

CHS BIOTECHNOLOGY 1 CURRICULUM

Date Revised (**JUNE, 2018**)

J. Pankowicz - Science & Tech Dept

Name of Course: Biotechnology I (479S)

Course Pre-requisite: Biology

Content Source(s): Supplemental resources from Internet; Bio-Tech texts and current articles; Amgen Bio-Tech

Experience (ABE) lab notebook

Credit(s): 0.5 credits

QT	UNIT	TOPICS	Major LABS, TASKS, ACTIVITIES	PERFORMANCE EXPECTATION Practice #1: Asking Questions Practice #3: Planning Investigations
1 ST	Intro to the Bio-Tech Lab Maintaining Safety in the Bio-Tech Lab	Basic fire and safety procedures in Bio-Tech Lab Use of tools/equipment in the Bio-Tech Lab	1. Complete Bio-Tech Lab Safety Assessment; answer assessment questions and discuss together; check for student understanding 2. Completion of Tools of a Biotechnician Lab Activity	1. Lab safety assessment in Bio-Tech lab 2. Observations of students in lab environment/conferencing with student during lab activities 3. Assessments on material covered, including lab safety and basic tools/techniques in Bio-Tech lab, at discretion of instructor
	History of Bio-Technology	History of Bio-Tech, uses including: agriculture, fermentation, genetics, embryology, biochemistry, etc.	1. Taking notes during lecture/instruction	1. Assessments on material covered, at discretion of instructor

1 ST	AIDS and Emerging Viruses	Demonstrate the proper procedure for gowning, gloving, masking; sanitizing a work area, and maintaining a clean work area using SOP guidelines. History of Universal Precautions, as introduced by the CDC. Specific bodily fluids which transmit specific infectious pathogens; routes/methods of transmission for most common viral/bacterial infections.	1. Gown, glove, and mask themselves according to SOP guidelines 2. Use proper aseptic technique/universal precautions protocols in performing simple on-demand lab tasks	1. Observations of students in lab environment while completing lab procedures in which safety gear is required/conferencing with student during lab activities 2. Assessments on material covered, at discretion of instructor
	Aseptic Technique and Universal Precautions in the Bio-Tech classroom			
1 ST	Virology	Definition and morphology of viruses	1. Taking notes during instruction 2. View <i>Viruses</i> simulation on Smartboard, and answer questions for understanding	1. Assessments on material covered, at discretion of instructor
1 ST	HIV/AIDS	History of HIV in U.S. Symptoms of HIV infection Transmission of HIV HIV vs AIDS criteria HIV “Cocktail” treatment to demonstrate morphology of HIV virus Detection of HIV infection Theories available of entrance of HIV in U.S.	1. Taking notes during instruction 2. View, and critique through class discussions, documentary “ <i>And the Band Played On...</i> ” 3. Simulation of <i>HIV Transmission Lab</i> 4. <i>HIV Cocktail Cooperative Learning Activity</i> 5. <i>ELISA Test Simulation Lab</i>	1. Assessments on material covered, at discretion of instructor 2. Individual student work; observations of lab data collected and analysis of investigations

1 ST	Vaccination	<p>History of early vaccination Descriptions/ Strengths/ Limitations of the different strategies implemented to make vaccines: weaken the virus; inactivate the virus; use part of virus; use part of the bacterium Phases of Study (I-IV) used by CDC to make vaccine safe for use in general public Role of the FDA in development of vaccine</p> <p>Theories/ Studies/ Research/ Misconceptions in studying vaccination</p>	<p>1. Taking notes during instruction 2. Read and analyze myriad of sources available on vaccination facts and theories</p>	<p>1. Assessments on material covered, at discretion of instructor 2. Individual student work; observations of lab data collected/discussed and analysis of investigations; student and parent(s) notes on discussions regarding vaccination concepts</p>
1 ST	Epidemiology	<p>Define Epidemiology Role(s) of Epidemiologist (Descriptive and Analytical), CDC, FDA when a new or emerging virus is introduced Infection Control Measures Endemic vs Epidemic Rate Define Emerging Infectious Disease Causes (6) of Epidemics around the world Types (4) of Epidemiological Studies to test hypotheses Association vs Cause of epidemics Types (2) of Associations Roles of CDC and FDA in implementing disease prevention strategies</p>	<p>1. Taking notes during instruction 2. Read and analyze myriad of sources available on epidemic(s) facts and theories</p> <p>3. Completing Task (CCA): <i>Outbreak: A Study in Epidemiology Lab Activity</i> in cooperative learning groups</p>	<p>1. Assessments on material covered, at discretion of instructor</p> <p>2. Individual student work; observations of student collecting data (role of the Descriptive Epidemiologist) and analysis of investigations</p>

2 ND	Bio-Technology at the Molecular Level			
	ABO blood groups	Blood Typing Technology Blood transfusions by matches and typing; presence of Rh Factor	1. Taking notes during instruction 2. Complete <i>ABO Blood Typing Simulation Lab</i>	1. Assessments on material covered, at discretion of instructor 2. Individual student work; observations of lab work and analysis of investigations 3. Completion of <i>Blood Detectives</i> (including data collected and analysis)
2 ND		DNA structure and function (review at microscopic level) Human Genome Project study Discussion of human genetic disorders/genetic counseling Genetic engineering	1. Taking notes during instruction 2. View and discuss <i>Human Genome Project Documentary</i> on SmartBoard	1. Assessments on material covered, at discretion of instructor
	Molecular Bio-technology	Describe cellular organization (cells→ tissues→ organs, etc) Justify how specific cell organelles contribute to cell homeostasis Connect roles of nucleus (DNA), ribosomes and rough ER to protein/hormone creation. Role(s) of proteins in the body: some common enzymes and hormones utilized in biopharma Tools of Biotechnician in lab setting: learning how to use the micropipette (and accompanying instruments), micro centrifuge, proper transfer and aliquot of substances	3. <i>DNA Extraction Lab</i> 4. <i>Amino acid chain sequence activity</i> (effectiveness of pig vs human insulin for diabetes patients)	2. Individual observations of student lab work, and analysis

2 ND		DNA Fingerprinting Basics and Tools Used in Lab: Uses in identification of goods/products; at the crime scene; paternity and maternity testing	5. <i>DNA, Gel Electrophoresis and PCR Virtual Lab Activities</i> 6. Completion (approximately 3-4 weeks) of Amgen Bio-Tech Experience (ABE) Lab Program, including: Lab 1: An Introduction to Microvolumetrics and Pipetting and Gel Electrophoresis Basics Lab Forensics Lab: Simulation of crime scene (CS and suspects A-F)	
2 ND	Stem Cell Research/ Embryology	Structure of stem cells Origin of stem cells Uses of stem cells to treat diseases/disorders in patients	1. Taking notes during instruction 2. Demonstrate understanding of 5-paragraph structure of persuasive essay 3. Use research gathered (cloning of embryonic cells and genes vs cloning of organisms) to support a side on issues surrounding stem cell research	1. Assessments on material covered, at discretion of instructor 2. Individual student work; observations of lab data and analysis of investigations 3. 5-paragraph persuasive essay on issues surrounding stem cell research (Validated Task for Graduation)

Not listed in curriculum:

- There will be a Final Exam; it will be a cumulative review of the semester course content.
- There will be guest speakers joining us in class to discuss the opportunities that Bio-Tech education has to offer and the career opportunities that are available. Guest speakers will also be provided from Bio-Tech firms in the state to discuss products/services that are available as a result of the work of Bio-Tech labs and industry; this will give the students exposure to real-world applications of Bio-Tech education and the many career opportunities available.