Small World: Crowdsourcing the Discovery of Antibiotics
BIOSC 0067 Research Lab  ♦ Fall 2016
SYLLABUS (PART 1)

<table>
<thead>
<tr>
<th>LAB SECTION</th>
<th>DAY/TIME (G15 CLAPP HALL)</th>
<th>INSTRUCTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 27397</td>
<td>Mon. &amp; Wed. 11:00 AM-12:50 PM</td>
<td>Ms. Jean Schmidt</td>
</tr>
<tr>
<td>Section 27400</td>
<td>Tue. &amp; Thur. 2:00 PM-3:50 PM</td>
<td>L04 Clapp Hall</td>
</tr>
<tr>
<td>Section 27398</td>
<td>Mon. &amp; Wed. 2:00 PM-3:50 PM</td>
<td>Dr. Elia Crisucci</td>
</tr>
<tr>
<td>Section 27399</td>
<td>Tue. &amp; Thur. 11:00 AM-12:50 PM</td>
<td>L06 Clapp Hall</td>
</tr>
<tr>
<td>All Students</td>
<td>Friday 1:00-4:00PM (optional open lab)</td>
<td>Jean and/or Elia</td>
</tr>
</tbody>
</table>

LAB MANUAL AND OTHER MATERIALS
The Lab Manual for the course will be provided. A spiral-bound Lab Notebook with carbonless copy pages (ISBN 978-1-930882-35-5) is required and is available in the Bookstore. You will also need:
- 1” or 1.5” 3-ring binder to compile the Student Research Guide with Protocols
- USB drive (thumb drive) for image capture

COURSE DESCRIPTION
A new alternative to BIOSC 0060, this second semester Introductory Biology Lab course will engage you in research on soil microbes and antibiotic discovery. Currently, the antibiotic development pipeline has slowed to a trickle and many of the antibiotics currently in use are losing efficacy due to the development of antibiotic resistance in pathogens. This health crisis drives the research you will perform in this laboratory course. You will isolate antibiotic-producing bacteria from soil collected on the University of Pittsburgh campus, characterize the producers and extract their metabolites, while contributing your findings to a database shared by a network of student researchers across the country.

COURSE OBJECTIVES
Throughout this course, you will be able to:
- practice scientific skills: question, probe, reason quantitatively, be skeptical, refute your own ideas, hold an open mind, be creative
- use current methodology in carrying out a scientific research project
- follow good laboratory practices: safety, lab notebook, read and think before you do
- observe: increase awareness of surroundings, detect patterns, ask questions
- experiment: design experiments, write hypotheses and make predictions, change variables, use controls, test models
- analyze data: organize data and assess results
- present findings: create figures and a final poster, deliver oral presentations

Students will work in diverse collaborative teams in lab, gain an appreciation of the value of team work in science, demonstrate cultural sensitivity in their interactions with team members, and promote an open exchange of ideas in an inclusive learning community.
PREREQUISITES
This course is considered equivalent to BIOSC 0060. Prerequisites: BIOSC 0050 and BIOSC 0160, with a grade of C (not C-) or better in both courses.
A grade of C or above in this course is required for most majors, including biology majors. Successful completion of this course will prepare you for upper division laboratory courses in the biological sciences.

STUDENT GRADES
Your grade in the course will be based on assignment and lab notebook scores. You will also produce and present a team poster at the end of the course to communicate your findings during the semester-long project. You will be evaluated in each of these three categories: Lab Notebook entries, Lab Assignments, Poster/Poster Presentation. Each category will comprise one third of your final grade.

OFFICE HOURS
Contact your instructor directly to set up an appointment. See contact information on p.1.

OPEN LAB TIMES
Lab is open on Friday afternoons from 1-4 PM to provide extra time for students to work on projects outside of regularly scheduled lab sessions. You may use this time to practice and refine your lab skills, to finish work that you did not have time to complete during lab, or to carry out extra work on your project. You may attend these extra sessions regularly or occasionally, as your interest and project progress warrant.

COURSE REQUIREMENTS
Attendance: You must attend all laboratory sessions at the time scheduled for your section. Each laboratory section meets twice per week for one hour and fifty minutes. Participation in each lab session for the entire period is mandatory to maintain the flow of the research project.

Late/Attendance Policy: Missing any lab or part of a lab results in grade penalty. In addition to grade penalty for absence or tardiness, you will lose the opportunity to earn credit for accompanying assignment. You must participate in a lab session in order to be eligible to turn in accompanying assignment.

Penalty for tardiness or absence:
First late arrival (after start of lab) - no penalty
First absence (IF made up during that week’s open lab) - no penalty

Beyond first instance, point penalties will accrue as follows AND you are still expected to advance your project during open lab for the week in question:

a. 2% deducted from final course grade for each late arrival (or leaving early)
b. 4% deducted from final course grade for each absence

Note:

a. Open lab is not the same as attending class. Open lab provides extra time and support for carrying out your research, but lacks the benefits to you of class instruction and discussion of results.
COURSE REQUIREMENTS (continued)

Late/Attendance Policy (continued):

Note:
   b. Being late or absent does NOT alter due dates for assignments; point penalties accrue for assignments not turned in at beginning of lab on date due. It is always fine to submit work prior to due date.

The only acceptable reasons for missing lab involve serious illness or personal trauma, or participation in certain University-sanctioned events (i.e. band, athletics, etc.). University events DO NOT include fraternity or sorority events.

   IF you miss a lab, you MUST:
   1. Contact your instructor immediately or as soon as possible via email.
   2. DO NOT wait until the day following the lab that you miss and do not wait until the next lab session to contact your instructor.
   3. Provide appropriate documentation for your absence (i.e. a doctor’s note or record of visitation to Student Health).

If a student accumulates more than 2 absences, he or she is encouraged to withdraw from the course because successful completion (i.e. a passing grade) is then unlikely.

Preparation and Participation – You are expected to come to lab on time, having read the lab material before class, so that you will be ready to participate fully. Your participation during experiments, data collection and group discussion is essential for optimum lab team function, and will help you get the most from this course.

CourseWeb – Access CourseWeb via http://courseweb.pitt.edu
Use the following menu items to access the required information and materials for this course: Announcements, Syllabus (2 Parts), Course Documents, and Supplemental Materials, including links to online videos. Check CourseWeb often.

Assignments – Assignments are due at the beginning of lab as shown on the course schedule. Although you will work collaboratively as part of a team in lab, and we strongly encourage scientific discussions with your peers, your assignments must be your own work, completed independently. Only certain specially designated assignments will be completed as teamwork and these will be clearly indicated.

   Penalty for Late Assignments: Assignments are considered late if they are turned in after class starts.
   • Late assignments will be docked 10% if turned in after lab begins on the date due.
   • Late assignments will be docked 20% if turned in by 5PM on the day following due date.
   • If more than 2 days late, no credit will be given.

Pre-lab Reading – You are expected to read designated background material before coming to lab to help you prepare for designing and carrying out experiments. In addition to pre-lab reading, videos will also occasionally be assigned to support your pre-lab preparation.

In addition to the reading and videos assigned as pre-lab preparation (see Course Schedule), you will find the Lab Manual lists many supplemental references at the end of each chapter.
Seeking out these additional resources will enhance your background knowledge, supporting your ability to make significant contributions to this research project. We encourage you to read widely and to share with us any additional resources that you discover.

**Laboratory Notebook** – Each student must keep a bound notebook with copy pages in which to plan experiments and record notes and data. Documenting your work in the laboratory is an essential part of developing your skills as a scientist. **Although you will work collaboratively as part of a team in lab, and we strongly encourage scientific discussions with your peers, your lab notebook must be your own work, completed independently.** You are expected to prepare your lab notebook before coming to lab, based on each day’s pre-lab reading and the guidance provided in the Student Research Guide chapters on CourseWeb.

**Project Poster** – You will design and present a final poster on your research.

**COURSE POLICIES**

**Accommodations for Students with Disabilities** – If you have a diagnosed disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Office of Disability Resources and Services, 140 William Pitt Union, (412)648-7890 / (412)624-3346 (FAX), at the start of the semester. DRS will verify your disability and determine reasonable accommodations for this course.

**Academic Integrity** – Cheating / plagiarism are regulated by university policy and will not be tolerated. Students suspected of violating the University of Pittsburgh Policy on Academic Integrity, from the February 1974 Senate Committee on Tenure and Academic Freedom reported to the Senate Council, will be required to participate in the outlined procedural process as initiated by the instructor. The minimum sanction will be a zero score for the work, with written notice to the Dean of Undergraduate Studies in Arts and Sciences.

View the complete policy at [www.cfo.pitt.edu/policies/policy/02/02-03-02.html](http://www.cfo.pitt.edu/policies/policy/02/02-03-02.html).

Academic dishonesty includes copying from another student, letting another student copy from you and giving or receiving information about a quiz or exam to/from a student who has not taken that quiz or exam.

Plagiarism is using someone else’s ideas as your own in your assignments. When an assignment is to be done independently, that prohibits working side-by-side with someone, even if you are both writing or typing with your own hands. In fact, working in this manner violates academic integrity standards as well as the purpose of the assignment. It places you at high risk of penalty, since the line between your thoughts and ideas and those of your peers becomes indistinguishable. If you use a particular source to find an answer to a question, you need to read the source for understanding and then write in your own words, citing the source. You do not avoid plagiarism just by changing a few words or lines in someone else’s work and then pretending it’s yours. Plagiarism is a serious offense and can result in failure of the assignment, failure of the course, and even dismissal from the University.

Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see your instructor before the assignment is due to discuss the matter.
COURSE POLICIES (continued)

Turnitin - Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of Turnitin.com page service is subject to the Usage Policy and Privacy Pledge posted on the Turnitin.com site.

E-mail Communication – Each student is issued a University e-mail address (username@pitt.edu) upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g. Gmail, Yahoo).

Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address.

To forward e-mail sent to your University account, go to http://accounts.pitt.edu, log into your account, click on Edit Forwarding Addresses, and follow the instructions on the page. Be sure to log out of your account when you have finished. (For the full E-mail Communication Policy, go to www.bc.pitt.edu/policies/policy/09/09-10-01.html.)

Audio/Video Recording - Students may not record lab lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student’s own private use.

UNIVERSITY RESOURCES

• Office of Disability Resources and Services (DRS) provides support and services to assist students, with learning and physical disabilities. Such disabilities may include: visual impairment, auditory impairment, mobility impairment, and learning disabilities.140 William Pitt Union, (412) 648-7890. http://www.studentaffairs.pitt.edu/drsabout

Do not hesitate to contact the counselors at this extremely helpful office if you think that you need additional assistance. Office Hours are M-F 8:30AM to 5PM.

• Academic Resource Center (ARC) provides programs to help students develop the skills, strategies and behaviors of confident, independent, and active learners. Find help with math, study skills and reading. Room G-1 Gardner Steel Conference Center (412) 648-7920. http://www.asundergrad.pitt.edu/offices/arc/index.html

• Writing Center provides tutorial help with all types of writing. Appointments are recommended. 317B O'Hara Street Student Center, 4024 O'Hara St. (412)624-6556. http://www.composition.pitt.edu/writingcenter/index.html

• Math Assistance Center provides help with all math in room 215 O’Hara Street Student Center, 4024 O’Hara Street. http://www.mathematics.pitt.edu/about/math-assistance-center
# Small World: Crowdsourcing the Discovery of Antibiotics

*Foundations of Biology 2 Laboratory – Research Lab (BIOSCI 0067)*

**Fall 2016 SYLLABUS, PART II - COURSE SCHEDULE**

Laboratory Notebook entries are to be completed independently of other students and will be collected regularly in lab. Assignments in the course are also to be completed independently, except where specifically indicated. Refer to individual assignment instructions for guidance. This schedule is tentative and subject to change based on progress of experiments.

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Lab Activity</th>
<th>Assignment(s) Due at the beginning of lab</th>
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</table>
| 1    | Aug. 29-Sept. 2 | 1. Introduction to Course  
2. Safety  
3. Tools of the Trade  
4. Devise strategy to isolate microbes from soil  
5. Implement strategy to isolate microbes from soil (Experiment 1) | PURCHASE: lab notebook with carbonless copies from Bookstore (ISBN # 978-1-930882-35-5)  
ASSIGNMENT: Watch Frontline episode online: *The Trouble With Antibiotics*  
Print and bring completed Student Information Form (See CourseWeb)  
READ: Student Research Guide Section 1 (Living in a Bacterial Planet)  
ASSIGNMENT: Set up *Student Research Guide Binder*, up to and including Sec.1  
View Micropipette Tutorial (See CourseWeb)  
LAB NOTEBOOK: Set up for Experiment 1 (Isolation of Soil Microbes) |
| 2    | Sept. 7-9 (no class Sept. 5-6) | 1. Lab sessions will not be held on Mon. and Tues. due to Labor Day Holiday  
2. View and record results from Experiment 1  
3. Perform compositional analysis on student-collected soil samples (Experiment 2A) | READ: Notebooks Shed Light on an Antibiotic’s Contested Discovery.  
**Student Research Guide Section 2 (More Than Just “Dirt”)**  
ASSIGNMENT: Watch online PhD Comics video: *The Search for Antibiotics*  
Bring soil sample to Lab Session #3 (keep refrigerated)  
Add *Research Protocols* to *Student Research Guide Binder*(CW)  
View Instructional Video: Soil Texture Typing (CW)  
LAB NOTEBOOK: Set up for Experiment 2 (Soil Sample Collection)  
Set up for Exp. 2A (Soil Physical & Chemical Characterization) |
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| 3    | Sept. 12-16 | 1. Pre-Course Survey  
2. Finish soil analysis  
3. Prepare for Experiment 3: Micropipette Calibration  
4. Prepare for Experiment 3: Serial Dilution Practice  
5. Culture soil-LB Agar (Exp.3) | READ: Student Research Guide Section 3 (Redefining “Growth” & “Culture”)  
ASSIGNMENT: Review Micropipette Tutorial (See CourseWeb)  
LAB NOTEBOOK: Set up for Exp. 3 (Isolating Single Colonies of Bacteria) / (Start by selecting appropriate protocol from Research Protocols)  
ASSIGNMENT: Final Micropipette Calibration Worksheet  
View Instructional Video: Serial Dilution (CW)  
LAB NOTEBOOK: Improve entry for Exp. 3-plan to work only from notebook |
| 4    | Sept. 19-23 | 1. Review and analyze results of Exp. 3 (LB Control)  
2. Practice Image Capture with Document Camera  
3. Quantify Soil Bacteria  
4. Quantify Bacterial Diversity  
5. Repeat Exp. 3  
6. Perform Exp. 4 - Culture Conditions | READ: Student Research Guide Section 4 (Bacteria Are What They Eat, Too)  
ASSIGNMENT: Soil Sample Analysis  
View Instructional Video: Counting Colonies (CW)  
Develop plan for calculating CFU/g of soil and evaluating bacterial diversity on plates.  
LAB NOTEBOOK: Update Lab Notebook (Experiments 1-3)  
ASSIGNMENT: Diversity Worksheet  
Name, organize and store electronic photo files / Print select photos for Lab Notebook.  
LAB NOTEBOOK: Update Lab Notebook (Exp’t.3 Results inc. photos + Discussion)  
Set up for 2nd trial of Experiment 3 –note changes/improvements  
Set up for Experiment 4 (Design Your Own Culture Conditions) |
| 5    | Sept. 26-30 | 1. Determine CFU/gram & Effective Number of Colony Types on new media/temp.  
2. Plan for Exp. 5- Isolating Unique Colonies  
3. Bacterial Abundance & Diversity: compare results on different media types  
4. Decide on media type for Exp. 5 (Master Plates)  
5. Choose and describe diverse colonies. | READ: Student Research Guide Section 5 (Solid Versus Liquid Cultures)  
ASSIGNMENT: Compare CFU/g and Effective # of Colony Types for Exp. 3 (trial 1) plates at two different lengths of incubation.  
LAB NOTEBOOK: Set up for Experiment 5 (Isolate Unique Colonies)  
Lab Notebooks will be collected at start of lab-thru Exp. 3 Trial 1 -Assemble copy pages; Print & attach Rubric before coming to lab.  
ASSIGNMENT: View Instructional Video: Patch Plating (CW)  
LAB NOTEBOOK: Update Lab Notebook through Experiment 4 (5-day incubation) – save room in notebook for Results for 7-day incubation, including 7-day CFU/g and 7-day diversity calculations, along with Discussion  
Improve set up for Experiment 5 (Isolate Unique Colonies) |
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<tr>
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</table>
| 6    | Oct. 3-7       | 1. Make 2 identical master plates (20-30 isolates)  
2. Evaluate master plates (Exp. 5); repeat as needed  
3. Choose ESKAPE pathogen to research (Exp. 6) | ASSIGNMENT: Bacterial Abundance and Diversity  
Join SWI Facebook Group.  
READ: Student Research Guide Section 6 (Meet the ESKAPE Pathogens)  
ASSIGNMENT: Choose 3 ESKAPE Pathogens you would like to research.  
Bring laptop to lab.  
LAB NOTEBOOK: Set up for Experiment 6 (Research ESKAPE Pathogens and Safe Relatives): Biological Questions through Reasons for Choosing ESKAPE Pathogen. |
| 7    | Oct. 10-14     | 1. Design Antibiotic Screen and order materials (Exp. 7)  
2. Repatch master plates as needed.  
3. Scientific Poster Evaluation Activity  
4. Perform Exp. 7 – first antibiotic screen | READ: Student Research Guide Section 7 (Antibiotics’ Discovery, Structure & Targets)  
ASSIGNMENT: View Tiny Conspiracies video (B. Bassler; iBiology.org; 27 mins.)  
Bring laptop to lab.  
LAB NOTEBOOK: Set up for Experiment 7 (Design a Method to Screen for Antibiotic Producers – compare “Spread-Patch” method to one other assay method; use 2 tester strains.)  
LAB NOTEBOOK: Update Notebook through Experiment 6.  
Improve entry for Experiment 7 – plan to work only from notebook |
| 8    | Oct. 19-21 (no class Oct. 17-18) | 1. Lab sessions will not be held on Mon. and Tues. due to Fall Break.  
2. Document and Evaluate Results of Exp. 7 – first screen for antibiotic production  
3. UTA Mid-Semester Survey | ASSIGNMENT: Read Poster Symposium Assign. directions; bring in any questions  
Bring laptop to lab.  
LAB NOTEBOOK: Set up for data collection for Experiment 7 – first screen  
ATTEND: Science 2016 Research Poster Session (choose one):  
Graduate and Faculty Posters I (Thurs. Oct. 20 @1:00 PM)  
*Undergraduate Posters (Thurs. Oct. 20 @5:00 PM)  
Graduate and Faculty Posters II (Fri. Oct. 21 @1:00 PM)  
All Poster Sessions will be held in Alumni Hall, J.W. Connolly Ballroom, 1st Floor  
*This session is highly recommended |
<table>
<thead>
<tr>
<th>Week</th>
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</thead>
</table>
| 9    | Oct. 24-28 | 1. Team Presentations on ESKAPE Pathogens  
2. Continue screening: test all isolates for antibiotic production against all tester strains  
3. Review peer feedback from ESKAPE Pathogen Pres.  
4. Plan to quantify frequency of antibiotic producers | ASSIGNMENT: Email final ESKAPE Pathogen Team PowerPoint Presentation to Instructor not later than 2 hours ahead of lab.  
Also bring team presentation on USB drive.  
ASSIGNMENT: Science 2016 Poster Symposium Assignment  
Plan next steps in screening soil isolates for antibiotic production.  
LAB NOTEBOOK: Set up for next screen.                                                                                                                                                                                                                       |
| 10   | Oct. 31-Nov. 4 | 1. Document Results of Antibiotic Screens  
2. Choose Single Antibiotic-Producer for Further Study  
3. Plan for Exp. 8: Prepare T-streak of chosen isolate  
4. Perform Exp. 8: Colony PCR of 16S rDNA (record colony morphology)  
5. Perform Exp. 8: Prepare smears for Gram staining  
6. Prepare Lawn Plates for Organic Extraction (Exp. 9) | READ: Student Research Guide Section 8 (Getting to Know Your Isolates)  
ASSIGNMENT: Complete first two fields of SWI Database (Sample Location including GPS Coordinates & Soil Type Data with % organic of wet weight)  
LAB NOTEBOOK: Lab Notebooks will be collected at start of lab-through Experiment 7 – first screen  
-Assemble copy pages; Print & attach Rubric before coming to lab.  
ASSIGNMENT: View PCR Animation online. (link on CW)  
LAB NOTEBOOK: Update Notebook through Experiment 7 – all screens  
Set up for Experiment 8: Colony PCR (Bead Method)  
Set up for Experiment 8: Gram Staining.                                                                                                                                                                                                                       |
| 11   | Nov. 7-11  | 1. Confirm PCR product via gel electrophoresis  
2. Set Up Organic Extraction (Exp. 9): chop and freeze plates, add solvent, shake  
3. Repeat PCR as needed  
4. Cleanup PCR and submit samples for sequencing | READ: Student Research Guide Section 9 (It All Comes Down to Chemistry)  
ASSIGNMENT: Frequency of Antibiotic Producers  
View JoVE video on Agarose Gel Electrophoresis  
LAB NOTEBOOK: Set up for Experiment 8: Agarose Gel Electrophoresis  
LAB NOTEBOOK: Update, including labeled image of gel.  
Set up for Experiment 9 (Preparing Organic Extract).                                                                                                                                                                                                                                                                  |
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<tr>
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<th>Lab Activity</th>
<th>Assignment(s) Due at the beginning of lab</th>
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</table>
| 12   | Nov. 14-18 | 1. Class Photograph  
3. Gram stain/ Microscopy  
4. BioLog Inoculation  
5. Test Organic Extract for Antibiotic Activity. | ASSIGNMENT: Methods Flow Diagram  
Complete field 3 of SW1 Database (Culture Media and Conditions – Antibiotic Resistance Frequency not applicable/ NA)  
ASSIGNMENT: Meet with poster team to discuss Objectives and Conclusions Assignment.  
LAB NOTEBOOK: Update. Set up for Exp. 9 (Testing Isolate’s Organic Extract for Antibiotic Activity). |
| 13   | Nov. 21-22 (no class Nov.23-25) | 1. Check Organic Extract Results  
2. BLAST tutorial  
3. Analyze DNA sequence data  
4. Lab sessions will not be held Wed. to Fri. due to Thanksgiving Holiday | ASSIGNMENT: Poster Objectives and Conclusions (TEAM Assignment)  
View DNA Sequencing Video (link on CW) (25 mins.)  
LAB NOTEBOOK: Update. |
| 14   | Nov. 28-Dec. 2 | 1. Document Organic Extract Results  
2. Microscopy as needed  
ASSIGNMENT: Final Poster (TEAM Assignment)  
LAB NOTEBOOK: Update, including DNA sequence data. |
| 15   | Dec. 5-9 | 1. Practice Poster Presentation  
2. Lab Cleanup  
3. Formal Poster Session  
4. Post-Course Survey | ASSIGNMENT: View video on Giving an Effective Poster Presentation.  
Complete field 4 of SW1 Database (Activity Profile for Bacteria [B] and Extract[E])  
ASSIGNMENT: Final practice and preparation for Poster Session  
LAB NOTEBOOK: Lab Notebooks will be collected at start of lab- entire notebook (original bound pages). |

Any changes to the syllabus will be announced in class and on CourseWeb.
### ASSESSMENTS:

<table>
<thead>
<tr>
<th>Lab Notebook (1/3 of grade) – 108 points</th>
<th>POSSIBLE POINTS</th>
<th>PNTS EARNED</th>
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<tbody>
<tr>
<td>Original bound pages will be collected and retained at end of semester. Points are awarded for set up of notebook ahead of lab and for finalized entries.</td>
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<tr>
<td>Notebook check #1 (Week 5)</td>
<td>16</td>
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<tr>
<td>Notebook check #2 (Week 10)</td>
<td>16</td>
<td></td>
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<tr>
<td>Final Notebook check (Week 15)</td>
<td>16</td>
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<tr>
<td>Advance Set-up:</td>
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<td>60 (5 pts each set up)</td>
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<tr>
<td>Experiment 1 (Isolation of Soil Microbes)</td>
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<td>Experiment 2 (Soil Sample Collection)</td>
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<td>Experiment 2A (Soil Physical and Chemical Characterization)</td>
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<td>Experiment 3 (Isolating Single Colonies of Bacteria)</td>
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<td>Experiment 4 (Design Your Own Culture Conditions)</td>
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<td>Experiment 5 (Isolate Unique Colonies)</td>
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<td>Experiment 6 (ESKAPE Pathogens)</td>
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<td>Experiment 7 (Screening for Antibiotic Production)</td>
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<td>Experiment 8 (Colony PCR &amp; Gram Stain)</td>
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<td>Experiment 8 (Electrophoresis)</td>
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<td>Experiment 9 (Preparing Extract)</td>
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<td>Experiment 9 (Testing Extract)</td>
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<tr>
<th>Assignments (1/3 of grade) – 103 points</th>
<th>POSSIBLE POINTS</th>
<th>PNTS EARNED</th>
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<tbody>
<tr>
<td>Binder set up (Week 1 - Session 2)</td>
<td>5</td>
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<tr>
<td>Protocol Guide added to binder (Week 2 - Session 3)</td>
<td>5</td>
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<td>Soil Sample Analysis (Week 4)</td>
<td>15</td>
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<tr>
<td>Bacterial Abundance and Diversity (Week 6)</td>
<td>15</td>
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<tr>
<td>ESKAPE Pathogen TEAM Presentation (including % participation) (Week 9)</td>
<td>18</td>
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<tr>
<td>Science 2016 Poster Symposium (Week 9)</td>
<td>12</td>
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<tr>
<td>Frequency of Antibiotic Producers (Week 11)</td>
<td>15</td>
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<tr>
<td>Uploading Experimental Results to SWI Database (ongoing)</td>
<td>18</td>
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<thead>
<tr>
<th>Poster (1/3 of grade) – 28 points</th>
<th>POSSIBLE POINTS</th>
<th>PNTS EARNED</th>
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<tbody>
<tr>
<td>Assignment 1 (Flow Diagram) – Week 12</td>
<td>8</td>
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<tr>
<td>Assignment 2 (Objectives and Conclusions – TEAM Assignment) – Week 13</td>
<td>8</td>
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<tr>
<td>TEAM Poster (including % participation) – Week 14</td>
<td>12</td>
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