728,
Tabara et al., 1999 Cell 99:123-132,
Verdel et al., 2009 Int. J. Dev. Biol. 53: 245-257,
Eymery et al., 2009 Int. J. Dev. Biol. 53: 259-268.

Oct. 4/5 and 11/12 *C. elegans* Genetics and RNAi

You will need to come back on day 4, day 8 and day 12 after the first lab to continue experiments. This will involve one hour on one weekend day the second week. Times for all returns will be organized by the TA during the lab periods.

Report on *C. elegans* Genetics and RNAi due Oct. 25/26.

Report on Mutation in Yeast due this week (Oct. 4/5).

Oct. 10 Epigenetics

Oct. 11/12 Continue *C. elegans* Genetics and RNAi lab

Research paper topics due Oct. 15, send email to Dr Grant by 5 pm Oct. 15

Report on *C. elegans* Lab due Oct. 25/26

Report on Conjugation Lab due this week.

Oct. 17 Midterm

Oct. 18/19, Nov. 1/2, Nov. 15/16/ *Drosophila* three-point cross.

Oct. 18/19 Transplant Arabidopsis

Report on *Drosophila* three-point cross due Nov. 20/30.

Oct. 24 Three point cross and mapping in humans

Readings for class: *Drosophila*: Hartwell Chapter 20 pp.732-749,
, Sex-linked inheritance: Hartwell Chapter 4 pp. 105-112,
Three point cross: Hartwell Chapter 5 pp. 123-141.

Map based cloning of the gene for Cystic Fibrosis

Readings for class: Cystic fibrosis: Hartwell Chapter 5 pp. 142-143,
Map based cloning in humans: Hartwell Chapter 11 pp. 408-419.
For discussion in class: Pearson 2009 Nature 460; 165-169.

Oct. 25/26 DNA Cloning lab. Run gels, set up ligations and transformations

You will need to come back on day 2 after the lab for about 15 minutes work and on day 3 to check results.

Readings: Hartwell Chapter 9 pp. 303-326.

1-2 page outlines for research papers due October 29, email to Dr. Grant by 5 pm.

Report on DNA Cloning Lab due Nov. 8/9.

Report on *C. elegans* Lab due in lab this week.

Oct. 31 Drosophila as a Model System Guest lecturer: Dr. Bob Duronio

Nov. 1/2 Drosophila Test Cross. Score for sex-linkage or autosomal markers, continue 3-point cross,

Nov. 7 DNA Markers and Forensics

Readings for class: PCR and forensics: Hartwell Chapter 9 pp. 327-330.

For discussion in class:

Lander, E.S, and J.J. Ellis. 1998. Nature 396:13-14,
Forster et al., 1998 1998. Nature 396:13-14.

Nov. 8/9 DNA Markers and Forensics lab.

Reading: Nakamura et al., 1988. NAR 16:9364.

Report on DNA Cloning lab due this week.

Nov. 14. Map Based Cloning in Model Organisms

Readings for class: Physical Mapping of genes: Hartwell Chapter 10 pp. 354-365,
Lukowitz et al., 2000 Plant Physiol. 123;795-805.

Nov. 15/16 Score 3 pt Cross

Report on Drosophila and 3 pt Cross due Nov. 29/30.

Nov. 21. Association mapping for human diseases

Reading for class: Hartwell Chapter 11 pp. 423-425,

Research papers due in class Monday Nov. 22.

No lab this week Thanksgiving

Nov. 28 Map Based Cloning continues

Nov. 29/30` Map Based Cloning lab

Report on Drosophila lab due this week.

Dec. 5 Results of Map Based Cloning Review

Dec. 12 Final Exam

12:00 noon to 3:00 pm
128 Wilson Hall