BACE Biotechnician Assistant Credentialing Exam

Knowledge Exam Categories

GENERAL TOPICS IN BIOTECHNOLOGY

- Discuss current techniques used in biotechnology, and their applications
- Demonstrate knowledge of regulatory agencies governing the manufacture and distribution of biotechnology-derived products
- Outline the development and regulatory approval process of biopharmaceuticals
- Understand the purpose of Good Laboratory Practices (GLPs), Good Clinical Practices (GCPs), and current Good Manufacturing Practices (cGMPs)
- Discuss the role and identify types of documents used in cGMP compliant industries
- Outline the role of various departments in a company, including Research and Development, Quality Assurance, Quality Control, and Manufacturing
- Describe appropriate safety and workplace behaviors
- Outline the manufacturing process of biopharmaceuticals
- Describe Environmental Monitoring in a controlled space
- Discuss ethics and bioethics in the workplace and society
- Describe careers in the biotechnology field
- Describe historical applications, benefits and advances in biotechnology

LABORATORY SKILLS/APPLICATIONS

- Describe the process of culturing microorganisms and tissues using aseptic technique
- Differentiate between sterilization, decontamination, and disinfection
- Describe the proper use of microscopes
- Understand the principle by which a pH meter works
- Discuss methods of DNA isolation, purification, and quantification
- Contrast agarose gel versus polyacrylamide gel electrophoresis (PAGE)
- Describe how restriction enzymes are used
- Describe recombinant DNA and cloning techniques
- Discuss the transformation and transfection of model organisms
- Describe the mechanism of Polymerase Chain Reaction (PCR)
- Discuss protein expression in model organisms
- Discuss methods of molecule/protein isolation, purification, and quantification
- Understand principles of immunoassays, such as ELISA
- Explain the principles of spectrophotometry
- Demonstrate knowledge of laboratory equipment calibration and validation
- Use scientific notation, significant digits, and decimals correctly

BIOCHEMISTRY/CHEMISTRY

- Compare and contrast types of chemical bonds
- Understand the chemistry of molecules and macromolecules
- Discuss the differences between aerobic and anaerobic respiration
- Demonstrate knowledge of enzymes and reaction rates
- Describe DNA structure and function
- Describe transcription
- Describe protein structure and function
- Describe translation and gene expression

BIOLOGICAL SYSTEMS

- Explain cell theory
- Understand the general physiology of cells
- Explain the interaction between cells, and between cells and their environment
- Describe cell division (meiosis and mitosis)
- Discuss cell staining, and distinguish between Gram positive/negative cells
- Demonstrate an understanding of the immune system
- Understand the genetics of model organisms
- Describe the "central dogma of molecular biology"

RESEARCH & SCIENTIFIC METHOD

- Discuss good experimental design, including the proper use of controls
- Explain the scientific method
- Analyze and interpret data, including the use of statistical analysis
- Explain how to maintain a laboratory notebook
- Discuss various ways of communicating scientific research, including peer-reviewed journals, and presenting posters or talks at meetings

"Any tool that provides hiring managers further information regarding a job applicant's applied skills is truly welcomed. Even reference check interviews with direct supervisors are often subjective and lack granularity. A BACE-credentialed job applicant will certainly have an advantage because it mitigates some of the risks associated with true job qualification, provides reassurance of base competencies required for the industry, and helps in the design of training plans."

—Juan Martinez
Director, Downstream Process Development
Ology Bioservices, Inc.

Practical Exam Subject Categories

BIOTECHNOLOGY SKILLS

- Accurately measure liquids using micropipets and serological pipets
- Accurately measure mass using electronic balances
- Demonstrate proper aseptic/sterile technique
- Demonstrate proper culturing of microorganisms
- Demonstrate proper use of electrophoresis equipment
- Properly measure and adjust the pH of a solution with a pH meter
- Properly prepare solutions, buffers, and media
- Properly perform a serial dilution
- Describe the applications and proper use of a spectrophotometer
- Describe the proper use of a centrifuge
- Use 24-hour time correctly

APPLIED MATHEMATICS IN BIOTECHNOLOGY

- Use scientific notation, significant digits, and decimals correctly
- Perform calculations for serial dilutions
- Perform calculations using dilution ratios
- Make conversions within the metric system, and use metric measurements
- Solution preparation:
  - Solve Volume/Volume (V/V) and Weight/Volume (W/V) solution calculations
  - Solve Molarity solution calculations
  - Solve Dilution Factor calculations
- Generate a graph using collected data:
  - Apply Beer's Law
  - Generate a standard curve
  - Properly plot data
  - Interpret data

LABORATORY EQUIPMENT

- Identify laboratory glassware and equipment
- Demonstrate proper and safe use of equipment (including, but not limited to):
  - Fume hoods
  - Biosafety cabinets
  - Microscopes
  - Electrophoresis equipment
  - Spectrophotometers
  - Micropipets & serological pipets
  - Electronic balances
  - pH meters
  - Incubators
  - Centrifuges
  - Water baths
  - Stirrers/shakers
  - Vortexers
  - Autoclaves

WORKPLACE SAFETY & BEHAVIOR

- Identify Safety Symbols
- Exercise proper laboratory safety protocols
- Describe proper handling of biological and hazardous waste
- Identify and properly use Personal Protective Equipment (PPE)
- Derive information from Safety Data Sheets (SDS)
- Follow practices associated with regulatory compliance
- Demonstrate good documentation practices, including following Standard Operating Procedures (SOPs)
- Properly label items, including solutions, buffers, Petri plates, samples, and products
- Identify acceptable work habits

"Earning the BACE certification opened doors to many opportunities through my educational career. It paved the way for me to complete an independent undergraduate research study, having proven the knowledge and methods necessary to conduct ethical and valid research. This led to a paid graduate assistantship while completing my Master's degree. The BACE certification made me a stand-out candidate. Without it, I could have easily been overlooked."

—Emily Miller
Masters Candidate in Speech Pathology
University of Southern Mississippi

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APPLIED BIOTECH TRAINING

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