BIOL-UA 70 Microbiology Laboratory

Instructor:
Michael Carrozza

Course Description:
In this course you will culture bacteria from soil and fermented food products. Bacteria will be isolated from these sources and identified using a variety of microbiological techniques. These include staining and using the microscope; culturing bacterial isolates under different growth conditions; subjecting the bacterial isolates to range of biochemical differential tests; and DNA sequence analysis of a gene from the isolates. The data obtained from microbiological techniques and comparison of DNA sequence with computer databases will be used to identify the unknown bacterial isolates. You will also test mutants of the bacteria Bacillus subtilis for the ability to form spores and culture bacteriophage. This course is designed to provide an investigative approach to learning many of the standard techniques of a microbiology lab.

Pre-requisite:
Molecular and Cell Biology I (BIOL-UA 21)

Textbook and Required Materials:
Leboffe, Michael J. & Burton E. Pierce. Microbiology: Laboratory Theory and Application, Brief, 3rd edition Englewood, CO: Morton, 2012

Grading:

Exam 1	25%
Exam 2	25%
Laboratory Practical	10%
Lab Report 1	10%
Lab Report 2	10%
Oral Presentation	10%
Lab Participation	5%
Lab Performance	5%
Principles	

Topics:
Introduction to Microbiology Lab
Microbiology of food fermentation
Introduction to Energy and Metabolism
Basic Techniques of Microbiology
Ubiquity of microorganism in our environment
Types of colony morphology
Principles of selective media
Staining of microorganisms for analysis under the microscope
Principles of differential testing for identification of an unknown bacteria
Detecting hydrolytic enzymes and motility
Starch hydrolysis, gelatin hydrolysis and motility agar
Importance of aerotolerance, temperature, pH and osmotic pressure microbial growth
Antimicrobial sensitivity
Molecular biological and genomics approaches to identifying microorganisms
Principles of preparing bacterial genomic DNA and PCR of 16S rDNA

Emerging identification tools
Principles of modern automated DNA sequencing
The Basic Local Alignment Search Tool (BLAST) for identifying and comparing sequences
Viruses and quantifying an unknown bacteriophage
Genetics of Bacillus subtilis spores
Plaque purification of phage
Measuring the rate of microbial growth