INSTITUTE OF CANADIAN EDUCATION

Course Title: Biology – SBI4U – Grade 12

Course Name: Biology

Course Code: SBI4U

Grade: 12

Course Type: University preparation

Credit Value: 1.0

Prerequisite: Biology, Grade 11, University Preparation

Curriculum Policy Document: The Ontario Curriculum, Grades 11–12: Science, 2008 (Revised),Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools (2010)

Course Developer: Institute of Canadian Education.

Department: Science

Head of Department: Sadiya Manjra

Development Date: 2025

Most Recent Revision Date: 2026

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.

COURSE EXPECTATION

UNIT ORDER	UNIT NAME	UNIT DESCRIPTION	Time Allocated
UNIT 1	Biochemistry	Study of biomolecules, enzymes, and chemical processes within living systems.	20 Hours
UNIT 2	Metabolic Processes	Cellular respiration, photosynthesis, and energy transformations.	20 Hours
-	Mid Term Exam	Assessment of Units 1–2 concepts and skills.	2 Hours
UNIT 3	Molecular Genetics	DNA/RNA structure, replication, transcription, translation, and gene regulation.	20 Hours
UNIT 4	Homeostasis	Feedback mechanisms, organ systems, and physiological regulation.	25 Hours
UNIT 5	Population Dynamics	Ecology, population growth, species interactions, and environmental impacts.	21 Hours
FINAL	FINAL EXAM		2 Hours
TOTAL			110 Hours

Overall Curriculum Expectations:

Scientific Investigation Skills and Career Exploration
By the end of this course, students will:
1. Demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communication);
2. Identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields.

Biochemistry
By the end of this course, students will:
1. Analyse technological applications of enzymes in some industrial processes, and evaluate technological advances in the field of cellular biology;
2. Investigate the chemical structures, functions, and chemical properties of biological molecules involved in some common cellular processes and biochemical reactions;
3. Demonstrate an understanding of the structures and functions of biological molecules, and the biochemical reactions required to maintain normal cellular function.

Metabolic Processes
By the end of this course, students will:
1. Analyse the role of metabolic processes in the functioning of biotic and abiotic systems, and evaluate the importance of an understanding of these processes and related technologies to personal choices made in everyday life;
2. Investigate the products of metabolic processes such as cellular respiration and photosynthesis;
3. Demonstrate an understanding of the chemical changes and energy conversions that occur in metabolic processes.

Molecular Genetics
By the end of this course, students will:
1. Analyse some of the social, ethical, and legal issues associated with genetic research and biotechnology;
2. Investigate, through laboratory activities, the structures of cell components and their roles in processes that occur within the cell;
3. Demonstrate an understanding of concepts related to molecular genetics, and how genetic modification is applied in industry and agriculture.

Homeostasis
By the end of this course, students will:
1. Evaluate the impact on the human body of selected chemical substances and of environmental factors related to human activity;
2. Investigate the feedback mechanisms that maintain homeostasis in living organisms;
3. Demonstrate an understanding of the anatomy and physiology of human body systems, and explain the mechanisms that enable the body to maintain homeostasis.

Population Dynamics
By the end of this course, students will:
1. Analyse the relationships between population growth, personal consumption, technological development, and our ecological footprint, and assess the effectiveness of some Canadian initiatives intended to assist expanding populations;
2. Investigate the characteristics of population growth, and use models to calculate the growth of populations within an ecosystem;
3. Demonstrate an understanding of concepts related to population growth, and explain the factors that affect the growth of various populations of specie

Assessment Strategies

Students will be provided with numerous and varied opportunities to demonstrate the full extent of their achievement of the curriculum expectations, across all four categories of the Achievement Chart. Progress will be monitored on an on-going basis using a variety of assessment tools, including written work, formal testing, quizzes, teacher-student communication, discussion boards and chat rooms.

Assessment FOR Learning	Assessment AS Learning	Assessment OF Learning
Diagnostic tests	Reflections	Tests and quizzes
Teacher questioning and discussions	Self-assessment	Research projects and reports
Discussion forums	Learning reflections	Problem-solving calculations
Video assignments with teacher feedback	Peer feedback	Graphs – plotting and analyzing
Practice problem-solving calculations	Goal setting and progress monitoring	Drawings, diagrams, sketches, and schematics
Practice graphs and data analysis	End-of-unit conversations (Google Meet)	Research reports
Practice drawings, diagrams, and schematics		Unit assessments
Teacher feedback on assignments		

Evaluation

Final Grade

The final grade will be determined as follows (in accordance with Ministry of Education standards):

Term Work Based on evaluations conducted throughout the course.	65%
Final Evaluation A final evaluation in the form of a written exam.	25%
Attendance and Participation	10%

Final evaluation breakdown:

- 20% written exam

ATTENDANCE POLICY

Regular attendance and active engagement are important for student success. Attendance and participation are monitored through the school's Learning Management System (LMS).
All online credit courses at ICE are designed to meet or exceed the **minimum 110 hours of instructional time** required for a credit course.

Online instructional time and engagement are monitored through:

- **LMS Engagement:** Students are expected to log in regularly and actively participate in online learning activities. LMS activity records are used to monitor engagement.
- **Biweekly Check-Ins:** Students complete a brief check-in every two weeks to review their progress and engagement. Additional support may be provided when concerns are identified.
- **Post-Unit Quizzes:** Short formative quizzes are completed at the end of each unit to monitor student progress and pacing.
- **Discussion Forums:** Students participate in required unit discussions and peer activities. Participation is monitored based on completion and engagement.

Students are responsible for maintaining regular participation and completing required learning activities within the course schedule.

EVALUATION MODEL – 10% TOTAL ATTENDANCE AND ENGAGEMENT WEIGHT

Component	Weight	Quantifiable Metric	Criteria
Biweekly Check-In	3%	Completed every two weeks	Students completes the required check-in within the scheduled time frame.
Post-Unit Formative Quiz	4%	Completed after each unit	Student completes the formative quiz by the assigned deadline.
Discussion Forum Participation	3%	Required posts and responses	Student submits the required original response and completes assigned peer responses.

CONSIDERATION FOR PROGRAM PLANNING

Students with Special Education Needs
Teachers support all students through **Universal Design for Learning (UDL)** and differentiated instruction. Where applicable, IEP accommodations are implemented in instruction, the learning environment, and assessment. Online learning provides flexibility through extended time, breaks, assistive technology, and opportunities to review materials.

English Language Learners
Teachers recognize students' diverse language backgrounds and provide appropriate support while maintaining curriculum expectations. Supports include clear language, visuals, multimedia, repeated access to content, additional time, bilingual dictionaries, and feedback that develops academic English.

Environmental Education
Environmental education is integrated throughout the course. Students explore sustainability, resource use, STSE connections, and the environmental impact of human activities. Online learning also supports environmental responsibility through paperless resources.

Equity and Inclusive Education
The course promotes a welcoming, respectful, and inclusive learning environment. Materials and activities reflect diverse cultures, perspectives, and experiences, and assessment practices are fair and free from cultural bias.

Financial Literacy Education
Students develop financial literacy by examining the economic aspects of scientific and technological decisions, including cost-benefit analysis and the financial impacts of choices related to health and the environment.

First Nations, Métis, and Inuit Education
Where appropriate, the course incorporates Indigenous perspectives, histories, cultures, contributions, and contemporary issues accurately and respectfully, including connections to Truth and Reconciliation.

Information and Communications Technology
ICT is integrated throughout the course for instruction, communication, learning, and assessment. Students use digital tools, multimedia, simulations, video conferencing, and productivity software while developing digital citizenship, responsible technology use, source evaluation, privacy awareness, and academic integrity.

Career Education
Students connect course learning to careers, postsecondary opportunities, and workplace skills. Career pathways may include health sciences, engineering, environmental science, research, technology, and skilled trades.

Cooperative Education and Experiential Learning

Students may connect classroom learning with real-world experiences through job shadowing, work experience, cooperative education, and other experiential learning opportunities.

Health and Safety
Health and safety are emphasized in online and practical learning. Students are encouraged to maintain proper ergonomics, take regular breaks, manage screen time, and support their well-being. Any at-home activities include clear safety instructions and appropriate precautions.

Accommodations
Accommodations are determined through consultation with parents/guardians, teachers, administration, and relevant educational assessment information. These may include:

- **Instructional accommodations:** modified teaching strategies, presentation methods, organization, technology, and multimedia.

- **Assessment accommodations:** additional time and alternative response formats, including oral responses where appropriate.
- Step-by-step instructions and graphic organizers.
- Support with planning and organizing tasks.
- Verbal responses using a scribe when appropriate.
- A range of reading and writing options.
- Providing reading materials in advance.
- Opportunities for enrichment and extension.

Course Materials – SBI4U

Required Textbooks and Resources:

- Biology textbooks covering biochemistry, metabolic processes, molecular genetics, homeostasis, and population dynamics
- Supplementary readings: articles, videos, and online resources on biology, genetics, ecology, and biotechnology
- Teacher-provided worksheets, lab manuals, practice exercises, case studies, and virtual simulations

Digital Resources and Software:

- Google Drive – storing, sharing, and submitting assignments
- Internet access for research and online biology databases
- Microsoft Office Suite (Word, Excel, PowerPoint) or equivalent software for lab reports, presentations, and data analysis

Teacher Considerations:

- Assistive technology (text-to-speech, speech-to-text, screen readers) may be used
- Flexibility in submission formats (Google Docs, PDFs, slides, lab reports, or other digital formats)
- Guided notes, concept maps, and scaffolded instruction for complex biological concepts

Tips for Success – SBI4U

Welcome to SBI4U: Grade 12 Biology – University Preparation

Get ready to explore in-depth biological concepts, laboratory investigations, and analytical thinking while developing strong scientific reasoning, problem-solving, and digital literacy skills in an online environment. By the end of this course, you will be well prepared for university or college studies in biology, health sciences, or related fields, and will have strengthened your time management, organization, and laboratory/reporting skills.

Here are some reminders to help you succeed in SBI4U:

- Check Announcements, "What's New," and your mailbox daily for updates and important information.
- Review the course calendar regularly and meet all assignment and lab deadlines. Contact your teacher as soon as possible if you experience difficulties.
- Carefully review assignment and lab instructions, rubrics, and evaluation criteria before submitting work. Use a checklist to ensure all biological concepts, analyses, and formatting requirements are met.
- Participate actively in discussions, case studies, simulations, and laboratory investigations to deepen your understanding of biological concepts and experimental techniques.

Ask for help when needed:

- For technical issues, contact the Help Desk.
- For course-related questions or concerns, email your teacher. Expect a response within 24 hours. If the matter is urgent, include "URGENT" in the subject line.

Key Elements to Success in SBI4U:

- **Time Commitment** – Plan for 1–2 hours of focused study each day, plus additional time for labs and experiments.
- **Communication** – Maintain regular contact with your teacher for guidance, clarification, and feedback.

- **Engagement** – Stay curious and attentive. Online learning may have challenges, but active participation and persistence will lead to success.

Remember: This course is designed to help you understand how biological concepts and scientific investigation inform decision-making in health, environment, and technology. Approach each activity thoughtfully and accurately as you develop informed perspectives on biological systems, ethical considerations, and sustainability.