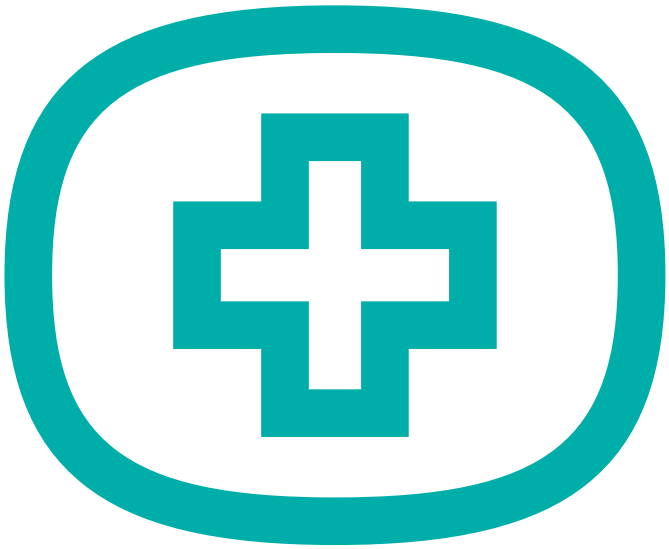
NOCTI

Teacher Credential Blueprint



Biotechnology

Code: 5389 / Version: 01

General Assessment Information

Blueprint Contents

Test Type: The Biotechnology assessment is included in NOCTI's Teacher assessment battery. Teacher assessments measure an individual's technical knowledge and skills in a proctored proficiency examination format. These assessments are used in a large number of states as part of the teacher licensing and/or certification process, assessing competency in all aspects of a particular industry. NOCTI Teacher tests typically offer both a written and performance component that must be administered at a NOCTI-approved Area Test Center. Teacher assessments can be delivered in an online or paper/pencil format.

Revision Team: The assessment content is based on input from subject matter experts representing the states of Connecticut, Georgia, Kentucky, New Jersey, New York, Oklahoma, Virginia, West Virginia.

CIP Code

41.0101- Biotechnician/Biotechnology Laboratory Technician

Learning that works for America CTE™

Career Cluster - Health Science

o*net™ in*it

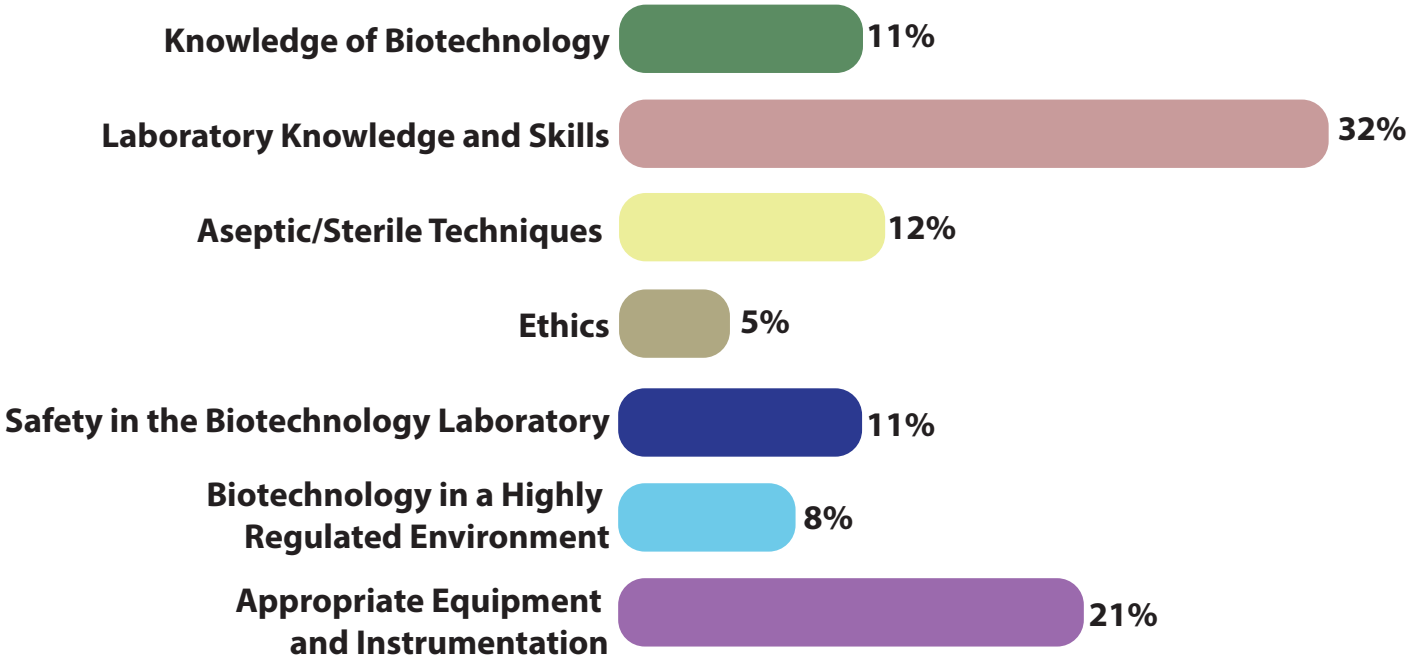
43-91111.01
Bioinformatics Technicians

Written Assessment

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

Administration Time: 3 hours
Number of Questions: 170
Number of Sessions: This assessment may be administered in one, two, or three sessions.

Areas Covered



Specific Standards and Competencies Included in this Assessment

Knowledge of Biotechnology

- Define biotechnology and its applications (e.g., agricultural, forensics, environmental, medical, food sciences)
- Demonstrate knowledge of events of biotechnology related to genetics
- Demonstrate knowledge of scientists who have shaped biotechnology (e.g., genetics, sterilization categories)
- Demonstrate understanding of the central dogma of molecular biology

Laboratory Knowledge and Skills

- Demonstrate competency in calibrating and using laboratory equipment
- Demonstrate knowledge of quality control related to validation
- Perform basic laboratory math skills in relation to material or solution preparation
- Interpret graphical data
- Demonstrate the ability to design an appropriate scientific experiment (e.g., steps in the method, independent variables, dependent variables)
- Identify different concepts of recombinant techniques
- Demonstrate the principles of electrophoresis
- Explain the process of Polymerase Chain Reaction (PCR)
- Explain various separation techniques related to proteins

Aseptic/Sterile Techniques

- Explain aseptic technique
- Demonstrate the concepts of microbial culture
- Identify and use Personal Protective Equipment (PPE)
- Demonstrate knowledge of related equipment
- Demonstrate knowledge of types of pathogens

(Continued on the following page)

Specific Standards and Competencies (continued)

Ethics
- Demonstrate knowledge of bioethics
- Demonstrate knowledge of professional ethics
- Demonstrate knowledge of how to effectively research and cite information

Safety in the Biotechnology Laboratory
- Demonstrate knowledge of general precautions for personal laboratory safety
- Demonstrate ability to implement safety protocols
- Follow SDS guidelines for handling, storage, and disposal of hazardous material
- Demonstrate knowledge of safety in compliance with OSHA
- Demonstrate awareness of safety items in a laboratory

Biotechnology in a Highly Regulated Environment
- Demonstrate knowledge of regulatory agencies and who and what they regulate
- Demonstrate an ability to maintain records
- Document lab research according to guidelines in a laboratory notebook

Appropriate Equipment and Instrumentation
- Determine appropriate general laboratory equipment for different jobs
- Accurately read various volumetric equipment
- Use microscopes
- Demonstrate knowledge of temperature regulating devices (e.g., water baths, stir plates/hot plates, incubators, freezers)
- Perform basic spectrophotometer assays

Sample Questions

The central dogma of molecular biology states that genetic information flows in only one direction. The correct order is

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

The most accurately used term that describes the process when changes occur in a Standard Operating Procedure (SOP) is

A. update
B. revision
C. editing
D. correction

Safety showers and eyewash stations need to be checked monthly to ensure

A. the water pressure is adequate
B. they are at the right height
C. the heavy metal contents of the water are high
D. the temperature is hot

The federal agency responsible for protecting people and the environment from significant health risks is the

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

When dispensing the liquid from a micropipette into an Eppendorf or microcentrifuge tube, a lab technician must

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

(*Continued on the following page*)

Sample Questions (continued)

What technique is used to separate the components of a mixture?

A. chromatography
B. PCR
C. micropipetting
D. spectrophotometry

The proper method to remove disposable gloves ensures that the

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

To validate a P1000 micropipette, 560 µl of water should equal

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

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

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

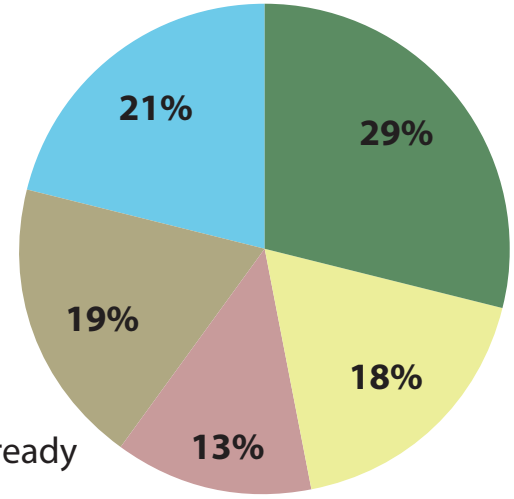
The fire triangle refers to

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: 1 hour, 45 minutes
Number of Jobs: 5



Areas Covered:

29% Colony Isolation Quadrant Streaking Bacteria Method
Participant will use the equipment provided and streak bacteria using a quadrant streaking method, place agar plate in incubator, and ensure workstation is clean and ready for next laboratory session.

18% Using Volumetric Equipment: Micropipettes
Participant will demonstrate good laboratory practices for both Step 1 and Step 2 to set micropipettes, choose the appropriate micropipette for each provided volume, provide each for evaluation, label centrifuge tube, set the appropriate micropipette to provided measurement, and ensure workstation is clean and ready for next session.

13% Using Volumetric Equipment: Serological Pipettes
Participant will select from provided pipette pumps, and accurately pipette the stock solutions into labeled tubes, compete the table provided, and ensure that workstation is clean and ready for next laboratory session.

(Continued on the following page)

Areas Covered (continued)

19% Making a Molar Solution
Participant will use the materials provided to make the correct amount of solution showing calculation, prepare the NaCl solution, store in properly labeled container, and ensure workstation is clean and ready for next laboratory session.

21% Making a Serial Dilution
Participant will use materials and equipment provided to make correct dilution, calculate final dilution, and ensure that workstation is clean and ready for next laboratory session.

Sample Job

Colony Isolation Quadrant Streaking Bacteria Method

Maximum Time: 15 minutes

Participant Activity: Using the equipment provided and aseptic technique, streak bacteria using a quadrant streaking method, place agar plate in incubator and alert evaluator, and ensure workstation is clean and ready for next laboratory session.