Miami Dade College

Course Description:

Corequisite: BSC2426

Course Competency	Learning Outcomes
Competency 1: The student will demonstrate knowledge of the basic safety procedures in a biotechnology laboratory by:	
1. Describing the elements of a safe laboratory environment. 2. Identifying general personal protection regulations and appropriate laboratory attire. 3. Describing the location and purpose of safety equipment in the laboratory. 4. Demonstrating the safe use of autoclaves and electrical equipment in the laboratory. 5. Demonstrating the safe disposal of broken glassware and sharp instruments. 6. Identifying the chemical hazards associated with the laboratory. 7. Demonstrating the safe use of chemicals in the laboratory. 8. Implementing strategies for minimizing exposure to laboratory hazards. 9. Demonstrating safe handling and usage of research microorganisms, plants, animals and their derivatives. 10. Describing proper safety measures when working with recombinant DNA. 11. Demonstrating proper storage and disposal of hazardous materials and biological specimens. 12. Evaluating Material Safety Data Sheets and official regulatory compliance policies. 13. Demonstrating proper safety procedures in handling emergency situations and contacting appropriate services and personnel.	
Competency 2: The student will knowledge of standard operating and record-keeping procedures in a biotechnology laboratory by:	
1. Describing the principles and rules for quality documentation in the laboratory. 2. Identifying procedural forms, protocols, reports, and logbooks in the laboratory. 3. Demonstrating accurate collection and recording of laboratory data. 4. Maintaining documentation of experimental procedures and results. 5. Demonstrating labeling procedures.	
Competency 3: The student will demonstrate knowledge of the mathematic applications in the biotechnology laboratory by:	
1. Listing standard laboratory mathematical equations/calculations. 2. Solving equations with different units. 3. Solving equations with different ratios and proportions. 4. Solving exponential relationships. 5. Organizing data visually. 6. Analyzing the relationships between data represented graphically or in charts. 7. Demonstrating the recognition of sample's representation and randomness. 8. Demonstrating calculations of variance and standard deviation. 9. Identifying patterns of normal distribution and standard deviation. 10. Solving the percentage of error for particular experiments.	

Competency 4: The student will demonstrate knowledge concerning the preparation of laboratory solutions in a biotechnology laboratory by:	
1. Demonstrating the calculation of percentage concentrations of solutions. 2. Demonstrating the conversion of a standard formulation into amounts of reagent employed in the preparation of a solution. 3. Applying the use of the "X" designation for expressing the concentration of diluted solutions. 4. Determining the amount of a stock reagent of a given concentration needed to obtain the desired final concentration of a solution. 5. Summarizing the safety standards for proper storage of laboratory solutions. 6. Performing dilutions. 7. Demonstrating how to monitor pH in a solution. 8. Preparing laboratory solutions for use in experimental procedures.	
Competency 5: The student will demonstrate knowledge and ability to use and collect data from different kinds of instruments common for a biotechnology laboratory by:	
1. Demonstrating the handling and operation of: mechanical and electric balances, pipettes, micropipetting devices and volumetric glassware, thermometers, pH-meters, spectrophotometers, centrifuges, incubators, laminar flow cabinets, electrophoresis equipment, gel-viewing devices, water baths, microscopes, PCR machines 2. Evaluating technical issues and maintenance associated with laboratory equipment.	
Competency 6: The student will knowledge of nucleic acid structure, function and properties by:	
1. Explaining: DNA isolation procedures, DNA restriction enzyme treatment, DNA fragments separation by means of agarose gel electrophoresis, Polymerase Chain Reaction (PCR). 2. Performing: DNA isolation procedures, DNA restriction enzyme treatment, DNA fragments separation by means of agarose gel electrophoresis, PCR. 3. Analyzing: DNA isolations procedures, DNA restriction endonuclease treatment, DNA fragment separation by means of agarose gel electrophoresis, PCR. 4. Explaining the resolving power of agarose gel verses polyacrylamide gel electrophoresis for the analysis of DNA. 5. Constructing a standard curve for DNA markers migrating during agarose gel electrophoresis and extrapolating the size of an unknown fragment of DNA. 6. Constructing a standard curve for DNA markers migrating during agarose gel electrophoresis and extrapolating the size of an unknown fragment of DNA. 7. Constructing a standard curve for DNA markers migrating during agarose gel electrophoresis and extrapolating the size of an unknown fragment of DNA. 8. Constructing a standard curve for DNA markers migrating during agarose gel electrophoresis and extrapolating the size of an unknown fragment of DNA.	
Competency 7: The student will demonstrate knowledge of basic separation methods by:	
1. Listing parameters for methods of separation, fractionation and clarification. 2. Comparing and contrasting different purification methods. 3. Listing the basic principles and types of filtration and chromatography. 4. Explaining basic principles of centrifugation and factors that determine the rate of sedimentation of a particle. 5. Defining differential centrifugation, density centrifugation, and continuous centrifugation. 6. Describing fixed angle rotors, horizontal rotors, near vertical and vertical tube rotors, k factors, balancing a rotor, centrifuge and rotor maintenance.	
Competency 8: The student will demonstrate knowledge of protein structure, function, isolation and characterization	

by:	
1. Explaining standard methods used for extraction and purification of proteins. 2. Using spectrophotometry as a quantitative method for determining total protein concentration and explaining the chemical reaction responsible for the Bradford Assay. 3. Performing protein analysis by polyacrylamide gel electrophoresis.	