

**GEORGIA INSTITUTE OF TECHNOLOGY**  
**BIOLOGY 2355 FALL 2008**  
**HONORS GENETICS LABORATORY SYLLABUS**

Labs: Cherry-Emerson (Biology) D104, Aug 18, 2008 - Dec 1, 2008. 1.0 Credits. Section A: M 12:05 - 2:55. Section B: M 3:05 - 5:55.

Instructors: Dr. Francesca Storici (CE 331; 385-3339; francesca.storici@biology.gatech.edu) and Dr. Kirill Lobachev (IBB 2303; 385-6197; kirill.lobachev@biology.gatech.edu)

Teaching assistants: Taylor Updegrave (tupdegrave3@gatech.edu) and Samantha Stuckey (samis21@gatech.edu)

Goal and course description: This course is designed for exceptional students interested in learning important concepts and practical techniques in the field of genetics. Students in the class will carry out actual laboratory experiments on model organisms aimed at exploring aspects of transmission genetics, population genetics, and molecular genetics. Students will also use critical thinking and statistical methods to analyze genetic data. Finally, students will learn to write laboratory reports and keep accurate scientific notes.

Prerequisites: A minimum grade of B in BIOL 1510 or BIOL 1511 and an overall GPA greater than 3.0.

Attendance: Attendance is required for all labs. You must have written confirmation of a legitimate excuse, such as a severe illness, if you miss a lab. **NO EXCEPTIONS!** Your conduct in the course should conform to the Student Honor Code (<http://www.honor.gatech.edu/>). Students caught cheating will be reported to the College for disciplinary action.

Laboratory modules: The laboratory section will consist of four modules that will explore different aspects of genetic analysis in *Saccharomyces cerevisiae*. The modules are:

- (1) Dissection of mutant phenotypes. You will mutate yeast cells using UV light and map the resulting mutations.
- (2) Genetic mapping in the yeast *S. cerevisiae*. You will map the location of genes by studying meiosis in yeast.
- (3) *Delitto perfetto in vivo* site-specific genome engineering. You will introduce specific mutation into a defined genomic locus.
- (4) Mutagenesis using ethyl methanesulfonate (EMS). You will random mutagenize yeast cells chemically by nucleotide substitution.

Assessments: Your grade in lab will come from the four elements described below. Overall, the most stringent scale used for your overall grade will be 90-100% an A, 80-89% a B, 70-79% a C, 60-69% a D, and 59% or less an F. Grades may be adjusted at the discretion of your instructors.

- (1) Two lab reports (40% of your grade). Laboratory reports will be submitted for all of the modules – one for both labs of the first half of the semester and one for both labs of the second half. The reports will consist of sections on the lab objectives, background,

methods, data, and conclusions. Lab reports should be 3-4 pages in length. All reports are due at the start of your lab section on the date indicated on the schedule. Late reports lose 10% credit per day and must be submitted directly to an instructor or a biology office staff member. After the third day, late reports receive no credit.

- (2) Your lab notebook (10%). Your lab notebook should contain neat, organized, and detailed notes each week. Your notebook must include an introduction to each lab, detailed explanations of the methods you used, reasons for conducting particular methods, results of experiments you complete, explanation of analyses, and summaries of conclusions. Lab notebooks will be collected for grading on weeks 8 and 16.
- (3) Two quizzes (40%). The quizzes will test your knowledge on the theory behind the labs. The quizzes will be given during the week 8 and week 16 lab periods.
- (4) Your performance in lab (10%). Your performance will be judged on your activity and care in conducting the laboratory experiments.

**Tentative Lab Schedule:** This syllabus is subject to change! Assessment dates are given in bold.

Week	Lab Dates	Lab Subject	Comments
1	18-Aug	Introduction	Discussion of genetic analysis and laboratory techniques
2	25-Aug	Yeast tetrads/mutation mapping	Replica plating, UV mutation, and cross testers with mutants
3	1-Sep	NO LAB	Labor Day holiday
4	8-Sep	Yeast tetrads/mapping	Isolation of UV mutants using streak-outs and diploid strain selection
5	15-Sep	Yeast tetrads/mapping	Cross isolated colonies with deletion strains and replica plate to sporulation media
6	22-Sep	Yeast tetrads/mapping	Replica plating to assess revertants, tetrad dissection, and allele and mating type testing
7	29-Sep	Yeast tetrads/mapping	Analysis of map distances and scoring of mutants, allele and mating type scoring <b>UV mutagenesis report due; Meiotic mapping report due; First lab quiz; Lab notebook grade for first half</b>
8	6-Oct	Reports/Quiz/Notebook	
9	13-Oct	NO LAB	Mid semester break
10	20-Oct	Delitto perfetto	Yeast transformation with CORE cassette. Oligonucleotide design. Colony PCR gel electrophoresis and replica plating to assess correct CORE integration./ Random genomic EMS mutagenesis.
11	27-Oct	Delitto perfetto/EMS	
12	3-Nov	Delitto perfetto	Analysis of replica plating and transformation with oligonucleotides. Scoring for transformants and streak transformants for single colonies./Counting EMS mutagenized colonies and replica plating.
13	10-Nov	Delitto perfetto/EMS	
14	17-Nov	Delitto perfetto/EMS	Colony PCR, gel electrophoresis and replica plating to score correct CORE replacement with oligonucleotides./Replica plating. Score results of delitto perfetto in vivo mutagenesis. Score results of EMS mutagenesis.
15	24-Nov	Delitto perfetto/EMS	
16	1-Dec	Reports/Quiz/Notebook	<b>Delitto perfetto report due; EMS mutagenesis report due; Second lab quiz; Lab notebook grade for second half</b>

Handouts will be posted on T-Square the week before each lab. Please print out the relevant handout each week and bring it to class.