

Job Ready Assessment Blueprint

Biotechnology



Test Code: 4075 / Version: 01

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General Assessment Information

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Test Type: The Biotechnology industry-based credential is included in NOCTI's Job Ready assessment battery. Job Ready assessments measure technical skills at the occupational level and include items which gauge factual and theoretical knowledge. Job Ready assessments typically offer both a written and performance component and can be used at the secondary and post-secondary levels. Job Ready assessments can be delivered in an online or paper/pencil format.

Revision Team: The assessment content is based on input from secondary, post-secondary, and business/industry representatives from the state of Pennsylvania.



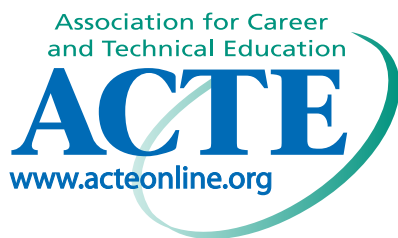
41.0101- Biotechnician/Biotechnology
Laboratory Technician



Career Cluster 8 - Health Science



43-91111.01
Bioinformatics Technicians



The Association for Career and Technical Education (ACTE), the leading professional organization for career and technical educators, commends all students who participate in career and technical education programs and choose to validate their educational attainment through rigorous technical assessments. In taking this assessment you demonstrate to your school, your parents and guardians, your future employers and yourself that you understand the concepts and knowledge needed to succeed in the workplace. Good Luck!



In the lower division
baccalaureate/associate degree
category, 3 semester hours in
Biotechnology

Written Assessment

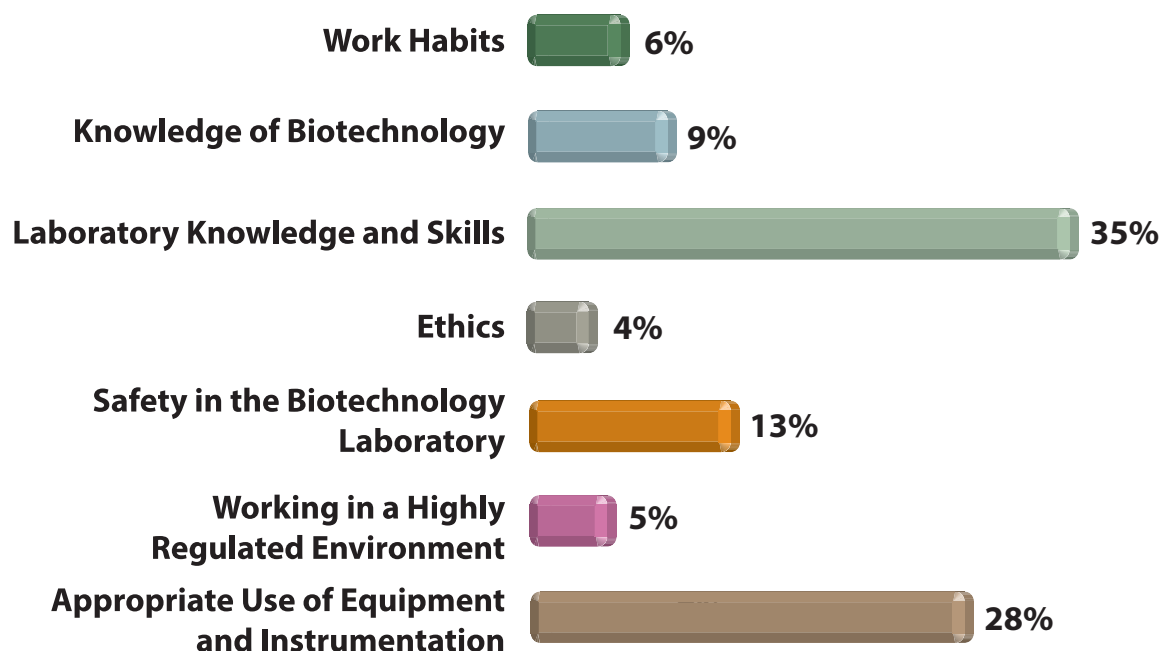
NOCTI written assessments consist of questions to measure an individual's factual theoretical knowledge.

Administration Time: 3 hours

Number of Questions: 198

Number of Sessions: This assessment may be administered in one, two, or three sessions.

Areas Covered



Specific Standards and Competencies Included in this Assessment

Work Habits

- Demonstrate professional work habits
- Demonstrate the ability to organize, implement, and troubleshoot specific tasks
- Demonstrate the ability to work in teams and as an individual

Knowledge of Biotechnology

- Define biotechnology and its role
- Demonstrate knowledge of the history of biotechnology
- Describe the life cycle of biotechnology product development
- Identify the application of the biotechnology industry
- Describe careers in biotechnology



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Specific Standards and Competencies (continued)

Laboratory Knowledge and Skills

- Demonstrate competency in validating and using laboratory equipment
- Demonstrate competency in using computer office applications
- Perform basic laboratory math skills
- Apply statistical analysis to interpret data
- Demonstrate the ability to use the scientific method
- Properly prepare buffers and solutions
- Demonstrate the concepts of recombinant technology
- Demonstrate the principles of DNA isolation
- Perform Polymerase Chain Reaction (PCR)
- Perform electrophoresis
- Perform separation techniques
- Explain and perform aseptic technique
- Demonstrate the concepts of microbial culture
- Demonstrate the concept of mammalian cell culture
- Demonstrate the concept of laboratory automation
- Perform basic spectrophotometer assays



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Specific Standards and Competencies (continued)

Ethics

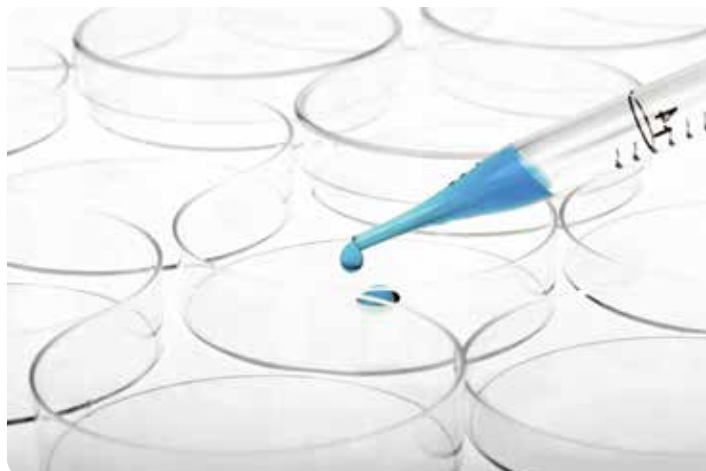
- Demonstrate the knowledge of bioethics
- Demonstrate the knowledge of professional ethics

Safety in the Biotechnology Laboratory

- Demonstrate general requirements for laboratory safety
- Identify and use personal protective equipment (PPE)
- Demonstrate ability to implement safety protocols
- Follow SDS guidelines for handling, storage, and disposal of hazardous material
- Demonstrate knowledge of safety regulatory agencies, such as OSHA

Working in a Highly Regulated Environment

- Perform documentation according to regulatory agency standards
- Demonstrate an ability to maintain records in accordance with Intellectual Property Law
- Document lab activities and findings according to guidelines



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Specific Standards and Competencies (continued)

Appropriate Use of Equipment and Instrumentation

- Use laboratory glassware
- Use volumetric equipment
- Use electrophoresis equipment
- Use a spectrophotometer
- Use balances
- Demonstrate knowledge of autoclaves
- Use centrifuges
- Use pH meters
- Demonstrate knowledge of thermocyclers
- Use microscopes
- Demonstrate knowledge of laboratory hoods for worker protection
- Demonstrate knowledge of temperature regulating devices (e.g., water baths, incubators)
- Demonstrate knowledge of chromatographic equipment



Sample Questions

The central dogma of biotechnology is

- A. protein to DNA to RNA to trait
- B. RNA to DNA to protein to trait
- C. RNA to protein to DNA to trait
- D. DNA to RNA to protein to trait

A program designed to copy itself onto other software and to spread through multiple computers when the software is used is called a

- A. bacteria
- B. bug
- C. germ
- D. virus

The study of the conduct that governs the behavior of a person or profession is called

- A. ethics
- B. morals
- C. values
- D. principles

The federal agency responsible for promoting public health through regulation and supervision of food, cosmetics, and drug products is the

- A. EPA
- B. OSHA
- C. FDA
- D. USDA

When dispensing the liquid from a micropipette, a lab technician must always

- A. push plunger to the second stop
- B. push plunger to the first stop
- C. push the tip ejector button
- D. draw the plunger up

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Sample Questions (continued)

One benefit of teamwork is

- A. less responsibility
- B. higher pay
- C. greater work efficiency
- D. less required training

The proper method to remove disposable gloves ensures that

- A. gloves can be removed and reused
- B. the gloved hand never touches skin or contaminates another surface
- C. the gloves are removed by pulling from the fingertips
- D. the SDS recommendations are followed

To validate a P1000 micropipette, 560 μ l of water should equal

- A. 0.56 g
- B. 5.60 g
- C. 0.56 mg
- D. 5.60 mg

To separate components based on their charge, use _____ column chromatography.

- A. ion-exchange
- B. gas
- C. size-exclusion
- D. thin-layer

The fire triangle refers to

- A. Class A, B, and C fires
- B. Class A, B, and C fire extinguishers
- C. physical, chemical, and biological fires
- D. heat, fuel, and oxygen needed to start a fire

Performance Assessment

NOCTI performance assessments allow individuals to demonstrate their acquired skills by completing actual jobs using the tools, materials, machines, and equipment related to the technical area.

Administration Time: 2 hours and 5 minutes

Number of Jobs: 6

Areas Covered:

27% Colony Isolation and Streaking Bacteria

Participant will wear PPE, prepare workstation with disinfectant or lab mat, label plates, use inoculating loop, maintain sterile technique, and demonstrate good laboratory practice.

17% Using Volumetric Equipment: Using Micropipettes

Participant will set micropipettes, choose the P1000 micropipette, and demonstrate good laboratory practice.

11% Using Volumetric Equipment: Serological Pipettes

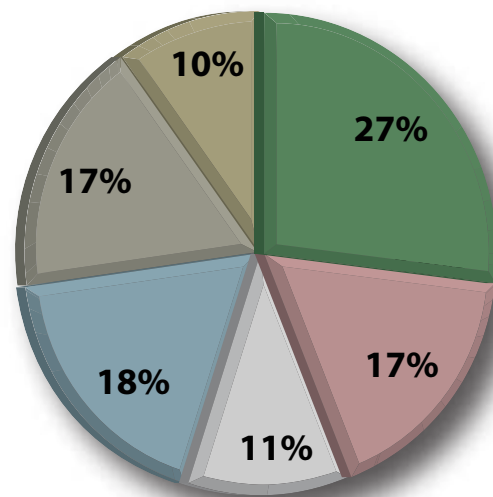
Participant will measure volume in tubes to 5.0 ml, record color and volume data, and demonstrate good laboratory practice.

18% Making a Molar Solution

Participant will calculate, massing NaCl, prepare and store salt solution, and demonstrate good laboratory practice.

17% Making a Dilution and Using a Spectrophotometer

Participant will wear proper PPE, prepare dilution, use a spectrophotometer, and demonstrate good laboratory practice.



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Areas Covered (continued)

10% Generating and Utilizing a Standard Curve

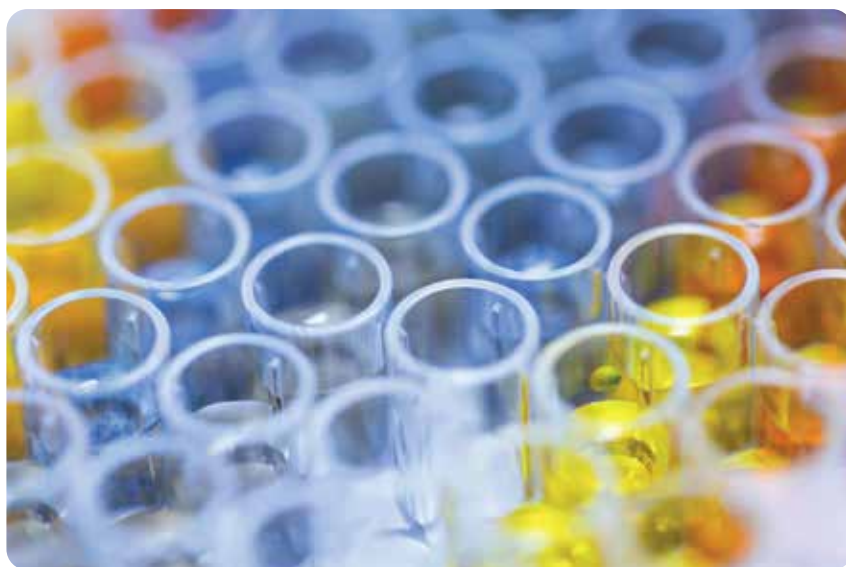
Participant will generate a standard curve and determine concentrations.

Sample Job

Colony Isolation and Streaking Bacteria

Maximum Time: 15 minutes

Participant Activity: Using the equipment provided, the participant will streak bacteria for single colony isolation from the liquid broth culture on to one agar plate.



Notes