

Microbiology

BIO302L

4 hours lab/week – Two days per week, 100 mins/lab

Course Description

The course, Fundamentals of Microbiology, has a lecture and laboratory component. The lecture focuses on the structure of prokaryotic and eukaryotic microorganisms, interaction between the microbe and the host, and human diseases. Laboratory sessions focus on pure culture techniques, methods of staining and the microscopic, colonial and biochemical identification of saprophytic organisms.

Overall Class Learning Outcomes

- (1) Use analytical and critical thinking skills to approach a research project.
- (2) Develop basic microbiology laboratory techniques.
- (3) Differentiate the various types of test used in identifying and classifying pathogenic microorganisms.
- (4) Use the scientific method to gather, analyze, interpret and present field base research project

Fall 2012 Class Project

Project Title: Bacterial Contaminant in Brooklyn Waterfront

Project description

Students will use laboratory skills and knowledge to collect, analyze and interpret data. They will use Brooklyn waterfront (location to be decided) to collect water samples. Samples will be analyzed using microbial techniques learnt in lab during the semester. This is a semester long class project. The class will be divided into randomly selected groups. Each group will be responsible for collecting samples from one location along the Brooklyn waterfront area. The class will first discuss and decide which of the 5 – 6 groups will sample designated area. Each group will subsequently collect samples, two each, and during the course of the semester run various test in concurrent with lab activities. The following test or analysis will be conducted;

1. Inoculating in broth
2. Gram staining
3. Negative stain
4. Streak plate for isolating pure culture
5. Inoculate on selective and differential media (MacConkey, PEA, blood agar, mannitol salt agar)
6. Inoculate starch agar, lipid and or DNA agar and gelatin deeps,
7. Urease, catalase, oxidase and nitrate reduction.
8. IMViC, SIM, Enterotube II or API system.
9. Oxygen requirement of growing microbes using oxidative/fermentative tubes or thioglycollate media.
10. Prepare antibiogram to test for antibiotic sensitivity.

Towards the conclusion of the semester, students will write a lab report and giving a short presentation of their analysis. In the lab report they use primary and secondary sources to identify some of the bacterial types they have isolated. This lab report will be comprehensive and will worth one exam grade. Materials will be posted on OpenLab site.

Project Learning Outcomes

Students will be able to

- Work in groups to accomplish a task.
- Use microbial techniques learnt throughout the semester to analyze samples collected from various locations along the Brooklyn Waterfront.
- Gather, interpret, evaluate, and apply information collected from variety of sources.
- Write a lab report on a semester-long activity.

General Education Learning Goals

- Pursue disciplined, inquiry-based learning in Microbiology
- Use the arts, sciences and humanities as a forum for the study of the physical world.
- Employ scientific reasoning and logical thinking
- Gather, interpret, evaluate and apply information discerningly from a variety of sources.
- Communicate in diverse settings and groups using written, oral and visual means

Assessment

Students will be assessed on the following; Work will posted on OpenLab

- o Draft of final lab report – group activity- use GenEd writing rubric or other rubric
- o Final lab report – group activity - use GenEd writing rubric or other rubric
- o Final presentation – group activity - use GenEd writing rubric or other rubric
- o Group members will assess each other in terms of cooperativeness, reliability, general team skills, and effort.

Schedule of Activities.

Week 1

- o Students will be placed into groups
- o Collect samples from selected locations.
- o Inoculate into broth
- o Familiarize students with OpenLab. Students will be encouraged to post pictures collected along the way to the sample collecting site.
- o Students will set up their profile.

Week 2

- o Perform Gram staining.
- o Continue learning the dynamics of OpenLab
- o Post pictures on OpenLab

Week 3

- o Perform negative staining
- o Perform acid-fast staining
- o Post pictures on OpenLab

Week 4 - 5

- Prepare and isolate pure culture
- Inoculate differential and selective media
- Post pictures on OpenLab

Week 6

- Analyze for extracellular activities using DNA, starch and gelatin media
- Analyze for carbohydrate fermentation using phenol red broths and TSI media
- Post pictures on OpenLab

Week 7

- Perform IMViC test, and inoculate on SIM media
- Inoculate Eenterotube II systems
- Perform urease, catalase, oxidase and nitrate reduction test
- Post pictures on OpenLab

Week 8 – 10

- Perform an antibiogram
- Begin the writing process
- Post pictures and writing process outline on OpenLab

Week 11

- Outline of group's lab report is due - online

Week 12

- Rough draft is due - online

Week 14

- Final paper is due - email

Week 15

- Oral presentation

Presentation Grading Rubric

Grade each presentation using the criteria below using 1 – 5, 1 very good and 5 being very poor.

GROUP DYNAMIC

- Worked well together
- Division of Work
- Helped one another
- Cohesiveness

CREATIVITY

- Get Audience Attention
- Organize Information in creative manner
- Presentation is very original
- Make good use of resources available
- Artistic

INFORMATION

- Credibility of Information
- Manner by which information is broken down
- Adequate Information on Topic
- Ability to remain on Topic

ORGANIZATION

- Introduction
- Hypothesis
- Materials and Methods
- Results
- Conclusion
- Presentation is well arranged

DELIVERY

- Eye Contact
- Tone
- Pace
- Limited Reading from note cards
- Maintain 6 minute time limit
- Audience Attentiveness

Notes:

Total: /150
Grade:

Title of Report _____					
Authors' names: _____					
	No Proficiency	Some Proficiency	Proficiency	High Proficiency	
	1	2	3	4	Score
Introduction	Does not give any information about what to expect in the report.	Gives very little information and no mention of what the objective is	Gives too much information -more like a summary. Relevant information is included.	Presents a concise lead-in to the report. Objective(s) is clear and well-stated. Very few language usage errors	
Purpose/Problem	Does not address an issue related to topic.	Addresses an issue which is somewhat related to the topic, but is incomplete or inaccurate	Addresses an or the issue related to research, but is too wordy or lengthy.	Addresses a real issue directly related to research findings. Very few usage errors.	
Procedure	Not sequential, most steps are missing or are confusing.	Some of the steps are understandable; many parts are confusing and lacking detail.	Most of the steps are understandable; some lack minor details or are confusing.	Presents easy-to-follow steps which are logical and adequately detailed. Very few usage errors	
Data & Results	Data tables and/or graph missing information and are inaccurate.	Data tables and or graphs are incomplete. Contains inaccuracies and/or illegible characters.	Data tables and graphs are complete and very accurate, some ill-formed characters. Minor errors or	Data tables and graph are completed and very accurate. Very few minor errors	
Discussion/ Conclusion	Presents an illogical explanation for findings and does not address any of the questions suggested in the template.	Presents an illogical or incomplete explanation for findings and addresses few questions.	Presents a logical explanation for findings and addresses most of the questions. Few errors are present	Presents a logical explanation for findings and addresses most or all of the questions. Very few usage errors	
Attractiveness	Illegible writing, loose pages, no organization, no pictures	Legible writing, some ill-formed letters, print too small or too large, not properly organized.	Legible writing, well-formed characters, clean and neatly bound in a report cover, illustrations, pictures are provided.	Word processed or typed, clean and neatly bound in a report cover, illustrations, pictures are provided.	
Timeliness	Report handed in more than one day late.	Report handed more than five hours late.	Report handed more less than two hours late.	Report handed in on time.	
				Total	