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# BACE

Biotechnician  
Assistant  
Credentialing  
Exam

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## DETAIL OF EXAM CATEGORIES

### Knowledge Exam Categories

#### **GENERAL TOPICS IN BIOTECHNOLOGY**

#### **Knowledge Exam**

- 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 the regulatory approval process of biopharmaceuticals
- Illustrate examples of the benefits to society of biotechnological advances
- Understand the purpose of Good Laboratory Practices (GLPs) in product testing
- Understand the purpose of Good Clinical Practices (GCPs) in clinical trials Discuss the role and identify types of documents used in CGMP compliant industries
- Understand the purpose of current Good Manufacturing Practices (CGMPs)
- Outline the role of various departments in a company, including Research and Development, Quality Assurance, Quality Control, and Manufacturing
- Identify proper workplace safety behaviors
- Describe appropriate 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 of biotechnology

#### **LABORATORY SKILLS/APPLICATIONS**

#### **Knowledge Exam**

- Describe the process of culturing microorganisms and tissues using aseptic technique
- Discuss the differences between sterilization, decontamination, and disinfection
- Describe the proper use of microscopes
- Understand the principle by which a pH meter works
- Discuss methods of chromosomal and plasmid DNA isolation, purification, and quantification
- Contrast agarose gel electrophoresis and polyacrylamide gel electrophoresis (PAGE)
- Understand how restriction enzymes are used
- Describe recombinant DNA and cloning techniques
- Discuss the transformation or 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 Western blotting, ELISA, and other immunoassays
- Explain the principles of spectrophotometry
- Demonstrate knowledge of laboratory equipment calibration and validation
- Use scientific notation correctly
- Use significant digits correctly

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### **BIOCHEMISTRY/CHEMISTRY**

### **Knowledge Exam**

- 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
- Differentiate between homogeneous and heterogeneous mixtures

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### **BIOLOGICAL SYSTEMS**

### **Knowledge Exam**

- 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”

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### **WORKPLACE SAFETY & BEHAVIOR**

### **Knowledge Exam**

- 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

## Practical Exam Categories

### **BIOTECHNOLOGY SKILLS**

### **Practical Exam**

- Accurately measure liquids using micropipettes 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**

### **Practical Exam**

- Use scientific notation correctly
- Use significant digits 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) solution calculations
  - Solve 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**

### **Practical Exam**

- Identify laboratory glassware and equipment
- Demonstrate proper and safe use of equipment (including, but not limited to):
 

○ Fume hoods	○ Micropipettes &	○ Water baths
○ Biosafety cabinets	serological pipets	○ Stirrers/shakers
○ Microscopes	○ Electronic balances	○ Vortexers
○ Electrophoresis equipment	○ pH meters	○ Autoclaves
○ Spectrophotometers	○ Incubators	
	○ Centrifuges	

## **RESEARCH & SCIENTIFIC METHOD**

## **Practical Exam**

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- 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
- Read, interpret, and draw conclusions from technical material