SYLLABUS: BIOL 2355 Honors Genetics Laboratory, Fall 2013

Sections:  
A: Thursday 12:05-2:55  
B: Thursday 3:05-5:55

Classrooms:  
CE 123 (wet lab) and CE306 (computer lab). See schedule.

Co-requisite:  
BIOL 2354 & BIOL 2355 are co-requisites. You must take both courses simultaneously.

Instructor: Dr. Chrissy Spencer  
Office locations:  
Clough Commons 474D on MWF  
Cherry Emerson A106 on TR

Office Hours: by appointment  
Email: chrissy.spencer@biology.gatech.edu  
Phone: 404 385 0539

TA: Sara Belauret  
Office location: IBB Wing 1B (back office)  
Office Hours: by appointment

Honors Genetics lab Teaching Assistants are graduate students with expertise in genetics research. They are available during office hours and by appointment for up to 2 hours/week outside of class to work with you on material connected to this lab course, including hypothesis generation, experimental design, technical expertise, and science writing. Please respect their other work and research commitments by coming prepared to office hours or other scheduled consultations.

Course Description:  
This course is designed for exceptional students interested in learning important concepts and practical techniques in the field of genetics. This lab is project-based, where students will design and conduct a laboratory experiment aimed at exploring aspects of transmission genetics, population genetics, and molecular genetics using the model organism *Escherichia coli*. We will cover necessary *E. coli* culturing techniques and some general genetics techniques in the first half of the semester. We will explore relevant published literature and hone scientific writing skills in lab notebooks and when constructing lab reports. While this laboratory is the co-required companion to BIOL 2354, your grade in each course is independently earned. This course is 1.0 credit hour. You are expected to work for 3 full hours in lab each week, and for the additional time required to complete your lab prep and assignments.

Course Goals: By the end of this course, you will be able to:
1) Generate genetics hypotheses using a haploid microbial model.  
2) Design experiments and interpret their results using basic statistical analysis.  
3) Create and troubleshoot genetics lab protocols.  
4) Write notebooks and lab reports in the style accepted by genetics scientific journals.  
5) Use appropriate lab safety standards and precautions.

Attendance: 100% attendance is expected. You will work with others to perform experiments and collect data, so there will be no make-up laboratories. If you must miss a laboratory, contact Dr. Spencer as soon as possible—beforehand is helpful. Vacation, work commitments, and social events are not acceptable reasons to miss lab. Examples of legitimate reasons to miss a lab include serious illness, illness or death in your immediate family, and participation in official university activities. You will be required to provide documentation for excused absences. You will not be permitted to make up work for unexcused absences. Persistent tardiness may result in loss of points from your participation grade.
Required Textbooks and materials:
Text: Griffiths et al. Introduction to Genetic Analysis. 10th edition (same as for lecture)
Notebook: You must take notes during lab, and you may use any format you find effective. After lab, your notes will be transferred and formalized into an electronic lab notebook, your formal lab notebook for this course.
Safety: Lab coat (see ‘Lab Safety’ for details)
Other: Close-toed shoes and long pants are required for every lab held in CE123 (wet labs); calculators and laptops (one per group) are useful (you will not be allowed to use your cell phone in lab, even as a calculator).

Evaluation: Your grade will be calculated using the following scale:
- A: ≥ 90.0%
- B: ≥ 80.0% and < 90.0%
- C: ≥ 70.0% and < 80.0%
- D: ≥ 60.0% and < 70.0%
- F: < 60.0%

Points will be based on the following:
- Pre-Lab Quizzes (5–10) 10%
- Participation 10%
- Lab Notebooks 25%
- Lab Reports (3) 30%
- Group Project
  - Project Plan 10%
  - Presentation 10%
  - Group evaluation 5%

Quizzes: T-square quizzes will be taken prior to lab in some weeks. Quizzes will be announced by email on Monday and are due Wednesdays by noon. Each quiz will assess your understanding of the week’s lab material and/or your progress to date on your project. Late submissions will be flagged for penalty; submissions will not be accepted after the beginning of the lab period. If you miss a quiz due to an unexcused absence from lab, you will receive a zero for that quiz. Each quiz is weighted equally. Upon on-line submission, you should receive a T-square submission email; please save this as evidence in case of submission error. It is the students responsibility to retain email evidence that each quiz was received.

Lab Notebooks: Your lab notebook will be maintained electronically. Your e-notebook should include an introduction to each experiment, detailed explanations of the methods you used, reasons for conducting particular methods, results of experiments you complete, explanation of analyses, and summaries of conclusions. Experiments may span multiple weeks—it’s rare to set-up and analyze an experiment in the same day, and your notebook should describe the beginning, middle, and end of each experiment. Lab e-notebooks should be updated within 24 hours of lab and will be monitored and commented on regularly, and graded periodically. Your notebook will be graded on content, accuracy, and completeness according to the rubric in the lab manual. A thorough lab notebook will be critical to write accurate lab reports. In your notebook, you must write in your own words, even if you are working with a team on the experiment. The only exceptions to this are:
• team-devised protocols,
• data, which should be proofread carefully, and
• tables and figures. These may be shared within your team but should be critically examined for accuracy.

Anything you write in your lab notebook may be used word-for-word in your lab report.

Reports: All lab reports are team assignments. Experimental design and lab work are completed collaboratively, and the write-up of that work is also a team effort. Strong and cohesive reports are better generated through collaborative writing sessions rather than a “divide-and-conquer” approach. Every component of the lab report, including tables and figures, should be generated by the report’s authors; text from any team member’s lab notebook is allowed in that team’s lab report. Reports are due at the beginning of lab and should be submitted as both a paper copy in lab and as a pdf on the T-square “Assignments” menu. “Instructions for authors” are available on t2 and will be handed-out in class. Assignments due dates are provided in the schedule below. A late assignment will be reduced one letter grade (10%) for 24 hour period that it is late. All authors agree to accept the same grade for each report.

Lab Safety: Georgia Tech has recently revised its policy regarding appropriate clothing in laboratories where chemicals and organisms are used or manipulated. **Students not conforming with the following requirements will be asked to leave the lab** and may not return without appropriate clothing:
1. **Long pants** must be worn in the laboratory.
2. **Close-toed shoes** that cover the sides and top of the foot must be worn in the laboratory.
3. **Lab coats** must be worn when working at the bench. Students are responsible for keeping their lab coats in good condition and reasonably clean so as not to create a hazard. Lab coats must be 100% cotton and cover the wearer to the knees.
4. **Safety glasses** must be worn when working at the bench. Safety glasses must have side shields for splash protection and conform to the wearer’s face. Glasses must be worn over prescription glasses and contact lenses. Safety glasses will be made available for your use in the lab.

More complete laboratory safety policies for Genetics Lab are described below and will be discussed on the first day of lab.

**Academic Integrity:** Academic dishonesty will not be tolerated. This includes cheating, lying about course matters, plagiarism, stealing classroom materials, or helping others commit a violation of the Honor Code. Students are reminded of the obligations and expectations associated with the Georgia Tech Academic Honor Code and Student Code of Conduct, available online at www.honor.gatech.edu. While students will collaborate in performing the experiments and collecting the data, each student is expected to write his or her own lab reports, including creating his or her own tables and figures. Plagiarism includes reprinting the words or ideas of others without citation. As direct quotes are seldom used in scientific writing, you are expected to rephrase the words of others and provide the citation. If this is unclear, please ask your TAs for help as you write your lab notebook entries and lab reports before turning in your assignment.

**Learning Accommodations:** If needed, we will make classroom accommodations for students with disabilities. These accommodations must be arranged in advance and in accordance with the ADAPTS office (http://www.adapts.gatech.edu).
**Schedule: Honors Genetics Lab, Fall 2013** --This schedule is subject to revision. NOTE: A lab report worth 10% of your course grade is due during Dead Week.

<table>
<thead>
<tr>
<th>Lab</th>
<th>Date</th>
<th>Where</th>
<th>Topic</th>
<th>Due for lab</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>22-Aug</td>
<td>CE 123</td>
<td>Aseptic Technique &amp; Intro to E coli</td>
<td>For lab: Read Jeong et al 2009 for lab Friday noon: Lab notebook blog set up &amp; first entry</td>
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<tr>
<td>2</td>
<td>29-Aug</td>
<td>CE 123</td>
<td>Characterizing E coli B strain</td>
<td>Read Spencer et al 2007 for lab</td>
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<tr>
<td>3</td>
<td>5-Sep</td>
<td>CE 123</td>
<td>Characterizing E coli B strain</td>
<td>Read Le Gac et al 2008 for lab Friday noon: Notebook check for Lab sessions 1–3</td>
</tr>
<tr>
<td>4</td>
<td>12-Sep</td>
<td>CE 306</td>
<td>Identify candidate genes using microarray data</td>
<td>For lab: Familiarize yourself to the &quot;Le Gac Significant Genes table.xls&quot; on T-square before lab</td>
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<tr>
<td>5</td>
<td>19-Sep</td>
<td>CE 306</td>
<td>Candidate gene primer design</td>
<td>Before you leave lab: Email candidate gene, primer sequences, &amp; PCR product length to <a href="mailto:chrissy.spencer@biology.gatech.edu">chrissy.spencer@biology.gatech.edu</a></td>
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<td>6</td>
<td>26-Sep</td>
<td>CE 123</td>
<td>Candidate gene PCR</td>
<td>Lab Write-up 1: Characterization of E coli B strains Methods &amp; Results (due in lab and on T-square)</td>
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<td>7</td>
<td>3-Oct</td>
<td>CE 123</td>
<td>Electrophoresis Project planning (1)</td>
<td>Before you leave lab: Email project question to Dr. Spencer Friday noon: Notebook check for Lab sessions 4–7</td>
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<tr>
<td>8</td>
<td>10-Oct</td>
<td>CE 123</td>
<td>PCR to test hypotheses Project planning (2)</td>
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<td>9</td>
<td>17-Oct</td>
<td>CE 123</td>
<td>PCR data analysis Report Results Project planning (3)</td>
<td>Friday noon: Project Plan due by email to <a href="mailto:chrissy.spencer@biology.gatech.edu">chrissy.spencer@biology.gatech.edu</a></td>
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<td>10</td>
<td>24-Oct</td>
<td>CE 123</td>
<td>Plasmids and insert expression 1</td>
<td>Before Friday noon: Schedule a group meeting with Dr. Spencer</td>
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<tr>
<td>11</td>
<td>31-Oct</td>
<td>CE 123</td>
<td>Plasmids and insert expression 2</td>
<td>Friday noon: Notebook check for Lab sessions 8–11</td>
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<tr>
<td>12</td>
<td>7-Nov</td>
<td>CE 123</td>
<td>Project Day 1</td>
<td>Lab Write-up 2: PCR to detect mutations in a candidate gene (due in lab and on T-square)</td>
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<tr>
<td>13</td>
<td>14-Nov</td>
<td>CE 123</td>
<td>Project Day 2</td>
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<tr>
<td>14</td>
<td>21-Nov</td>
<td>CE 123</td>
<td>Create group presentation Project Presentations</td>
<td>Friday noon: Notebooks due</td>
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<td>28-Nov</td>
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<td>NO LAB – Thanksgiving</td>
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<td>-</td>
<td>5-Dec</td>
<td>-</td>
<td>NO LAB – Dead Week</td>
<td>Tuesday noon: Lab Write-up 3: Plasmids and insert expression (due in Dr. Spencer's mailbox in BioHub &amp; on T-square)</td>
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