



## **BIOSCIENCE – TECHNOLOGIST (BSTY 2021)**

### **Preamble**

The Canadian Technology Standards (CTS) are a collection of learning outcomes for Canada's engineering technology and applied science profession at the technician and technologist level.

### **Stakeholders**

The CTS may be utilized by accreditation bodies, provincial professional associations, educational institutions, government agencies, industry and others for the purposes accreditation, certification and other applications.

### **Educational Programs**

The Bioscience CTS is relevant to programs including, but not limited to, biotechnology, environmental, agriculture, food health, and medicine at the at the technologist level.

### **Learning Outcomes**

This CTS list Discipline Learning Outcomes (DLO) which describe the significant and essential learning that students have achieved and can reliably demonstrate at the time of graduation. Each DLO has a number of Learning Outcome Indicators (LOI), which are examples illustrating, defining and clarifying the level of performance expected. The list of LOI is not comprehensive and there may be other indicators which can be used to assess achievement of learning outcomes.

### **Graduate Capability**

Students graduating from an accredited program have demonstrated achievement of all general learning outcomes, including a prescribed level of math, and discipline learning outcomes selected by the program.

Having completed a program that is based on applied mathematics and scientific and engineering theory, principles and practices and having acquired the knowledge, skills and attitudes to function in the work place, graduates are;

- able to evaluate assignments, establish objectives, set parameters and determine appropriate procedures and actions.
- able to exercise due diligence in the workplace and adhere to related practices, applicable laws and health and safety practices.

- able to work in accordance with labor-management principles and practices.
- able to work independently or interdependently as part of a discipline or multi-disciplinary team.
- prepared to assume responsibility for their work.

### **Graduate Career Opportunities**

Graduates of Bioscience Technology - Technologist programs have career opportunities in such areas as: business, industry, construction, government, and public organizations. They may find employment in careers such as laboratory activities and research; maintenance of equipment or systems; interpretation or preparation of specifications, or instructions; quality management and inspection; project management; administration; manufacturing operations; field and customer service; technical sales; supervision of manufacturing; supervision of projects; and training activities.

## Discipline Learning Outcomes (DLOs)

### **BSTY01 Quantitative Analysis**

- Evaluate, interpret, analyze, collect, and report on representative samples from various media.

Learning Outcome Indicators include:

- 1.1 Diagnose, calibrate, operate, and maintain equipment.
- 1.2 Perform complex laboratory operations.
- 1.3 Demonstrate manual dexterity.
- 1.4 Apply principles of solution chemistry in basic solution preparation, concentration units, and conversions.
- 1.5 Perform basic bioassay methods in enzymology, immunology, and microbiology.
- 1.6 Purify macromolecules using chromatographic and electrophoretic procedures.
- 1.7 Test and analyse materials utilizing variety of microscopic methods.

### **BSTY02 Qualitative Analysis**

- Perform quantitative and qualitative analyses and tests, using appropriate laboratory and/or field procedures, for use in quality control, research, process or product development, or manufacturing in bioscience.

Learning Outcome Indicators include:

- 2.1 Perform cell transformation as required.
- 2.2 Prepare, maintain, and preserve plant, animal, and microbial cultures.
- 2.3 Prepare and dispose of culture media appropriately.
- 2.4 Evaluate and implement fermentation processes as required applying appropriate process knowledge.
- 2.5 Identify cell cultures utilizing appropriate microscopic, biochemical, culture, and immunological techniques.

### **BSTY03 Instrument Maintenance and Calibration**

- Test, operate, maintain, and calibrate instrumentation and equipment appropriate to bioscience projects.

Learning Outcome Indicators include:

- 3.1 Diagnose, test, operate, and maintain equipment.
- 3.2 Calibrate instruments to manufacturers' specifications.

### **BSTY04 Environmental Systems Management**

- Contribute to the development and implementation of environmental systems management.

Learning Outcome Indicators include:

- 4.1 Use good laboratory practices in accordance with accepted principles.
- 4.2 Select and apply health, safety, and waste management procedures.
- 4.3 Identify and perform in accordance with ethical standards.

### **BSTY05 Legal and Ethical Handling of Animals**

- Implement procedures in accordance with legal and ethical criteria for the safe handling of laboratory animals, livestock, and wildlife.

Learning Outcome Indicators include:

- 5.1 Implement safe, established handling procedures for laboratory animals, livestock, and wildlife.
- 5.2 Perform routine inspections and safety checks.
- 5.3 Evaluate and monitor animal health and apply quarantine programs.

### **BSTY06 Aquatic Ecosystems**

- Identify and differentiate the evolutionary stages in aquatic ecosystems.

Learning Outcome Indicators include:

- 6.1 Interpret stages of plant and animal primary succession.
- 6.2 Interpret principles and factors affecting lake and water flow evolution.

### **BSTY07 Air and Water Pollution**

- Perform biological procedures for air and water pollution control.

Learning Outcome Indicators include:

- 7.1 Interpret and identify sources of air and water pollution.
- 7.2 Interpret, compute, and record meteorological data.
- 7.3 Calibrate, operate, and maintain test-monitoring equipment.
- 7.4 Process, collect, transport, and store air and water samples in accordance with established procedures.
- 7.5 Interpret and generate bacterial counts.
- 7.6 Assess, record and document data.

### **BSTY08 Environmental Studies**

- Interpret and analyze environmental studies and data.

Learning Outcome Indicators include:

- 8.1 Identify and apply basic concepts of ecosystems in analysis of environmental studies.
- 8.2 Interpret and analyze field reports for sustainable development and renewable resources.

### **BSTY09 Molecular Biology**

- Implement molecular biology procedures for use in quality control, research, product development, or manufacturing in a biotechnology environment.

Learning Outcome Indicators include:

- 9.1 Perform extraction and purification of DNA/RNA.
- 9.2 Perform DNA/RNA manipulations such as cloning, sequencing, and gene amplification.
- 9.3 Use DNA/protein analysis computer software.
- 9.4 Use and access analytical software using internet resources.
- 9.5 Perform electrophoretic, blotting, and hybridization techniques.

### **BSTY10 Professional Reporting**

- Interpret, prepare, maintain, and communicate scientific data effectively.

Learning Outcome Indicators include:

- 10.1 Prepare and maintain accurate records using manual and computer-based methods.
- 10.2 Manipulate data using computer software such as spreadsheet, database, or statistical software.
- 10.3 Implement appropriate literature searches.
- 10.4 Create technical documents and presentations.
- 10.5 Present results clearly and concisely using oral, written, graphic, or electronic formats.
- 10.6 Interpret experimental data.

### **BSTY11 Management Practices**

- Apply management practices in a biotechnology workplace.

Learning Outcome Indicators include:

- 11.1 Implement purchase of supplies and control of inventories.
- 11.2 Contribute to budget planning.
- 11.3 Use economy of time, effort, and materials in project management.

### **BSTY12 Quality Assurance**

- Apply quality assurance techniques in a lab environment.

Learning Outcome Indicators include:

- 12.1 Differentiate between quality control and quality assurance.
- 12.2 Implement routine checks.

- 12.3 Implement good lab practices in accordance with accepted principles of quality assurance.
- 12.4 Implement systems for monitoring quality conformance.

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