

BIOL 3381: Intro Microbiology Lab

Fall Semester 2014

Section A: Tuesday 12:05-1:55, Thursday 12:05-12:55

Location: CE 330

Section B: Tuesday 3:05-4:55, Thursday 3:05-3:55

Location: CE 330

Instructors

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TAs

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Lab Tech

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Overview

This lab is designed to explore commonly used microbiological techniques, such as culturing microorganisms, conducting microbial isolation techniques, staining, identifying various biochemical properties of different organisms, polymerase chain reaction (PCR), DNA isolations, genetic complementation, bacterial conjugation, transformation, and transposon mutagenesis.

Prerequisites

Biological Principles ([BIOL 1510](#)) or Honors Biological Principles ([BIOL 1511](#)) are required background, as well as Organic Chemistry I ([CHEM 2311](#)).

Corequisite

Intro Microbiology lecture ([BIOL 3380](#)).

BIOL 3381 is a "separate course" that cannot be taken independent of lecture.

Course Learning Outcomes

By the end of this course, you will be able to...

- Use tools and equipment common in microbiology and molecular biology labs accurately and safely.
- Interpret data obtained in experiments and express results in the form of a written laboratory report.
- Transfer and culture bacteria in liquid and on solid growth medium using aseptic technique.
- Prepare, observe, and interpret stained bacterial slides using a compound microscope.
- Isolate and identify various bacteria using differential media and biochemical testing, and PCR.
- Explain how bacteria sense and respond to their environment by changing their gene expression.
- Perform mutagenesis experiments that alter bacterial DNA and result in changes in behavior.
- Describe how recombinant DNA technology involves restriction and ligation of DNA molecules.
- Analyze DNA sequence with analysis software.

Resources

- Lab exercises will be made available prior to each lab via the T-square site
- Additional resources such as research papers may also be posted at T-square
- T-square (<http://www.tsquare.gatech.edu>)

Evaluation/Grading

- In-class quizzes 40%
- Lab reports 40% (four reports, 10% each)
- Final lab report 20%

Quizzes

Short quizzes will be administered by the TAs typically at the beginning of lab and will cover material from the week of the quiz, and potentially from prior weeks. There are no “make-up” quizzes. To allow for university excused absences, you will be allowed 1 dropped quiz grade. If you fail to clean your station, leave lab early without finishing your work, or fail to come to a lab session, your weekly quiz will not be graded and a score of "0" will be recorded.

Written Lab Reports

After the completion of each group of experiments indicated in the schedule, each student should prepare a lab report in the style of a scientific journal article. Grades for reports submitted late will be lowered by 10% for each day past the due date. You will be allowed to drop one lab report (but not the Final Report).

Each lab report should include:

- Abstract: concise summary of rationale, design and results of experiment (2-3 sentences).
- Introduction: provides adequate background to enable a biologist to understand why you did the experiment. This should include the hypothesis.
- Materials and Methods: concise summary of experimental procedures (should not read like a cookbook).
- Results: written and graphical representation of the results.
- Discussion: analysis of the results and conclusions drawn.
- References: when applicable.

Academic Integrity and the Honor Code

Students are reminded of the obligations and expectations associated with the Georgia Tech Academic Honor Code and Student Conduct Code, available on-line at:

<http://www.osi.gatech.edu/>

Learning Accommodations

Classroom accommodations will be made for students with disabilities to participate fully in the course activities and meet course requirement. These accommodations must be arranged in advance in accordance with the ADAPTS office:

<http://adapts.gatech.edu>

Tentative Schedule

Dates	Experiment
Aug 26-28	Lab introduction Lab 1 – Isolation, cultivation and staining
Sept 2-4	Lab 2 - Isolation of <i>Pseudomonas</i> species from soil Lab 3 - Nutritional requirements
Sept 9-11	Lab 2 continued -Isolation of <i>Pseudomonas</i> species from soil (II) Lab 4 – Biochemical Activity Report 1 due Sept 9
Sept 16-18	Lab 2 continued – Isolation of <i>Pseudomonas</i> species from soil (III) Lab 4 continued – Biochemical Activity
Sept 23-25	Lab 5 - PCR of <i>phzF</i> gene Report 2 due Sept 23
Sept 30-Oct 2	Lab 6 - Plasmid DNA isolation and cultivation and transformation of mutant <i>Pseudomonas</i> strains
Oct 7-9	Lab 7 – UV Radiation Damage and Repair
Oct 14-16	NO LAB – FALL BREAK (OCT 11 – 14) Report 3 due Oct 16
Oct 21-23	Lab 8 – <i>Vibrio harveyi</i> quorum sensing and signal transduction
Oct 28-30	Lab 9 – Transformation of <i>E. coli</i> with a <i>lacZ</i> reporter gene fusion
Nov 4-6	Lab 10 – Transposon mutagenesis of <i>E. coli</i> , blue/white screening Report 4 due Nov 4
Nov 11-13	Lab 11 – Genomic DNA prep, digestion/ligation of genomic DNA
Nov 18-20	Lab 12 – Transformation of <i>E. coli</i> with ligation
Nov 25	Lab 13 – Miniprep transformants, sequence transposon junction
Dec 2-4	Lab 14 – Sequence analysis and determination of Tn insertion site
Dec 9	Final Report due Dec 9

<u>Report</u>	<u>Due date</u>	<u>Labs</u>	<u>Description</u>
1	Sept 9	1 and 3	Isolation, cultivation, staining, and nutritional requirements
2	Sept 23	2 and 4	Isolation of <i>Pseudomonas</i> from soil and biochemistry
3	Oct 7	5-7	Molecular characterization of <i>Pseudomonas</i>
4	Nov 4	8-9	<i>V. harveyi</i> quorum sensing, and cell signaling
Final	Dec 9	10-14	<i>E. coli</i> mutagenesis and screen