Syllabus: BIOL 3381 Microbiology Laboratory, Fall 2013

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

Classroom: Cherry Emerson D104 (ground floor, SW corner of the building)
Co-requisite: BIOL 3380 is a required co-requisite (or pre-requisite, with instructors permission) of BIOL 3381.

Instructor: Dr. Chrissy Spencer  TA: Yusuf Uddin
Office locations:  Email: yuddin3@gatech.edu
               Clough Commons 474D on MWF  Office location: Cherry Emerson 128
               Cherry Emerson A104 on TR
Office Hours: by appointment  Office Hours: Wednesday 3-5 pm
Email: chrissy.spencer@biology.gatech.edu
Phone: 404 385 0539 (no voice mail)

Microbiology lab Teaching Assistants are graduate students with expertise in microbiology 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:
Microbiology Lab is a 1 credit hour course designed to emphasize modern microbiological techniques and experimental design. To do this, we will explore the soil bacterium Pseudomonas aeruginosa and its production of the virulence factor pyocyanin. This laboratory is formatted as a guided-inquiry course, meaning that students will learn to develop their own scientific protocols for the lab. Before each lab, students are expected to locate, download, and read a set of assigned papers from the primary literature and complete a pre-lab exercise online. In lab, students will work with a partner or small group to define a question, develop a protocol, and conduct the relevant experiment. As the semester progresses, students will have more freedom to develop independent experiments based on the learned techniques, and a careful reading of the scientific literature.

Course Goals: By the end of this course, you will have:
1) learned to read and interpret protocols & findings from the primary literature
2) created protocols from the primary literature to analyze microbiology problems.
3) conducted relevant microbiology protocols and analyze the results.
4) practiced record-keeping for research in a format that meets the industry best-practices for lab notebooks, including a detailed question, protocols, results, and conclusion.
5) communicated scientific findings in a relevant format for journals regulated by the American Society of Microbiology.

Required materials:
Three-ring binder to maintain lab handouts and materials neatly and in order for reference.
Lab coat (see ‘Lab Safety’ for details)
Close-toed shoes and long pants are required for every lab
Calculators and laptops (one per group) are useful. (You will not be allowed to use your cell phone in lab, even as a calculator).
**Attendance:** 100% attendance is expected. You will work with others to perform experiments and collect data, so there is no possibility for make-up laboratories. If you must miss a laboratory, contact Dr. Spencer as soon as possible—beforehand preferably. 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. Students will be required to provide documentation for excused absences. Students will not be permitted to make up work for unexcused absences. Persistent tardiness may result in loss of points from a student’s participation grade.

**Evaluation:** Your grade will be calculated using the following scale:

- **A:** $\geq 90.0\%$
- **B:** $\geq 80.0\%$ and $< 90.0\%$
- **C:** $\geq 70.0\%$ and $< 80.0\%$
- **D:** $\geq 60.0\%$ and $< 70.0\%$
- **F:** $< 60.0\%$

Points will be based on the following:

- Pre-Lab Quizzes 10%
- Participation 10%
- Lab Notebooks
  - Protocols 15%
  - Expt summary 10%
  - Updated on time 5%
- Lab Reports 20%
- Final Report 20%
- Team Reflection & Evaluation 10%

**Quizzes & Participation:** T-square quizzes will be taken prior to lab in some weeks. Quizzes will be announced by email on Friday and are due **Mondays by noon.** Each quiz will assess your preparation to participate in the week’s lab. Late submissions will be flagged for grade penalty; submissions will not be accepted after the beginning of the lab period. If you fail to clean your station, leave lab early without finishing your work, or have an unexcused absence, your weekly quiz will not be graded and a score of "0" will be recorded. 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 student’s responsibility to confirm that each quiz was received.

Your active participation in lab will be monitored by the instructors. Conducting science is not a passive activity; successful science requires your attention and the cooperative effort of a group of researchers. Evidence of incomplete contributions during lab and to lab assignments will lower your participation grade.

**Lab Notebooks:** Your lab notebook will be maintained electronically. Your e-notebook should include the question being addressed, background material or explanation of why an experiment is being conducted, detailed protocols for the methods you used, reasons for conducting particular methods, results of experiments you complete, explanation of analyses, and conclusions. Experiments may span multiple weeks—it’s rare to set-up and analyze an experiment in the same day; however, a complete entry in 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 essential 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 provided for your use in the lab.

More complete laboratory safety policies for Microbiology Lab 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: Microbiology Lab, Fall 2013 –This schedule is subject to revision.

<table>
<thead>
<tr>
<th>Lab</th>
<th>Date</th>
<th>Topic</th>
<th>Due at beginning of Lab</th>
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<tbody>
<tr>
<td>1</td>
<td>20-Aug</td>
<td>Hands-on Microbiology: Plating, Aseptic technique, Gram staining</td>
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<td>2</td>
<td>27-Aug</td>
<td>Following an existing protocol: Isolation, Cultivation and Visualization of Bacteria</td>
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<tr>
<td>3</td>
<td>3-Sep</td>
<td>Revising an existing protocol: Isolation of Bacteria from Soil</td>
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<td>4</td>
<td>10-Sep</td>
<td>Planning the next experimental step: Isolation of Bacteria from Soil</td>
<td>Revised protocol from Lab 3 due from each student (one copy)</td>
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<td>5</td>
<td>17-Sep</td>
<td>Creating a protocol from published sources: Identification of Unknown Soil Bacterium</td>
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<tr>
<td>6</td>
<td>24-Sep</td>
<td>Experimental work to identify <em>Pseudomonas</em></td>
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<td>7</td>
<td>1-Oct</td>
<td>Experimental work to identify <em>Pseudomonas</em> Peer-review of Report</td>
<td>Draft outline for comments (two from your group)</td>
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<td>8</td>
<td>8-Oct</td>
<td>Experimental work &amp; Clean-up</td>
<td>Team Report (one copy per group member)</td>
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<td>-</td>
<td>15-Oct</td>
<td>NO LAB - Fall Break</td>
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<tr>
<td>9</td>
<td>22-Oct</td>
<td>Planning the next experiments: Pyocyanin in <em>Pseudomonas aeruginosa</em></td>
<td>Revised Report (one copy)</td>
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<tr>
<td>10</td>
<td>29-Oct</td>
<td>How can we use PCR to detect is a strain can synthesis phenazine?</td>
<td>Team protocol for this lab due at beginning of lab (one copy)</td>
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<tr>
<td>11</td>
<td>5-Nov</td>
<td>How can bacterial transformation help determine what specific genes do?</td>
<td>Draft outline for comments (two from your group)</td>
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<tr>
<td>12</td>
<td>12-Nov</td>
<td>How can we show that pyocyanin functions as an antibiotic? A Pathogen?</td>
<td>Draft outline for comments (two from your group)</td>
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<tr>
<td>13</td>
<td>19-Nov</td>
<td>Experimental work Peer-review of Report</td>
<td>Team Report (one copy per group member)</td>
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<tr>
<td>14</td>
<td>26-Nov</td>
<td>Clean-up</td>
<td>Revised Report (one copy)</td>
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<td>-</td>
<td>3-Dec</td>
<td>NO LAB - Dead Week</td>
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