BIOLOGICAL TECHNICIAN
(Time-Based)

APPENDIX A

O*NET CODE 19-4021.00

This training outline is a minimum standard for Work Processes and Related Instruction. Changes in technology and regulations may result in the need for additional on-the-job or classroom training.

WORK PROCESSES

	Approximate Hours
A. Safe Work Practices	**100**
1. Develop awareness of work environment and potential biological, chemical, radiological and physical hazards.	
2. Develop awareness of environmental hazards, such as: solids, liquids, gases.	
3. Implement emergency response protocol(s) if necessary.	
4. Select, don, and doff appropriate Personal Protective Equipment (PPE).	
5. Develop awareness and demonstrate compliance with addressing safety and health concerns particular to industry, e.g., nuclear, biological, food, pharmaceutical.	
6. Setup, operate, and store equipment safely.	
B. General Skills	**150**
1. Use Fundamental Laboratory Units and Calculations, including weights, measures, ratios, mixtures, concentration and dilutions.	
2. Accurate, safe weighing of laboratory chemicals.	
3. Prepare solutions of specific concentration and pH.	
4. Accurate, Safe Sample and Reagent Transfer by handheld Pipet.	
5. Calculate and prepare Dilution Series.	
6. Label solutions and wastes per employer procedure.	
7. Sample centrifugation per employer procedure.	
8. Refer to laboratory notebook per employer procedure	
9. Learn and follow ethics and compliance procedure	

C. Biochemical Testing **1000**

1. Set-up, use, clean and take-down:
    a. Multidrop Combi Liquid Dispenser.
    b. ECHO Acoustic Sample Transfer Station.
    c. Certus Flex Liquid Dispenser.
    d. BioTek Plate Washer.
    e. PE EnVision Plate Reader.
    f. MD FLIPR Plate Reader.
2. Implement Biochemical Assay Standard Operating Procedures (SOPs) for sample testing.
3. Record and analyze biochemical test data.

D. Cell Culture and Cellular Testing **1000**

1. Setup, use, and clean:
    a. Biosafety Class II cabinets.
    b. Cell Incubators.
    c. Floor Standing Centrifuges.
2. Use and clean cell analyzers and microscopes.
3. Recognize and be familiar with culture and maintenance of:
    a. Microbial Organisms
    b. Insect Cells
    c. Mammalian Cells
4. Analyze cell culture density and health.
5. Execute Cell Culture Standard Operating Procedures (SOPs).
6. Record keeping for cell culture and maintenance.
7. Execute Cell Toxicity SOPs for sample testing.
8. Record and analyze Cell Toxicity test data.
9. Maintain cell culture laboratory housekeeping.

E. Protein Expression and Purification **1000**

1. Execute DNA Plasmid, Bacmid and Phage production and analyze SOPs.
2. Record Keeping for DNA Production.

3. Setup, use, and clean DNA Production and Analysis equipment.
4. Execute Cell Culture Infection and Transfection.
5. Setup, use, and clean Cell Infection, Cell Transfection and Analysis Equipment.
6. Execute Protein Production SOPs.
7. Record Keeping for Protein Production and Analysis
8. Setup, use, and clean protein production and analysis equipment.

F. Data Recording, Reporting, Cleanup, and Housekeeping **1000**

1. Collect data from various pieces of testing equipment.
2. Compare data to standards.
3. Report results per employer protocol(s).
4. Prepare chain of custody documents for samples taken for analysis (if applicable).
5. Use Laboratory Information Management System (LIMS).
6. Identify need for maintenance and calibration and performing when required.
7. Clean work area.
8. Maintain inventory and order spare parts (if applicable).

Approximate Total Hours **4250**

Apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law. For guidance regarding classification for purposes of Article 8 or 9 of the Labor Law, please refer to https://dol.ny.gov/public-work-and-prevailing-wage

BIOLOGICAL TECHNICIAN

APPENDIX B

RELATED INSTRUCTION

Safety/Health/Environment

1. General Workplace Safety
2. Occupational Safety and Health Administration (OSHA) required trainings (if applicable)
3. Nuclear Regulatory Commission (NRC) training(s) (if applicable) Proper selection and use of Personal Protective Equipment (PPE) Biosafety & Bloodborne Pathogens Safety
4. Industrial Hygiene Plan
5. High Potency Compound Procedures Spill Clean-up Procedures Hazardous Waste Procedures Radiation Safety
6. Emergency Response and Evacuation Hazard Communication Plan
7. Right-to-Know/Safety Data Sheets (SDS)
8. First Aid & CPR
9. Sexual Harassment Prevention Training – MUST comply with section 201-g of the Labor Law

Trade Science

1. Basic Biochemistry
2. Basic Microbiology
3. Basic Cell Biology
4. Basic Chemistry
5. Basic Mathematics
6. Core Protection

Trade Practice

1. Laboratory Equipment
2. Biochemical Analysis
3. Cell Culture and Analysis
4. Protein Expression, Purification and Analysis
5. Radiation & Radioactive Decay (if applicable)
6. Sample Preparation and Testing

7. Centrifugation
8. Liquid Handling
9. Spectrophotometry
10. Fluorimetry
11. Liquid Scintillation
12. Chromatography
13. Electrophoresis
14. Bioassay

Workplace Skills

1. Laboratory Vocabulary
2. Fundamental Laboratory Units and Calculations, including Weights,
3. Measures, Ratios, Mixtures and Dilutions
4. Accurate, Safe Weighing of Laboratory Chemicals
5. Preparation of Solutions of Specific Concentration and pH. Fundamental Hand-Held Pipetting
6. Calculation and Preparation of Dilution Series
7. Procedures for Labeling Solutions and Waste
8. Laboratory Notebook Keeping

Biochemical Testing Skills

1. Biochemical Vocabulary and Laboratory Orientation
2. Best Practices for Execution of Biochemical Assay Standard Operating Procedures (SOPs)
3. How to Read an SOP
4. Organizing the Workspace and Schedule for SOP Execution
5. Handling and Dilution of Proteins, Nucleic Acids, Substrates and Compounds Appropriate Actions in the Event of a Deviation from the SOP
6. Recording and Analysis of Biochemical Test Data

Cell Culture, Maintenance and Test Skills

1. Cell Culture Vocabulary and Laboratory Orientation
2. Personal Protective Equipment and Procedures for Cell Culture Use and Cleaning of Cell Analyzers and Microscopes
3. Aseptic Technique
4. How to Read a Cell Culture SOP
5. Organizing the Workspace and Schedule for SOP
6. Execution Appropriate Actions in the Event of a Deviation from the SOP
7. How to Read Microbial and Mammalian Cell Toxicity Assay SOPs

Protein Expression, Purification and Analysis Skills

1. Protein Expression, Purification and Analysis Vocabulary and Laboratory Orientation
2. Execution of DNA Plasmid, Bacmid. P1 Phage, P2 Phage and P3 Phage
3. Production and Analysis SOPs
    a. How to Read a DNA Production and Analysis SOP
    b. Organizing the Workspace and Schedule for SOP Execution
    c. Production of Plasmid for Expression in E.coli
    d. Production of Plasmid for Expression in Yeast
    e. Production of Plasmid and Bacmid for Expression in Mammalian Cells
    f. Production of Phage for Expression in Insect Cells
    g. Analysis of DNA Samples
    h. Appropriate Actions in the Event of a Deviation from the SOP or an
    i. Execution of Cell Infection and Cell Transfection SOPs
    j. How to Read a Cell Infection/Transfection SOP
    k. Organizing the Workspace and Schedule for SOP Execution
    l. Plasmid Transfection of E.coli
    m. Plasmid Transfection of Yeast
    n. Plasmid Transfection of Mammalian Cells

o. Phage infection of Insect Cells

p. Assessment of Transfection and Infection Efficiency

q. Assessment of Target Protein: Expression SDS-PAGE Western Blot ELISA Assay

r. Appropriate Actions in the Event of a Deviation from the SOP or an unexpected outcome

s. Record Keeping for Cell Culture Infection and Transfection

t. Setup, Use and Cleaning of Cell Infection, Cell Transfection and Analysis Equipment

4. Execution of Protein Production SOPS

   a. How to Read a Protein Production SOP

   b. Organizing the Workspace and Schedule for SOP Execution

   c. Protein Production from E.coli

   d. Protein Production from Yeast

   e. Protein Production from Mammalian Cells

   f. Protein Production from Insect Cells

   g. Assessment of Protein Production Yield and Purity Protein, Concentration Assay SDS-PAGE, Western Blot ELISA, Assay LAL, Assay Analytical SEC

   h. Appropriate Actions in the Event of a Deviation from the SOP or an unexpected outcome

   i. Record Keeping for Protein Production and Analysis

5. Setup, Use and Cleaning of Protein Production and Analysis Equipment

   a. AKTA and FPLC Chromatography Systems

   b. Chromatography Columns

   c. Electrophoresis Systems and Protein Stains

   d. High Performance Liquid Chromatography

   e. LAL Assay System

Other Biotechnology Industry Sector-Specific Topics as Needed

A Minimum of 144 Hours of Related Instruction is required for each apprentice for each year.

Appendix B topics are approved by New York State Education Department.