



Laboratory Worker

Bio-economy Skills Profile



Building skills for Canada's bio-economy

About BioTalent Canada

Helping Canada's Bio-economy thrive globally

Canada is a world leader in biotechnology—the application of living organisms to industrial, agricultural, medical and other processes and products. To maintain and build on this leadership, the sector needs highly skilled, job-ready people.

By acting as a national hub and central resource for employers, job seekers, students, educators and government agencies, BioTalent Canada helps make this happen.



Building skills for Canada's bio-economy

www.biotalent.ca • Telephone: 613-235-1402



This project is funded by the Government of Canada's Foreign Credential Recognition Program.

Table of Contents

About the BioTalent Canada bio-economy skills profiles	3
Occupational Definition	3
Components of the skills profile	4
Focus on competencies	4
How to use the profiles	4
Scenario.....	5
Situational Analysis	6
Essential Skills	7
Language Benchmarks	8
Competency Profile	9
A. Conducts professional practice according to established protocols, safety guidelines and existing legislation	9
B. Verifies relevant data and ensures that appropriate samples are procured according to established protocols.....	11
C. Analyzes samples and validates results using established protocols	12
D. Understands the principles and performs proper analytical techniques on samples that originate from a variety of sources ..	13
E. Interprets, communicates and documents confidential data, using scientific knowledge as the basis	17
F. Practices and promotes the principles of quality management and the efficient utilization of resources	18
G. Applies critical thinking skills to constructively solve problems.....	19

H. Addresses workplace challenges by applying skills in change management, time management, materials management and information management..... 20

I. Projects a professional image and interacts in a competent manner, using effective listening, verbal and written communication in dealings with others..... 21

J. Meets legal and ethical requirements of practice..... 22

About the BioTalent Canada bio-economy skills profiles

Biotechnology's fusion of science and business creates unique requirements for occupations in the sector. Executives and managers must have technical expertise; technical staff often need entrepreneurial skill sets. Occupational descriptions from other sources don't always fit the bio-economy context. That's why, in partnership with industry stakeholders, BioTalent Canada has developed skills profiles specific to the bio-economy including this description of the role of a Laboratory Worker.

Occupational Definition

Laboratory Workers are employed in various bio-economy laboratories including research, quality control and quality assurance laboratories. They perform "on-the-bench" tasks and laboratory procedures under the supervision of laboratory technologists, laboratory researchers, research scientists and other senior staff. They assist and support laboratory processes in compliance with good laboratory and manufacturing practices, and may participate in the development of structures and processes related to biotechnology. Laboratory Workers are employed under a variety of job titles by Canadian bio-economy companies of different sizes (i.e., small, medium, large) and in various subsectors, such as:

- Agriculture
- Aquaculture
- Bioenergy
- Bioinformatics
- Bioproducts
- Biosciences
- Environment
- Food Processing
- Forestry
- Genomics
- Human Health
- Industrial
- Life Sciences
- Medical Devices
- Natural Resources
- Nanotechnology
- Nutraceuticals
- Pharmaceuticals

The specific duties and responsibilities associated with the role of a Laboratory Worker may vary according to employer, company and biotechnology area. Laboratory Workers must adhere to industry and workplace policies, health and safety standards and good manufacturing processes (if applicable) when carrying out their work. They do not commonly supervise or oversee the work of other laboratory staff.

Components of the skills profile

Every BioTalent Canada skills profile presents the areas of competence and tasks associated with a specific occupation.

Area of competence (AC): This describes a major function or responsibility associated with the profession, trade or position.

Task: This is a specific, observable unit of work with definite start and end points. Tasks can be broken down into two or more steps and are generally performed in a limited period of time. Tasks and ACs are identified in behavioural terms, beginning with a verb that describes the applied behaviour.

Focus on competencies

The BioTalent Canada skills profiles are built around *areas of competence* because competencies are flexible, inclusive and linked directly to performance: they are the traits or qualities a professional must have to succeed in a given role within a given organization, and can be used for recruiting, professional development, curriculum planning and many other purposes.

How to use the profiles

The complete contents of this or any BioTalent Canada skills profile are unlikely to be used for any one position. Because they are comprehensive, they include every area of competence and task that *could* be required for a specific occupation. In reality, the definition of a given job will encompass a narrower subset of the profile. Hiring organizations must choose the elements of the profiles that are relevant to their businesses—and tailor those elements as necessary to more precisely describe their particular job requirements.

The profiles can be put to many uses:

- **Employers** can use them to develop job descriptions, performance evaluations, professional development, succession planning, team building, target skills needed, and recruitment plans.
- **Job seekers** can use them to tailor their resumes, prepare for interviews, see job descriptions and identify additional professional development needs.

- **Educators** can build industry-oriented curricula from the profiles to produce job-ready graduates.
- **Students** can enhance their understanding of employers' expectations and choose the right educational programs to equip themselves with the skills for success.

Scenario

The following illustrates how an employer might use the BioTalent Canada skills profiles to identify professional development priorities for his or her team.

Step 1

The employer would review the ACs for each occupation and identify which apply to the related positions within his or her company, omitting those that are not relevant.

Step 2

Under the selected ACs, the employer then notes which of the associated tasks are relevant to that specific position within his or her business.

Step 3

Now with a complete, tailored profile, the employer can assess employee performance. Needs areas are easily identified and defined—to a significant depth of detail.

Step 4

Based on the needs analysis, the employer can either develop or seek out professional development programs that address employee needs areas.

Situational Analysis

Laboratory Workers must be adaptable and maintain a strong work ethic to complete their various research and analysis tasks. As a part of the laboratory team, they play an important assistive role to senior researchers and laboratory technicians and technologists, quality and technical managers, and principal investigators. Although their responsibilities and duties can vary greatly between employers, subsectors and specializations, Laboratory Workers often handle large amounts of laboratory work to meet deadlines and project timetables.

Laboratory Workers must effectively adapt to tight deadlines and sudden and frequent changing priorities. Industry practitioners noted that experiments and research frequently require their attention and observation outside their regular or scheduled working shifts, and may require them to work after hours, overtime and during weekends depending on the nature of their experiments, research and analysis. In addition to shift work, Laboratory Workers may work three to four consecutive days, rotating the same number of “off days”. The degree to which they engage in shift work depends on the nature of their work, the types of research and experiments they assist, and the operating hours of their laboratories. Funding schedules and deadlines also directly affect their work hours as principal investigators must meet their funding and contractual requirements, increasing the workload of Laboratory Workers at certain specific times of the year, dependent on subsector, organization and specialization.

Entry into the position of a Laboratory Worker often consists of a community college diploma (two-year laboratory technician / technologist program). Incumbents may hold Bachelor’s degrees in scientific areas including chemistry and biology, and current incumbents may hold Grade 12 academic diplomas, backed by years of practical laboratory experience. Incumbents and supplementary research state that these academic credentials should be accompanied by on-the-job training experience in the biotechnology or related industry. Typical minimum levels of education to perform the duties and responsibilities of the Laboratory Worker are equivalent to high school graduation and the completion of a college or technical school diploma training program. This training must often be supported by related work experience.

Laboratory Workers must be able to work in a fast-paced research environment, and excel at prioritizing multiple work tasks under sometimes strict and firm deadlines. They must be self-motivated and directed, yet realize and accept their supportive role in their laboratories. Practitioners stressed the importance of communication skills within the laboratory setting, as verbal and written instructions comprise their daily work tasks. Their ability to quickly and effectively understand instructions from senior laboratory staff, and their ability to completely comprehend their work allows Laboratory Workers to perform well in their job. Additionally, Laboratory Workers should be able to work well in teams and maintain an approachable and friendly attitude. Honesty was mentioned by many practitioners as an essential personal attribute. Honesty serves to maintain Laboratory Workers’ personal integrity, as well as the reliability of their research.

Future changes are mostly related to technological advances, increasing legislative and regulatory requirements, and increasing expectations of employers and supervisors regarding the duties and responsibilities of Laboratory Workers. The equipment they use to perform their

various research tasks, and the technology associated with the equipment adapts very rapidly and forces re-training and additional thinking skills to process their research findings. As new technologies and equipment change the techniques used in research, Laboratory Workers must ensure they stay abreast of associated changes to policies and procedures from all levels, including organizational changes and legislative changes. They are frequently being asked to perform skills they did not perform previously, and partake in the associated learning to complete these new tasks quickly and accurately. Their roles and responsibilities are expanding with their experience and can be determined by their companies' research needs and funding pools.

Essential Skills

The most important Essential Skill(s) for this Profile: ✓					
	Reading Text		Thinking Skills – Problem Solving		Working With Others
✓	Document Use		Thinking Skills – Decision Making	✓	Computer Use
	Writing		Thinking Skills – Critical Thinking		Continuous Learning
	Numeracy		Thinking Skills – Job Task Planning & Organizing		
✓	Oral Communication		Thinking Skills – Significant Use of Memory		
			Thinking Skills – Finding Information		

Laboratory Workers must remain knowledgeable about testing protocols and skilled in sample collection procedures. They learn through the completion of their daily tasks and interactions with co-workers. They may read articles in industry magazines to become knowledgeable of emerging life science issues and biotechnology trends within their sectors. They may attend seminars provided by their organizations on changes to policies and procedures and other corporate matters such as privacy and confidentiality and methods for safeguarding data.

Laboratory Workers must be calm and understanding and enjoy interacting with other staff.

Computer use will continue to be an important skill with the expanding use of databases to manage testing data, biological samples and test results.

Language Benchmarks

Laboratory Workers must be able to perform the full range of tasks and will need an upward language benchmark level of 10. The majority of the criteria used in the Canadian Language Benchmarks were found to be about level 8.

Competency Profile

A Laboratory Worker:

A. Conducts professional practice according to established protocols, safety guidelines and existing legislation

	TASKS
1	Applies the principles of standard precautions
2	Uses personal protective equipment (e.g., gloves, gowns, mask, face shields, aprons)
3	Applies appropriate laboratory hygiene and infection control practices
4	Minimizes possible dangers from biological samples, laboratory supplies, radioactive material and equipment
5	Utilizes laboratory safety devices in a correct manner (e.g., biological safety cabinets, fume hoods, laminar flow cabinets, safety pipetting devices, safety containers and carriers, safety showers, eye washes)
6	Labels, dates, handles, stores, and disposes of chemicals, dyes, reagents and solutions according to WHMIS and existing legislation
7	Handles and disposes of "sharps" according to institutional policy
8	Stores, handles, transports and disposes of biological, chemical, radioactive materials and controlled substances according to existing legislation
9	Selects and utilizes the appropriate method for items to be disinfected/sterilized
10	Minimizes the potential hazards related to disinfection/sterilization methods

	TASKS
11	Seeks appropriate first-aid treatment by mobilizing emergency response (e.g., external response (911) and/or internal response (Emergency Response Team), to respond to incidents such as chemical injury, traumatic injury, electrical shock, burns, radioisotope contamination)
12	Applies spill containment and clean up procedures for infectious materials and dangerous chemicals according to institutional policy
13	Responds appropriately to fire emergencies
14	Reports incidents related to safety and personal injury (e.g., needle stick injuries), in a timely manner to management

A Laboratory Worker:

B. Verifies relevant data and ensures that appropriate samples are procured according to established protocols

	TASKS
1	Records relevant information on appropriate requisition forms
2	Procures and labels samples according to specific requirements, in a variety of conditions
3	Observes established protocols for procurement of samples with legal implications
4	Collects, labels and delivers samples in a safe and timely manner taking into account priority and sample stability
5	Verifies sample suitability including adequate amount/volume and integrity
6	Validates documentation to ensure that it corresponds with the sample
7	Registers samples into laboratory information system (e.g., logbook, computers)
8	Complies with existing guidelines for sample retention, storage and disposal
9	Takes corrective action when errors in sample procurement are identified

A Laboratory Worker:

C. Analyzes samples and validates results using established protocols

	TASKS
1	Prepares samples for analysis (e.g., centrifuging, aliquoting, preserving)
2	Ensures appropriate storage of samples
3	Prioritizes analyses according to sample stability (e.g., urgent, routine, etc.)
4	Maximizes efficient use of resources (e.g., time, equipment, personnel)
5	Prepares and uses calibrators, standards, quality control materials
6	Organizes samples from worklists, log books and computerized work documents
7	Performs analyses within acceptable limits of error
8	Verifies test results using calibration and quality control data
9	Recognizes possible sample/analytical deficiencies and takes appropriate action
10	Identifies implausible results and takes appropriate action
11	Verifies that sample identification is traceable throughout the analysis
12	Verifies that all ordered analyses have been completed

A Laboratory Worker:

D. Understands the principles and performs proper analytical techniques on samples that originate from a variety of sources

	TASKS
1	Collects samples (e.g., completes documentation, labels collection vessel properly, etc.)
2	Processes samples (e.g., isolates cells, performs staining)
3	Stores samples (e.g., stores samples temporarily or for archiving purposes such as cryopreservation)
4	Applies the principles of working with hazardous chemical or biological material regarding reagent preparation, storage and disposal (WHMIS)
5	Weighs out chemicals on sensitive weighing devices
6	Uses appropriate personal protective equipment (e.g., mask, gloves, laboratory coat, etc.)
7	Conducts volume measurements on liquids using micropipetors, pipettes, graduated cylinders
8	Calculates concentrations, areas, dilutions and other measurements in varying units of measure
9	Uses laboratory materials in a cost effective manner
10	Maintains and calibrates laboratory equipment and initiates repair procedures when necessary
11	Applies principles of working with hazardous materials when cleaning and disinfecting equipment (e.g., centrifuge, incubator)
12	Works with radioactive materials

	TASKS
13	Performs microscopy
14	Prevents cross-contamination and/or applies aseptic technique
15	Reports all equipment malfunctions
16	<p>Applies tissue culture techniques related to field of work outlined by supervisor.</p> <p>For example:</p> <ul style="list-style-type: none"> - performs cell separation techniques (e.g., using centrifugation) - performs sterile dissections - uses a haemocytometer for quantification of cell number - uses a Coulter counter - performs staining for immunocytochemistry, for flow cytometry, differential staining - uses bio-containment hoods - uses and maintains incubators - uses and maintains water baths - disposes of tissue culture products properly (e.g., autoclaving, decontamination of tissues or biological fluids) - uses environmental shakers for mass production of bacterial cultures - performs propagation of human/animal cell lines - performs bacterial/viral productions - performs fixation/cryopreservation of tissues
17	Performs assays related to field of work outlined by supervisor, potentially including enzymes, cytokines, functional assays, antibody production, ELISAs, immunofluorescence, protein, and assays used to measure cell-mediated immune responses

	TASKS
18	<p>Performs chemical tests related to field of work outlined by supervisor, potentially including:</p> <ul style="list-style-type: none"> - chromatography, High Pressure Liquid Chromatography (HPLC), spectrometry, ion chromatography, and mass spectrometry; - chemistry on waste for regulatory compliance such as Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), ammonia, Total Kjeldahl Nitrogen (TKN), phosphorous, solids testing, pH, and oils and greases; - on food (e.g., nutritional labelling of calories and proportion, food additives and colours, fatty matter, protein, ash content, complete profile of fatty acids, cholesterol, minerals, vitamins); - on water (e.g., hardness, metals in water, conductivity, trihalomethanes, hydrocarbons, carbohydrates, moisture, refractive index, viscosity, sulphites and chemical residues).
19	<p>Performs molecular biology techniques related to field of work outlined by supervisor, potentially including gel electrophoresis, Quantitative Reverse Transcription (QRT), Polymerase Chain Reaction (PCR), Western Blots and isolation of DNA/RNA and protein</p>
20	<p>Performs microbiology techniques related to field of work outlined by supervisor, potentially including:</p> <ul style="list-style-type: none"> - drinking water regulatory compliance testing for total coliforms and E. Coli, waste waters and coliform testing; - food safety testing on shellfish and other foods, lysteria presence and salmonella, Staph. Aureus, total plate counts and bio burden testing.
21	<p>Works with mammals related to field of work outlined by supervisor, potentially including:</p> <ul style="list-style-type: none"> - cognitive testing (e.g., water maze tests, animal profusions, tissue harvesting, intravenous injections and blood collection); - use of microtome for sectioning, blood gas analyzer and Oxygen Glucose Depravation (OCG) chamber.
22	<p>Applies good record keeping skills (e.g., maintains up to date laboratory notebook)</p>
23	<p>Applies computer skills in the processing and presentation of data</p>

	TASKS
24	Is knowledgeable of appropriate computer software (e.g., word processing, spreadsheet, graphics)
25	Maintains laboratory supplies and monitors inventories (e.g., by identifying supply shortages and reordering as necessary, identifying expired chemicals and disposing of chemicals properly, dealing with laboratory suppliers by telephone and in person)
26	Practices Good Laboratory Practices (GLP)
27	Maintains a clean and well organized work environment
28	Follows procedural documentation (e.g., standard operating procedures (SOPs), test procedures)

A Laboratory Worker:

E. Interprets, communicates and documents confidential data, using scientific knowledge as the basis

	TASKS
1	Evaluates analytical results on the basis of: <ul style="list-style-type: none"> - reference values - critical values - method limitations (e.g., dynamic ranges, interferences, specificity, sensitivity) - delta checks - recognition of implausible results - relationship to clinical conditions - relationship to other laboratory findings
2	Releases results of laboratory analyses that meet internal quality control criteria in a timely and efficient manner
3	Recognizes when results of analyses are outside expected findings and responds appropriately
4	Investigates unusual findings prior to reporting
5	Recognizes critical values and responds appropriately
6	Communicates information regarding laboratory analyses in an appropriate manner
7	Ensures that laboratory results are accurately documented and retained in accordance with existing legislation
8	Uses a computer for data entry, storage, retrieval and calculations

A Laboratory Worker:

F. Practices and promotes the principles of quality management and the efficient utilization of resources

	TASKS
1	Follows established protocols as defined in policy and procedure manuals
2	Determines if there is a need for calibration of instruments with electronic and/or manual methods
3	Performs and assesses quality control (internal and external)
4	Utilizes statistics and indicators to monitor the acceptability of results based on established quality control ranges
5	Maintains appropriate documentation (e.g., document laboratory reporting errors and corrective measures taken)
6	Utilizes responsible practices which contribute to the cost-effective use of resources
7	Follows established preventive maintenance programs and maintains instrument logs
8	Recognizes malfunctions in equipment/instruments and initiates appropriate corrective action
9	Addresses equipment/instrument malfunction according to established protocol
10	Applies continuous quality improvement techniques and risk management processes to ensure quality laboratory services

A Laboratory Worker:

G. Applies critical thinking skills to constructively solve problems

	TASKS
1	Demonstrates an open, inquiring mind and self-directed learning processes in resolving analytical, workplace and career challenges
2	Demonstrates the ability to adapt to rapidly changing situations (e.g., responds appropriately to critical situations; retains composure in stressful situations; applies existing skills to new situations; makes appropriate decisions when working independently)
3	Recognizes that change initiated in one area will impact on other areas

A Laboratory Worker:

H. Addresses workplace challenges by applying skills in change management, time management, materials management and information management

	TASKS
1	Contributes to, responds to, and effectively works in a changing environment
2	Demonstrates effective time management
3	Participates in maintaining and controlling inventory and purchase of supplies
4	May participate in shipping and receiving of dangerous goods and controlled substances
5	Plans work schedule according to tasks and availability of equipment
6	Uses computers, laboratory information systems and related technology in sample tracking and data management

A Laboratory Worker:

I. Projects a professional image and interacts in a competent manner, using effective listening, verbal and written communication in dealings with others

	TASKS
1	Practices effective communication with others while maintaining a professional attitude
2	Seeks out and listens to others
3	Uses effective verbal communication strategies (e.g. communicates in French when appropriate)
4	Uses technology appropriately to facilitate communication
5	Writes clearly and concisely in English
6	Uses effective written communication strategies
7	Identifies barriers to effective communication
8	Recognizes forms of non-verbal communication
9	Works effectively with team members and others

A Laboratory Worker:

J. Meets the legal and ethical requirements of practice

	TASKS
1	Maintains confidentiality (e.g., data, records, intellectual property, client information)
2	Seeks help and guidance when asked to perform beyond competence
3	Exercises a judicious approach to the right to refuse to participate in potentially dangerous situations
4	Takes responsibility and is accountable for his/her actions
5	Identifies learning needs and participates in continuing education and skills development
6	Keeps abreast of laboratory techniques and research and shares new knowledge with colleagues
7	Promotes a professional image by maintaining high standards in practice
8	Recognizes how ethical issues affect the Laboratory Worker

Strong Board of Directors

The Board of Directors is composed of experts in the field of HR: CEO's, CFO's and CSO's from across Canada with extensive financial and industry experience representing companies and organizations in Canada's bio-economy. BioTalent Canada is not a membership organization and therefore relies on the guidance provided by its dedicated volunteer Board of Directors.

John McMillan (Chair)
Winnipeg, MB

Bob Ingratta (Vice Chair)
President
Fast-Trak Strategies
Ottawa, ON

Christopher Adams (Treasurer)
AdamsRevers
Toronto, ON

Dupuis Angers (Past Chair)
Senior Director of Business Development
Ovos Natural Products
Laval, QC

Norma K. Biln
Chief Executive Officer
Augurex Life Sciences Corp.
North Vancouver, BC

Anne-Marie Bonneau
Vice-President & COO
Aurelium BioPharma Inc.
Montréal, QC

Patrick Girouard
President
AgroNovita Inc.
Ottawa, ON

Denis Kay
Chief Scientific Officer
Neurodyn Inc.
Charlottetown, PE

Wilf Keller
President & CEO
Genome Prairie
Saskatoon, SK

Victor Knopov
President & COO
Diversified Bio-Medics, Inc.
Richmond, BC

Janet LeClair
Human Resources
Toronto Centre for Phenogenomics
Toronto, ON

Linda Lupini
Senior Vice President
Human Resources and Organizational
Development
QLT Inc.
Vancouver, BC

Lucie Morin
Human Resources Senior Advisor
ProMetic Life Sciences Inc.
Mont-Royal, QC

Julia O'Rawe
Associate Vice President HR Canada & Global
HR Partner R&D
Sanofi Pasteur
Toronto, ON

Ashley O'Sullivan
Saskatoon, SK

François Schubert
General Manager, Administration
The Research Institute-McGill University
Health Centre
Montréal, QC

Jim Smith
Executive Director
Food Technology Centre, Prince Edward Island
Charlottetown, PE

Lee D. Wilson
Assistant Professor, Department of Chemistry
University of Saskatchewan
Saskatoon, SK

Secretary:
Colette Rivet
Executive Director
BioTalent Canada
Ottawa, ON



Building skills for Canada's bio-economy

www.biotalent.ca • Telephone: 613-235-1402