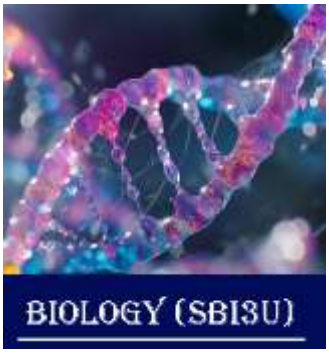

INUKSHUK ACADEMY

Course code: **Biology (SBI3U)**
Credit: **1.0** Total Hours: **110 hours**
Prerequisite: **Science, Grade 10, Academic**
Curriculum basis**: Ontario Curriculum, Grades 11–12: Science (Revised 2008)**
Last Update: **Inukshuk Academy 2026**

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Course Description

This course furthers students' understanding of the processes that occur in biological systems. Students will study theory and conduct investigations in the areas of biodiversity; evolution; genetic processes; the structure and function of animals; and the anatomy, growth, and function of plants. The course focuses on the theoretical aspects of the topics under study, and helps students refine skills related to scientific investigation.

1. Course Rationale

Biology provides the scientific framework for understanding living systems, their interactions, and the processes that sustain life. SBI3U strengthens students' ability to investigate biological systems, analyze scientific evidence, and apply inquiry-based reasoning to real-world issues affecting organisms and ecosystems. Through scientific investigation, research, and inquiry, students:

- Develop a deeper understanding of biodiversity, evolution, genetics, animal systems, and plant biology;
- Explore the relationships between structure and function in living organisms;
- Refine laboratory, analytical, and scientific investigation skills essential for senior science and STEM disciplines;
- Learn to interpret biological data, evaluate scientific evidence, and communicate scientific reasoning clearly;
- Recognize the impact of biological science on health, sustainability, technology, and environmental decision-making.

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

2. Overall Curriculum Expectations

The Ontario Curriculum organizes SBI3U 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 scientific methods and laboratory procedures;
- Evaluate scientific evidence and communicate conclusions using proper biological terminology and conventions;

- Explore careers related to biology, health sciences, environmental science, and biotechnology.

b. Diversity of Living Things

Students will:

- Analyze the effects of human activities on biodiversity and ecosystems;
- Investigate classification systems, taxonomy, and phylogeny using laboratory and field techniques;
- Demonstrate an understanding of the diversity and evolutionary relationships among living organisms;
- Evaluate the importance of biodiversity in maintaining ecological sustainability.

c. Evolution

Students will:

- Analyze scientific evidence supporting the theory of evolution;
- Investigate evolutionary processes including natural selection, mutation, and adaptation;
- Evaluate the environmental and societal impacts of artificial selection technologies;
- Explain how evolutionary theory accounts for biological diversity and species change over time.

d. Genetic Processes

Students will:

- Investigate genetic processes including meiosis, inheritance, and genetic variation;
- Solve genetics problems involving monohybrid and dihybrid crosses;
- Analyze ethical and social implications of genetic and genomic research;
- Demonstrate an understanding of hereditary mechanisms and modern genetic technologies.

e. Animals: Structure and Function

Students will:

- Analyze the relationships between organ systems and overall health in animals and humans;
- Investigate respiratory, circulatory, and digestive system functions through laboratory inquiry and simulations;
- Demonstrate an understanding of animal anatomy, physiology, and system interactions;
- Evaluate technological and medical advances related to human body systems.

f. Plants: Anatomy, Growth, and Function

Students will:

- Investigate plant structures, tissues, and internal transport systems;
- Analyze factors affecting plant growth and plant responses to environmental conditions;
- Demonstrate an understanding of the diversity and ecological importance of vascular plants;
- Evaluate the importance of sustainable plant use and biodiversity conservation.

3. Learning Goals for Students

By the end of SBI3U, 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, and data analysis;
- Explain biodiversity, taxonomy, evolution, genetic processes, animal systems, and plant structures;
- Interpret biological data using diagrams, charts, models, graphs, and scientific terminology;
- Evaluate the impact of biological science and technology on health, society, sustainability, and the environment;
- Communicate scientific reasoning clearly using appropriate biological vocabulary, diagrams, lab reports, and research formats.

Course Structure and Instructional Units

Unit	Description	Hours
Unit 0: Scientific Investigation Skills and Career Exploration	Lab safety, inquiry skills, research methods, biological careers, WHMIS, scientific communication	5 hours
Unit 1: Diversity of Living Things	Biodiversity, taxonomy, classification systems, phylogeny, human impacts on ecosystems	20 hours
Unit 2: Evolution	Natural selection, artificial selection, adaptation, evidence for evolution, environmental change, species survival	21 hours
Unit 3: Genetic Processes	Meiosis, inheritance, monohybrid and dihybrid crosses, genetic variation, genetic technologies, ethical issues	25 hours
Unit 4: Animals: Structure and Function	Digestive, respiratory, and circulatory systems; homeostasis, system interactions, health and disease	21 hours

Unit 5: Plants: Anatomy, Growth, and Function	Plant tissues, roots, stems, leaves, transport systems, plant growth, sustainability and biodiversity	20 hours
Culminating Task	Biological investigation, research assignment, or applied inquiry project	5 hours
Final Exam	Proctored examination	3 hours

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 scientific inquiry, laboratory, and research skills students require for success in Grade 11 Biology. Students review laboratory safety procedures, WHMIS symbols, scientific communication, and experimental design while developing skills in observation, data collection, analysis, and biological research. Emphasis is placed on scientific investigation methods and career pathways related to biology and health sciences.

b. Key Learning Goals

Students will:

- Demonstrate safe laboratory practices and proper use of scientific equipment;
- Apply scientific investigation skills including observation, data collection, and analysis;
- Use appropriate scientific terminology and communication formats;
- Identify careers related to biology, health sciences, and environmental science;
- Interpret biological information using graphs, diagrams, and scientific models.

c. Sample Learning and Assessment Activities

- Laboratory safety investigations and WHMIS activities;
- Scientific method and experimental design tasks;
- Career research and presentation assignments;
- Biological data interpretation exercises.
- Diagnostic quiz, lab safety tasks, research assignment.

2. Unit 1: Diversity of Living Things

Approx. Hours: 20

a. Unit Overview

In this unit, students investigate the diversity of living organisms and the systems used to classify them. Students explore taxonomy, phylogeny, and evolutionary relationships among organisms while examining how biodiversity contributes to ecosystem stability and sustainability.

Students analyze the impact of human activities on biodiversity and investigate conservation strategies used to protect endangered species and ecosystems. Laboratory investigations and classification activities strengthen understanding of biological organization and diversity.

b. Key Learning Goals

Students will:

- Classification and taxonomy investigations;
- Biodiversity field studies or virtual ecosystem explorations;
- Species-at-risk research projects;
- Ecological impact case studies.
- Classification assignments, biodiversity presentation, quizzes, unit test.

c. Sample Learning and Assessment Activities

- Graphing investigations using dynamic graphing software;
- Function transformation mapping activities;
- Real-world modelling tasks involving functions;
- Inverse function exploration using tables and graphs.
- Graphing assignments, transformation tasks, quizzes, unit test.

3. Unit 2: Evolution

Approx. Hours: 21

a. Unit Overview

Students investigate the theory of evolution as a scientific explanation for biological change over time. Topics include natural selection, adaptation, mutation, speciation, and evidence supporting evolutionary theory from fossil records, comparative anatomy, genetics, and embryology.

Students also examine the impacts of environmental change and artificial selection technologies on species survival and biodiversity. Real-world applications help students understand the ongoing significance of evolutionary processes in science, medicine, and ecology.

b. Key Learning Goals

Students will:

- Analyze evidence supporting the theory of evolution;
- Explain mechanisms of natural selection and adaptation;
- Investigate factors influencing species survival and extinction;
- Evaluate the impacts of artificial selection technologies;
- Apply evolutionary principles to biological and environmental contexts.

c. Sample Learning and Assessment Activities

- Evolution simulations and adaptation modelling;
- Fossil and comparative anatomy investigations;
- Natural selection case studies;
- Species survival and environmental change analysis.
- Evolution assignments, poster presentation, quizzes, unit test.

4. Unit 3: Genetic Processes

Approx. Hours: 25

a. Unit Overview

This unit focuses on heredity, meiosis, and the transmission of genetic information. Students investigate Mendelian genetics, monohybrid and dihybrid crosses, genetic variation, and chromosome behaviour during meiosis.

Students also explore modern genetic technologies and examine the ethical and social implications of genetic and genomic research. Inquiry activities strengthen students' understanding of inheritance patterns and genetic processes.

b. Key Learning Goals

Students will:

- Explain the role of meiosis in genetic variation;
- Solve genetics problems involving inheritance patterns;
- Analyze monohybrid and dihybrid crosses;
- Investigate genetic technologies and genomic research;
- Evaluate ethical issues related to genetics and biotechnology.

c. Sample Learning and Assessment Activities

- Punnett square and pedigree investigations;
- Meiosis simulations and chromosome modelling;

- Genetics problem-solving tasks;
- Genetic ethics research assignments.
- Genetics quizzes, inheritance assignments, lab investigations, unit test.

5. Unit 4: Animals: Structure and Function

Approx. Hours: 21

a. Unit Overview

Students investigate the anatomy and physiology of animal systems with emphasis on the respiratory, circulatory, and digestive systems. Students examine how organ systems interact to maintain homeostasis and overall organism health.

Students also explore disorders affecting body systems and evaluate technological and medical advances used to diagnose, monitor, and treat diseases. Laboratory investigations and simulations help students understand physiological processes and system interactions.

b. Key Learning Goals

Students will:

- Describe the structure and function of major animal organ systems;
- Analyze interactions among respiratory, circulatory, and digestive systems;
- Investigate factors affecting human health and homeostasis;
- Evaluate medical technologies related to body systems;
- Interpret physiological data collected through inquiry activities.

c. Sample Learning and Assessment Activities

- Respiratory and circulatory system simulations;
- Heart rate and breathing investigations;
- Medical technology research tasks;
- Health and lifestyle analysis activities.
- Lab reports, physiology assignments, quizzes, unit test.

6. Unit 5: Plants: Anatomy, Growth, and Function

Approx. Hours: 20

a. Unit Overview

In this unit, students investigate plant anatomy, physiology, and growth processes. Students examine plant tissues, roots, stems, leaves, vascular transport systems, and environmental factors affecting plant growth.

Students also analyze the ecological and societal importance of plants and evaluate sustainable agricultural and conservation practices. Inquiry activities help students understand how plants contribute to ecosystem stability and biodiversity.

b. Key Learning Goals

Students will:

- Describe the structures and functions of plant tissues and organs;
- Analyze factors influencing plant growth and development;
- Investigate vascular transport systems in plants;
- Evaluate the importance of plants in ecosystems and society;
- Examine sustainable plant use and biodiversity conservation.

c. Sample Learning and Assessment Activities

- Plant tissue and microscopy investigations;
- Photosynthesis and transport experiments;
- Sustainable agriculture case studies;
- Plant biodiversity research activities.
- Plant investigations, lab assignments, quizzes, cumulative project.

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 reasoning, inquiry, communication, and real-world biological applications.

Final Exam

Approx. Hours: 3

Students complete a proctored final examination assessing conceptual understanding, scientific inquiry skills, biological terminology, data interpretation, and application across all course strands.

Instructional Approaches

Teaching and learning in SBI3U at Inukshuk Academy incorporate a wide range of strategies to ensure students develop strong conceptual understanding, scientific inquiry skills, and confidence in applying biological knowledge to real-world situations. 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 scientific inquiry. Lessons regularly include laboratory activities, case studies, simulations, research tasks, and real-world applications that reinforce biological concepts.

Examples include:

- Investigating biodiversity through classification and ecosystem analysis;
- Exploring evolutionary processes using simulations and evidence-based inquiry;
- Analyzing genetic inheritance patterns through modelling and problem solving;
- Conducting investigations involving plant growth, respiration, circulation, and homeostasis.

b. Multiple Representations of Concepts

Students encounter biological concepts through a combination of:

- Scientific diagrams and models;
- Laboratory observations and data analysis;
- Charts, graphs, and classification systems;
- Written explanations and scientific reasoning;
- Simulations, animations, and visualizations.

This approach supports deeper conceptual understanding and helps students connect biological structures, systems, and processes across multiple contexts.

c. Use of Technology and Digital Tools

Digital tools are integrated throughout the course to enhance learning, scientific inquiry, and data analysis. Technology is used to:

- Conduct virtual laboratories and simulations;
- Analyze biological data and trends;
- Model genetic processes and inheritance patterns;
- Visualize anatomical systems and cellular processes;
- Research current biological issues and technologies;
- Create graphs, presentations, and scientific reports.

Examples include virtual lab platforms, interactive simulations, digital microscopes, spreadsheets, presentation software, and online scientific databases.

d. Collaborative Scientific Inquiry

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

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

Collaborative learning supports communication skills, 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 opportunities for advanced learners;
- Visual, hands-on, and interactive learning experiences;
- Guided practice and targeted support for students requiring additional assistance.

f. Explicit Teaching of Scientific Investigation Skills

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

- Scientific inquiry and experimentation;
- Observation and data collection;
- Data analysis and interpretation;
- Evaluating scientific evidence and sources;
- Connecting biological concepts to real-world contexts;
- Communicating scientific reasoning clearly and accurately using appropriate biological terminology and conventions.

Assessment and Evaluation

Assessment in SBI3U 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 science concepts and laboratory skills;
- Diagnostic quizzes to identify gaps in biological knowledge and scientific reasoning;
- Informal observations, discussions, and concept checks;
- Readiness activities related to scientific inquiry, graphing, and data interpretation.

b. Assessment as Learning (Formative)

- Homework and review activities;
- Laboratory investigations with ongoing feedback;
- Reflection tasks and self-assessment activities;
- Collaborative inquiry and problem-solving exercises;
- Draft submissions of lab reports, research tasks, and scientific investigations.

c. Assessment of Learning (Summative)

- Unit tests on major biology strands;
- Laboratory reports and inquiry investigations;
- Research assignments and case studies;
- Performance tasks involving real-world biological applications;
- Culminating investigation or research 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 cellular biology, genetics, evolution, anatomy, physiology, biodiversity, and ecological systems.

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

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

Application (30 percent):
Application of biological knowledge and scientific skills to real-world contexts, environmental issues, health sciences, biotechnology, 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 ecosystem interactions and environmental sustainability;
- Analyzing genetic inheritance patterns or biotechnology applications;
- Designing and conducting a biological experiment;
- Researching human body systems, disease prevention, or emerging biological technologies.

2. Final Examination (15–20 percent)

A proctored examination assessing conceptual understanding, scientific inquiry skills, biological processes, data analysis, 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 SBI3U emphasize:

- Inquiry-based learning through laboratory investigations, simulations, observations, and case studies;
- Conceptual understanding supported by real-world biological applications;
- Scientific investigation of living systems, biodiversity, evolution, genetics, animal systems, and plant biology;
- Multiple representations, including diagrams, models, graphs, charts, biological specimens, and scientific explanations;
- Collaboration through group investigations, discussions, research tasks, and presentations;
- Technology integration in data collection, graphing, microscopy, simulations, research, and analysis.

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

Course Learning Resources

Students will engage with a variety of biology learning materials, both digital and print, selected to support inquiry, experimentation, research, and conceptual development.

a. Primary Resources

- Teacher-created notes, examples, laboratory activities, and practice sets;
- Biology demonstrations, models, specimens, and simulation tools;
- Laboratory equipment, including microscopes, slides, prepared specimens, sensors, and measurement tools;
- Scientific calculators and biology reference materials.
- *Ontario Curriculum, Grades 11–12: Science (2008)* [2]

b. Digital Tools and Platforms

- Virtual biology labs and interactive simulations;
- Digital microscopy and image analysis tools;
- Spreadsheets or graphing software for data analysis;
- Online databases for biodiversity, genetics, evolution, and health science research;
- Presentation and collaboration tools for inquiry projects.

c. Supplementary Resources

- Virtual biology labs and interactive simulations;
- Digital microscopy and image analysis tools;
- Spreadsheets or graphing software for data analysis;
- Online databases for biodiversity, genetics, evolution, and health science research;
- Presentation and collaboration tools for inquiry projects.

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.