

BIOTECHNOLOGY, AS

PROGRAM LEARNING OUTCOMES

The assessment of Program Learning Outcomes is not only a key indicator of program effectiveness, it is also one of the standards of excellence identified by the Middle States Commission (Standard 5) and is required through the SUNY assessment initiative.

Current Program Learning Outcomes for Program as stated in Catalog

Upon completion, students will:

1. Perform technical procedures such as DNA extraction and characterization, electrophoresis, cloning, polymerase chain reaction, protein isolation and purification using various chromatographic techniques
2. Understand the principles and practices of biotechnology, and the currently-used laboratory that can be applied to future advances in these techniques
3. Evaluate societal issues and implications of biotechnology
4. Analyze and draw conclusions from generated scientific data, and present findings in a formal laboratory report
5. Understand the basic principles of genomics, proteomics and systems approaches in biotechnology
6. Conduct basic bioinformatics-based analysis
7. Use critical thinking and principles of logic to analyze ethical issues raised in the practice of biotechnology
8. Qualify for transfer to a four-year college or university with the necessary foundations in biology, chemistry and mathematics for upper-level study in a wide variety of biological disciplines

CURRICULUM MAP								
	SLO1	SLO2	SLO3	SLO4	SLO5	SLO6	SLO7	SLO8
BIO 103					A, E (I)	A, E (I)	A (I)	A, E (P)
BIO 104						A (P)		A (P)
BIO 109/BIO 109L				L (I)				E, L (P)
BIO 110/BIO 110L				L (I)				E, L (P)
BIO 203/BIO 203L	E, L (P)	E, L (P)	E (I)	L (P)			E (I)	E, L (P)
BIO 204/BIO 204L	E, L (P)	E, L (P)	E (I)	L (P)			E (I)	E, L (P)
BIO 221/BIO 221L	L (P)	E, L (P)		L (P)				E, L (P)
BIO 250/BIO 250L	E, L (P)	E, L (P)		L (P)				E, L (P)
CHE 120/CHE111L				L (I)				E, L (P)
CHE 121/CHE 113L				L (P)				E, L (P)

Assessment Key:

P=Paper E=Exam PO=Portfolio O=Oral Presentation L=Lab Assignment PR=Project I=Internship
A=Assignment (I)=Introduced (P)=Practiced (R)=Reinforced

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8
BIO 103: Bioinformatics Introduction								
Compare the subunits of DNA, RNA and proteins and identify their chemical components					X			
Recognize the elements in DNA sequence that define a gene					X	X		
Describe how DNA sequencing is performed and compare the different types					X			
Describe how DNA mutations can be agents of disease and evolution, and how the effects of these mutations are determined					X		X	
Use the computer program BLAST to analyze DNA sequences					X			
BIO 104: Bioinformatics Applications								
Compare DNA & RNA sequences using BLAST						X		
Search for homologous genes within genomes I						X		
Construct a phylogenetic tree using ClustalW or like programs						X		
Conduct a microarray analysis of RNA expression using MAGIC2 or like programs						X		
Demonstrate proficiency in using the software associated with these analyses						X		
BIO 109: General Biology I and Lab								
Identify the characteristics of living things								X
Design and critically assess a scientific investigation				X				X
Identify and describe the basic structure and function of the categories of plant and animal tissues								X
Outline the structure and basic biochemical processes of plant and animal cells								X
BIO 110: General Biology II and Lab								
Explain the basic principles of Mendelian genetics				X				X
Explain the basic principles of Darwin's Theory of Evolution by Natural Selection				X				X

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8
Analyze disease symptoms to determine the site of infection and probable etiological agent based on a case history for rickettsial, viral, mycological, protozoal, helminth, and bacteriological infections								X
Correlate historical information in microbiology and explain its relationship to current trends and research								X
Explain the role of genetics in current advances in Genetic Engineering		X						X
BIO 221L: Microbiology Lab								
Design an experiment to test a hypothesis about bacterial growth and nutrition performance (technique) grading, essay and rubric for SUNY GER natural science				X				X
Demonstrate the preparation of a smear and use of the following staining procedures for microscopic examination: simple stain, gram stain, acid fast stain, negative stain, spore stain and capsule stain								X
Explain the relationship between bacterial growth and nutrition by analyzing experimental data								X
Explain the relationship between environmental conditions and bacterial growth by analyzing experimental data (Exams, lab book, lab reports, essays and performance)				X				X
Demonstrate aseptic techniques (exams, lab practicum, lab book, lab reports, and performance)	X							X
Record and analyze data and draw conclusions from those data about microbial growth and bacterial infection (Etiological agent) (Exams, lab book, lab report, unknown report, unknowns, performance)	X			X				X
Identify and describe the structure of selected algae, fungi, protozoa and helminthes								X
Perform biochemical tests which simulate the diagnosis of bacterial infections and their treatment using appropriate antibiotics								X
BIO 250: Cell Biology & Lab								
Demonstrate the scientific method process				X				X

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8
Calculate the relationships between reactants and products in an acid/base reaction								X
Calculate energy changes associated with a chemical reaction								X
Determine the direction a redox reaction will proceed spontaneously by calculating the standard potential of an electrochemical cell, using standard reduction potentials for the appropriate redox half-reactions								X
CHE 113L: General Chemistry II Lab								
Demonstrate proper use of laboratory equipment and safe handling of chemicals								X
Demonstrate accuracy in laboratory operations, collection of experimental data and analysis of data				X				X