INUKSHUK ACADEMY

Course code: **Biology (SBI4U)**
Total Hours: **110 hours** and Credit: **1.0**
Prerequisite: **Biology (SBI3U)**
Curriculum basis: **Ontario Curriculum, Grades 11–12: Science (Revised 2008)**
Last Update: **Inukshuk Academy 2026**

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Course Description

This course provides students with the opportunity for in-depth study of the concepts and processes that occur in biological systems. Students will study theory and conduct investigations in the areas of biochemistry, metabolic processes, molecular genetics, homeostasis, and population dynamics. Emphasis will be placed on the achievement of detailed knowledge and the refinement of skills needed for further study in various branches of the life sciences and related fields.

1. Course Rationale

Biology provides the scientific framework for understanding living systems, their interactions, and the processes that sustain life. SBI4U strengthens students' ability to investigate complex biological systems, analyze scientific evidence, and apply inquiry-based reasoning to contemporary scientific and societal issues.

Through scientific investigation, research, and inquiry, students:

- Develop a deeper understanding of biochemistry, metabolic processes, molecular genetics, homeostasis, and population dynamics;
- Explore the relationships between molecular structure, cellular function, physiological regulation, and ecological interactions;
- Refine laboratory, analytical, and scientific investigation skills essential for university-level science and STEM disciplines;
- Learn to interpret biological data, evaluate scientific evidence, and communicate scientific reasoning clearly using appropriate biological terminology and representations;
- Examine the impact of biotechnology, genetics, medicine, environmental change, and scientific innovation on individuals, society, and global sustainability;
- Investigate ethical, environmental, and societal issues related to modern biological research and technological advancement.

The course fosters scientific literacy, critical thinking, inquiry, and problem-solving skills essential for success in university-level programs and careers in biology, health sciences, biotechnology, environmental science, medicine, and related scientific fields.

2. Overall Curriculum Expectations

The Ontario Curriculum organizes SBI4U into five major strands. The following expectations are paraphrased for clarity and alignment with Inukshuk Academy's course design.

a. Scientific Investigation Skills and Career Exploration

Students will:

- Demonstrate scientific investigation skills related to inquiry, research, experimentation, and communication;

- Analyze biological data using appropriate laboratory procedures, technology, and scientific methods;
- Evaluate scientific evidence and communicate conclusions using proper biological terminology and conventions;
- Explore careers related to biology, health sciences, biotechnology, environmental science, medicine, and research.

b. Biochemistry

Students will:

- Analyze the structures and functions of biological molecules involved in cellular processes;
- Investigate biochemical reactions involving carbohydrates, lipids, proteins, enzymes, and nucleic acids;
- Demonstrate an understanding of metabolic processes and energy transformations within living systems;
- Evaluate the importance of biochemistry in health, medicine, biotechnology, and nutrition.

c. Metabolic Processes

Students will:

- Investigate cellular respiration, photosynthesis, and energy transfer in living organisms;
- Analyze the relationships among metabolic pathways, energy production, and environmental conditions;
- Compare aerobic and anaerobic processes using scientific evidence and laboratory inquiry;
- Evaluate the ecological and societal importance of metabolic processes.

d. Molecular Genetics

Students will:

- Investigate DNA structure, replication, protein synthesis, and gene expression;
- Analyze mechanisms of genetic mutation, regulation, and biotechnology;
- Evaluate ethical and social implications of genetic engineering and genomic research;
- Demonstrate an understanding of heredity and molecular processes within cells.

e. Homeostasis

Students will:

- Analyze the physiological mechanisms that maintain internal balance in organisms;
- Investigate feedback systems involving the nervous, endocrine, and excretory systems;
- Demonstrate an understanding of how body systems interact to maintain homeostasis;
- Evaluate technologies and medical treatments related to human health and physiological regulation.

f. Population Dynamics

Students will:

- Investigate population growth, species interactions, and ecological relationships;
- Analyze factors affecting population sustainability and ecosystem stability;
- Evaluate the impact of human activities on populations, biodiversity, and the environment;
- Demonstrate an understanding of population models, resource management, and ecological change.

3. Learning Goals for Students

By the end of SBI4U, students will be able to:

- Analyze biological systems using scientific inquiry, research, and evidence-based reasoning;
- Conduct investigations using proper laboratory safety, experimental design, observation, measurement, and data analysis;
- Explain biochemical processes, metabolism, molecular genetics, homeostasis, and population dynamics using appropriate scientific terminology;
- Interpret biological data using diagrams, charts, models, graphs, and scientific representations;
- Evaluate the impact of biological science and biotechnology on health, society, sustainability, and the environment;
- Analyze ethical, environmental, and societal issues related to genetics, medicine, ecology, and biotechnology;
- Communicate scientific reasoning clearly using appropriate biological vocabulary, laboratory conventions, research methods, and scientific formats.

Course Structure and Instructional Units

Unit	Description	Hours
Unit 0: Scientific Investigation Skills and Career Exploration	Laboratory safety, inquiry skills, research methods, biotechnology careers, scientific communication	5
Unit 1: Biochemistry	Biological molecules, enzymes, metabolic reactions, energy transfer, molecular structure and function	20
Unit 2: Metabolic Processes	Cellular respiration, photosynthesis, ATP production, aerobic and anaerobic pathways, environmental influences	22
Unit 3: Molecular Genetics	DNA structure and replication, protein synthesis, gene regulation, mutations, biotechnology, ethical issues	24

Unit 4: Homeostasis	Nervous, endocrine, and excretory systems; feedback mechanisms; physiological regulation and health	21
Unit 5: Population Dynamics	Population growth, species interactions, ecological relationships, sustainability, human environmental impact	15
Culminating Task	Biological investigation, research assignment, or applied inquiry project	5
Final Exam	Proctored examination	8
	Total	**120**

4. Course Structure, Unit Overview and Instructional Plan

1. Unit 0: Scientific Investigation Skills and Career Exploration

Approx. Hours: 5

a. Unit Overview

This introductory unit strengthens the foundational scientific investigation and laboratory skills students require for success in Grade 12 Biology. Students review laboratory safety procedures, scientific inquiry methods, experimental design, data analysis, and biological communication conventions. Emphasis is placed on safe laboratory practice, ethical scientific investigation, and accurate interpretation of biological evidence.

Students also explore careers and postsecondary pathways related to biology, biotechnology, medicine, environmental science, and health sciences.

b. Key Learning Goals

Students will:

- Apply laboratory safety procedures and WHMIS guidelines appropriately;
- Develop scientific inquiry and experimental design skills;
- Analyze and communicate biological data using proper scientific conventions;
- Evaluate scientific sources and biological evidence critically;
- Explore careers and emerging fields related to biology and biotechnology.

c. Sample Learning and Assessment Activities

- Laboratory safety and WHMIS review activities;
- Scientific method and experimental design investigations;
- Data interpretation and graphing exercises;
- Career exploration and biotechnology research tasks;
- Diagnostic activities, inquiry tasks, laboratory skill assessments.

2. Unit 1: Biochemistry

Approx. Hours: 20

a. Unit Overview

In this unit, students investigate the structures and functions of biological molecules and their roles in cellular processes. Students examine carbohydrates, lipids, proteins, nucleic acids, enzymes, and metabolic reactions while exploring the relationship between molecular structure and biological function.

Laboratory investigations and modelling activities help students understand energy transformations, enzyme activity, and biochemical processes essential for life.

b. Key Learning Goals

Students will:

- Analyze the structure and function of biological molecules;
- Investigate enzyme activity and factors affecting metabolic reactions;
- Explain biochemical processes related to energy transfer and cellular function;
- Interpret molecular models and biochemical data;
- Evaluate applications of biochemistry in health, nutrition, and biotechnology.

c. Sample Learning and Assessment Activities

- Enzyme activity laboratory investigations;
- Molecular structure modelling activities;
- Biochemical reaction simulations;
- Nutritional and metabolic case studies;
- Laboratory reports, modelling tasks, quizzes, unit test.

3. Unit 2: Metabolic Processes

Approx. Hours: 22

a. Unit Overview

Students investigate the metabolic processes that sustain life, with emphasis on cellular respiration and photosynthesis. Students analyze energy transfer, ATP production, aerobic and anaerobic pathways, and the environmental factors affecting metabolic efficiency.

The unit emphasizes connections between biochemical reactions, ecological systems, and global energy cycles through inquiry-based learning and laboratory analysis.

b. Key Learning Goals

Students will:

- Compare aerobic and anaerobic metabolic pathways;
- Analyze factors affecting metabolic reactions and energy production;
- Interpret metabolic pathways using diagrams and models;
- Evaluate the ecological importance of metabolic processes.

c. Sample Learning and Assessment Activities

- Cellular respiration and photosynthesis investigations;
- ATP production modelling activities;
- Metabolic pathway analysis tasks;
- Environmental impact case studies;
- Laboratory investigations, assignments, quizzes, unit test.

4. Unit 3: Molecular Genetics

Approx. Hours: 24

a. Unit Overview

In this unit, students investigate DNA structure, replication, protein synthesis, gene expression, and mutation. Students analyze molecular mechanisms controlling heredity and examine how biotechnology and genetic engineering influence modern science and society.

Ethical, legal, and social implications of genetic research and biotechnology are explored through inquiry and discussion.

b. Key Learning Goals

Students will:

- Explain DNA structure, replication, and protein synthesis;
- Analyze gene expression, mutation, and regulation mechanisms;
- Investigate biotechnology techniques and applications;
- Evaluate ethical and societal issues related to genetics and biotechnology;
- Interpret genetic information using models, diagrams, and scientific evidence.

c. Sample Learning and Assessment Activities

- DNA extraction and modelling investigations;
- Protein synthesis simulations;
- Biotechnology and genetic engineering case studies;
- Ethical debate and inquiry activities;

- Research assignments, laboratory reports, quizzes, unit test.

5. Unit 4: Homeostasis

Approx. Hours: 21

a. Unit Overview

Students investigate the physiological processes that maintain internal balance in living organisms. The unit focuses on feedback mechanisms and interactions among the nervous, endocrine, and excretory systems.

Students explore how disruptions to homeostasis affect health and examine technologies and medical treatments related to physiological regulation.

b. Key Learning Goals

Students will:

- Explain the mechanisms involved in maintaining homeostasis;
- Analyze interactions among body systems involved in regulation;
- Investigate feedback systems and physiological responses;
- Evaluate medical technologies and treatments related to homeostasis;
- Interpret physiological data and biological models.

c. Sample Learning and Assessment Activities

- Homeostasis simulation activities;
- Nervous and endocrine system investigations;
- Physiological response analysis tasks;
- Medical technology and disease case studies;
- Laboratory investigations, assignments, quizzes, unit test.

6. Unit 5: Population Dynamics

Approx. Hours: 15

a. Unit Overview

In this unit, students investigate population growth, ecological relationships, species interactions, and environmental sustainability. Students analyze factors influencing population change and evaluate human impacts on ecosystems and biodiversity.

Mathematical modelling, ecological analysis, and case studies help students understand the complexity of environmental systems and sustainability challenges.

b. Key Learning Goals

Students will:

- Analyze population growth models and ecological relationships;
- Investigate factors affecting population sustainability and biodiversity;
- Evaluate human impacts on ecosystems and environmental stability;
- Interpret ecological data using graphs, models, and scientific evidence;
- Propose strategies for environmental sustainability and conservation.

c. Sample Learning and Assessment Activities

- Population growth modelling investigations;
- Ecological relationship simulations;
- Biodiversity and sustainability case studies;
- Environmental data analysis activities;
- Inquiry investigations, research assignments, quizzes, unit test.

Teaching and Learning Strategies

Instruction in SBI4U is grounded in the scientific investigation skills and inquiry processes identified in the Ontario Curriculum. These processes guide lesson design, assessment, and classroom interaction to ensure students develop deep conceptual understanding alongside scientific literacy and analytical reasoning. Teaching strategies emphasize inquiry, experimentation, collaboration, and the thoughtful application of biological concepts to real-world and scientific contexts.

• **Scientific inquiry and problem solving:** Students engage in investigations and case studies that require them to ask questions, analyze evidence, test hypotheses, and solve biological problems using scientific reasoning.

• **Critical thinking and analysis:** Learners interpret biological data, evaluate scientific evidence, analyze relationships within living systems, and assess the reliability of scientific conclusions and research findings.

• **Reflecting:** Students examine their own learning, evaluate the effectiveness of investigation strategies, and revise their thinking based on evidence, feedback, and scientific analysis.

• **Selecting tools and strategies:** Learners use appropriate laboratory tools, scientific models, simulations, digital resources, and analytical techniques to investigate biological systems and solve problems effectively.

• **Connecting:** Students connect biological concepts across molecular, cellular, physiological, ecological, and environmental systems while relating scientific learning to health, sustainability, biotechnology, and society.

• **Representing:** Learners communicate biological understanding using diagrams, charts, graphs, models, laboratory observations, scientific terminology, and written explanations.

• **Communicating:** Students articulate scientific reasoning clearly in written, oral, visual, and digital forms through discussions, laboratory reports, presentations, and inquiry activities.

These strategies ensure that students develop strong conceptual understanding, scientific literacy, inquiry skills, and confidence in applying biology to academic, environmental, and real-world contexts.

Culminating Task

Approx. Hours: 5

Students complete a biological investigation, research assignment, or applied inquiry project integrating multiple strands of the course. The culminating task emphasizes scientific inquiry, data analysis, biological reasoning, communication, and the application of biology to real-world and contemporary scientific issues.

Final Exam

Approx. Hours: 8

Students complete a proctored final examination evaluating conceptual understanding, biological processes, scientific inquiry skills, data interpretation, analytical reasoning, and application of knowledge across all course strands.

Instructional Approaches

Teaching and learning in SBI4U at Inukshuk Academy a wide range of strategies to ensure students develop strong conceptual understanding, scientific reasoning, analytical thinking, and confidence in applying biology to real-world and contemporary scientific issues. Instruction is guided by the scientific investigation processes and inquiry-based principles outlined in the Ontario Curriculum.

a. Inquiry-Based and Experiential Learning

Students learn biology most effectively through investigation, observation, experimentation, and problem solving. Lessons regularly include laboratory activities, guided inquiry tasks, simulations, case studies, and real-world applications that reinforce biological concepts.

Examples include:

- Investigating enzyme activity and factors affecting biochemical reactions;
- Exploring cellular respiration and photosynthesis through models and simulations;
- Analyzing DNA, gene expression, mutation, and biotechnology applications;
- Investigating homeostatic regulation using feedback models and physiological data;

- Examining population growth, ecological relationships, and sustainability through data analysis.

b. Multiple Representations of Concepts

Students encounter mathematical ideas through a combination of:

- Algebraic expressions, equations, and function notation;
- Graphs, tables, and diagrams;
- Tangent lines, derivative graphs, and rate-of-change models;
- Vector diagrams, parametric equations, and scalar equations;
- Technology-based visualizations and dynamic models.

This approach supports deeper conceptual understanding and helps students connect biological processes across molecular, cellular, organismal, and ecological levels.

c. Use of Technology and Digital Tools

Digital tools are integrated throughout the course to enhance learning, support inquiry, and strengthen visualization skills. Technology is used to:

- Conduct virtual laboratories and biological simulations;
- Model DNA, proteins, enzymes, and metabolic pathways;
- Analyze biological data and trends;
- Visualize homeostatic feedback systems and population dynamics;
- Research current biological issues, biotechnology, and environmental science;
- Create graphs, presentations, lab reports, and scientific models.

Examples include virtual lab platforms, molecular visualization tools, spreadsheets, graphing software, online scientific databases, and presentation tools.

d. Collaborative Scientific Inquiry

Scientific learning is strengthened through collaboration. Students work in pairs or small groups to:

- Conduct laboratory investigations and simulations;
- Analyze and interpret biological data;
- Discuss scientific theories, case studies, and ethical issues;
- Compare observations and research findings;
- Complete inquiry and research activities collaboratively.

Collaborative learning supports communication skills, critical thinking, scientific reasoning, and confidence in biological investigation.

e. Differentiated Instruction

Instruction is adapted to support a variety of learning styles, readiness levels, and interests. Strategies include:

- Scaffolded laboratory and inquiry activities;
- Enrichment and extension tasks for advanced learners;
- Visual, hands-on, verbal, and digital supports for complex biological systems;
- Guided practice and targeted intervention for students requiring additional support.

f. Explicit Teaching of Mathematical Processes

Students receive direct instruction and ongoing support in the scientific investigation skills emphasized in the Ontario Curriculum, including:

- Scientific inquiry and experimental design;
- Observation, measurement, and data collection;
- Data analysis and interpretation;
- Evaluating scientific evidence and sources;
- Connecting biological concepts to health, biotechnology, ecology, and society;
- Communicating scientific reasoning clearly and accurately using appropriate biological terminology and conventions.

Assessment and Evaluation

Assessment in SBI4U aligns with the principles of *Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools* (2010) [1]. Evaluation reflects students' most consistent achievement, with particular emphasis on recent evidence of learning.

Assessment serves three purposes:

a. Assessment for Learning (Diagnostic)

- Initial review of prerequisite biology concepts, laboratory skills, and scientific investigation procedures;
- Diagnostic quizzes to identify gaps in biological knowledge and scientific reasoning;
- Informal observations, discussions, and concept checks;
- Readiness activities related to laboratory inquiry, graphing, data interpretation, and scientific communication.

b. Assessment as Learning (Formative)

- Homework and review activities;
- Laboratory investigations with ongoing feedback;
- Reflection tasks and self-assessment activities;
- Collaborative inquiry and scientific problem-solving exercises;

- Draft submissions of laboratory reports, research assignments, and inquiry investigations.

c. Assessment of Learning (Summative)

- Unit tests on major biology strands;
- Laboratory reports and scientific investigations;
- Research assignments and biotechnology case studies;
- Performance tasks involving real-world biological applications;
- Culminating investigation or applied biology project;
- Final examination.

d. Achievement Chart Categories

Student achievement is evaluated across the four categories defined in the Ontario Curriculum for Science:

Knowledge & Understanding (30 percent)
Understanding of biological concepts, processes, terminology, and relationships involving biochemistry, metabolic processes, molecular genetics, homeostasis, population dynamics, and ecological systems.

Thinking & Inquiry (20 percent)
Use of scientific inquiry skills, critical thinking, experimental design, data analysis, problem solving, and interpretation of biological evidence.

Communication (20 percent)
Clarity and accuracy in scientific explanations, laboratory reports, diagrams, graphs, terminology, data presentation, and communication of biological reasoning.

Application (30 percent)
Application of biological knowledge and scientific skills to real-world contexts, health sciences, biotechnology, environmental sustainability, ecological systems, and interdisciplinary situations.

e. Final Evaluation (30 percent)

The final evaluation consists of:

1. Culminating Performance Task (10–15 percent)

A multi-step biological investigation, inquiry task, or applied research project. Examples may include:

- Investigating biochemical or metabolic processes through experimentation or modelling;

- Analyzing genetic technologies, biotechnology applications, or ethical issues in molecular genetics;
- Designing and conducting a biological investigation related to homeostasis or ecological sustainability;
- Researching population dynamics, biodiversity, or environmental impacts on ecosystems.

2. Final Examination (15–20 percent)

A proctored examination assessing conceptual understanding, scientific inquiry skills, biological processes, laboratory analysis, data interpretation, and application of knowledge across all course strands.

3. Summary of Achievement Levels and Percentage Grade Ranges

Student achievement in secondary school courses is evaluated according to the Ontario Ministry of Education's four-level achievement scale. Each percentage grade corresponds to a level of achievement, as outlined below.

Percentage Grade Range	Achievement Level	Summary Description
80–100%	Level 4	Demonstrates a very high to outstanding level of achievement. Performance exceeds the provincial standard.
70–79%	Level 3	Demonstrates a high level of achievement. Performance meets the provincial standard. (This is the provincial expectation for student performance.)
60–69%	Level 2	Demonstrates a moderate level of achievement. Performance is below but approaching the provincial standard.
50–59%	Level 1	Demonstrates a passable level of achievement. Performance is significantly below the provincial standard. Further improvement is required for continued success.
Below 50%	Level 0	Insufficient achievement. Curriculum expectations have not been met. A credit will not be granted.

Academic Honesty and Integrity Policy

Inukshuk Academy is committed to fostering a learning environment based on honesty, responsibility, respect, and academic integrity. Students are expected to submit original work and properly acknowledge all sources of information, ideas, images, data, and wording used in assignments and investigations. Academic honesty is essential to maintaining fairness and trust in the evaluation process.

All submitted work must represent the student's own understanding and effort. Sources must be documented appropriately using MLA or APA citation style, as directed by the teacher. The use of generative artificial intelligence tools (e.g., ChatGPT) or other forms of external assistance must

be disclosed and approved by the teacher. Undisclosed or inappropriate use of such tools may be treated as academic dishonesty.

Students may be asked to provide process work, rough drafts, notes, calculations, or planning documents to verify authorship and learning progress. If academic dishonesty occurs, the student and Principal may be notified, and consequences will be applied in accordance with school policy. Repeated incidents may result in escalating consequences.

1. Improper Citation

Improper citation occurs when a student fails to use appropriate citation formatting when referencing sources.

Grade Level	First Instance	Subsequent Instances
Grades 9–10	Warning and opportunity to resubmit	Warning and opportunity to resubmit
Grades 11–12	Warning and opportunity to resubmit	Opportunity to resubmit, maximum grade of 75%

2. Unaccredited Paraphrasing

Unaccredited paraphrasing occurs when a student rewrites another person's ideas without giving proper credit.

Grade Level	First Instance	Subsequent Instances
Grades 9–10	Warning and resubmission allowed	Resubmission allowed, maximum grade of 75%
Grades 11–12	Resubmission allowed, maximum grade of 75%	Resubmission allowed, maximum grade of 50%

3. Unaccredited Verbatim Copying

This occurs when a student copies sentences or passages directly from a source without proper citation.

Grade Level	First Instance	Subsequent Instances
Grades 9–10	Resubmission allowed, maximum grade of 75%	Resubmission allowed, maximum grade of 50%
Grades 11–12	Resubmission allowed, maximum grade of 50%	Grade of zero. No resubmission permitted

4. Full Plagiarism

Full plagiarism occurs when a student submits work entirely created by another person or source.

Grade Level	First Instance	Subsequent Instances

Grades 9–10	Grade of zero. No resubmission	Grade of zero. No resubmission
Grades 11–12	Grade of zero. No resubmission	Grade of zero and possible removal from the course

5. Missed Work

Students are responsible for reviewing lesson materials, completing missed assignments, and meeting established deadlines. Students are expected to remain informed about course expectations, due dates, and assessment requirements.

6. Homework Expectations

Students are expected to:

- Complete homework assignments, readings, and practice problems on time;
- Prepare for scheduled lessons, laboratories, discussions, and assessments;
- Participate actively and consistently in course activities and investigations.

If homework is repeatedly incomplete, the teacher may:

- Schedule a meeting with the student;
- Contact parents or guardians;
- Consult with school administration to support student success and progress.

Inclusion, accommodations & ELL supports

Inukshuk Academy is a small private school with limited accommodation resources. The school is committed to supporting students' access to learning within the scope of available staffing, programming, facilities, and course delivery structures.

Where possible, reasonable accommodations may be provided for students with documented learning needs, including limited support for Individual Education Plans (IEPs). Accommodations are considered on a case-by-case basis in consultation with the student, parents/guardians, teacher, and school administration.

Possible supports may include:

- Clear written instructions and success criteria;
- Guided notes, visual examples, and scaffolded practice;
- Reasonable extended time where appropriate;
- Preferential seating or reduced-distraction work space when available;
- Use of approved assistive technology;
- Check-ins with the teacher to support organization and progress;
- ELL support through simplified instructions, vocabulary support, and additional clarification.

Inukshuk Academy may not be able to provide specialized programming, intensive one-on-one support, modified curriculum expectations, or accommodations requiring resources beyond the school's capacity. Students requiring significant accommodations or specialized services may need additional external support.

Instructional Philosophy

Teaching and learning in SBI4U emphasize:

- Inquiry-based learning through laboratory investigations, simulations, case studies, and research tasks;
- Conceptual understanding supported by real-world biological, medical, environmental, and technological applications;
- Scientific investigation of biochemical processes, metabolism, molecular genetics, homeostasis, and population dynamics;
- Multiple representations of biological concepts, including diagrams, graphs, molecular models, pathway charts, data tables, and written explanations;
- Collaboration through group investigations, discussions, research tasks, peer feedback, and scientific inquiry activities;
- Technology integration in data analysis, graphing, virtual labs, molecular modelling, simulations, research, and presentations.

This approach ensures students engage deeply with biological concepts while developing transferable scientific reasoning, inquiry, communication, and STEM skills.

Course Learning Resources

Students will engage with a variety of mathematics learning materials, both digital and print, selected to support inquiry, modelling, problem solving, and conceptual development.

a. Primary Resources

- Teacher-created notes, examples, laboratory activities, and practice sets;
- Biology investigations, case studies, models, and simulation tools;
- Laboratory equipment including microscopes, prepared slides, biological models, sensors, and measurement tools;
- Biology reference materials and scientific calculators.
- *Ontario Curriculum, Grades 11–12:* Mathematics *(2008)* [2]

b. Digital Tools and Platforms

- Virtual biology labs and interactive simulations;
- Molecular modelling and visualization tools for DNA, proteins, enzymes, and cells;
- Spreadsheets or graphing software for biological data analysis;
- Online scientific databases and research platforms;
- Presentation and collaboration tools for inquiry projects.

c. Supplementary Resources

- Scientific journals, articles, videos, and multimedia related to biology, biotechnology, medicine, and environmental science;
- Practice questions, review materials, and exam preparation resources;
- Real-world case studies involving genetics, biotechnology, human health, disease, ecology, population dynamics, sustainability, and biological innovation.

References

[1] Ministry of Education, "Growing Sucess," 2010. [Online]. Available: https://www.edu.gov.on.ca/eng/policyfunding/growsuccess.pdf.

[2] Ministry of Education, "Course Descriptions and Prerequisites," August 2024. [Online]. Available: https://www.dcp.edu.gov.on.ca/en/course-descriptions-and-prerequisites.