



**Ontario eSecondary School  
Course Outline  
2024-2025**

<b>Ministry of Education Course Title: Grade 11 Biology, University</b>	
<b>Ministry Course Code: SBI3U</b>	
<b>Course Type: University Preparation</b>	
<b>Grade: 11</b>	
<b>Credit Value: 1.0</b>	
<b>Prerequisite(s): Science, Grade 10 Academic</b>	
<b>Department: Science</b>	
<b>Course developed by: Kristine Strybosch and Quan Ly</b>	<b>Date: July 20, 2024</b> <b>Revised:</b>
<b>Length:</b> One Semester	<b>Hours:</b> 110
<p>This course has been developed based on the following Ministry documents:</p> <ol style="list-style-type: none"> <li>1. <a href="#"><u>Science, The Ontario Curriculum Grades 11 and 12 (2008)</u></a></li> <li>2. <a href="#"><u>Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools (2010)</u></a></li> <li>3. <a href="#"><u>Learning for All (2013)</u></a></li> </ol>	

## **COURSE DESCRIPTION/RATIONALE**

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.

## **OVERALL CURRICULUM EXPECTATIONS**

### **A. Scientific Investigation Skills and Career Exploration**

By the end of this course, students will:

- A1. 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 communicating);
- A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields.

### **B. Diversity of Living Things**

By the end of this course, students will:

- B1. analyse the effects of various human activities on the diversity of living things;
- B2. investigate, through laboratory and/or field activities or through simulations, the principles of scientific classification, using appropriate sampling and classification techniques;
- B3. demonstrate an understanding of the diversity of living organisms in terms of the principles of taxonomy and phylogeny.

### **C. Evolution**

By the end of this course, students will:

- C1. analyse the economic and environmental advantages and disadvantages of an artificial selection technology, and evaluate the impact of environmental changes on natural selection and endangered species;
- C2. investigate evolutionary processes, and analyse scientific evidence that supports the theory of evolution;
- C3. demonstrate an understanding of the theory of evolution, the evidence that supports it, and some of the mechanisms by which it occurs.

### **D. Genetic Processes**

By the end of this course, students will:

- D1. evaluate the importance of some recent contributions to our knowledge of genetic processes, and analyse social and ethical implications of genetic and genomic research;
- D2. investigate genetic processes, including those that occur during meiosis, and analyse data to solve basic genetics problems involving monohybrid and dihybrid crosses;
- D3. demonstrate an understanding of concepts, processes, and technologies related to the transmission of hereditary characteristics.

### **E. Animals: Structure and Function**

By the end of this course, students will:

- E1. analyse the relationships between changing societal needs, technological advances, and our understanding of internal systems of humans;
- E2. investigate, through laboratory inquiry or computer simulation, the functional responses of the respiratory and circulatory systems of animals, and the relationships between their respiratory, circulatory, and digestive systems;
- E3. demonstrate an understanding of animal anatomy and physiology, and describe disorders of the respiratory, circulatory, and digestive systems.

## COURSE CONTENT

<i>Unit</i>	<i>Length</i>
Unit 1: Animal Systems	19 hours
Unit 2: Genetics	20.5 hours
Unit 3: Evolution	19.5 hours
Unit 4: Diversity of Living Things	27 hours
Unit 5: Plant Systems	17 hours
Unit 6: Cumulative Assessments (Final Project and Final Exam)	7 hours
<b>Total</b>	<b>110 Hours</b>

## UNIT DESCRIPTIONS

### Unit 1 -Animal Systems

Students will:

- analyse the relationships between changing societal needs, technological advances, and our understanding of internal systems of humans
- investigate, through laboratory inquiry or computer simulation, the functional responses of the respiratory and circulatory systems of animals, and the relationships between their respiratory, circulatory, and digestive systems
- demonstrate an understanding of animal anatomy and physiology, and describe disorders of the respiratory, circulatory, and digestive systems

### Unit 2 - Genetic Processes

Students will:

- evaluate the importance of some recent contributions to our knowledge of genetic processes, and analyse social and ethical implications of genetic and genomic research
- investigate genetic processes, including those that occur during meiosis, and analyse data to solve basic genetics problems involving monohybrid and dihybrid crosses
- demonstrate an understanding of concepts, processes, and technologies related to the transmission of hereditary characteristics

### Unit 3- Evolution

Students will:

- analyse the economic and environmental advantages and disadvantages of an artificial selection technology, and evaluate the impact of environmental changes on natural selection and endangered species
- investigate evolutionary processes, and analyse scientific evidence that supports the theory of evolution
- demonstrate an understanding of the theory of evolution, the evidence that supports it, and some of the mechanisms by which it occurs

### Unit 4- Diversity of Living Things

Students will:

- analyse the effects of various human activities on the diversity of living things
- investigate, through laboratory and/or field activities or through simulations, the principles of scientific classification, using appropriate sampling and classification techniques
- demonstrate an understanding of the diversity of living organisms in terms of the principles of taxonomy and phylogeny

## Unit 5 - Plant Systems

### Plants: Anatomy, Growth, and Function

Students will:

- evaluate the importance of sustainable use of plants to Canadian society and other cultures
- investigate the structures and functions of plant tissues, and factors affecting plant growth
- demonstrate an understanding of the diversity of vascular plants, including their structures, internal transport systems, and their role in maintaining biodiversity

## TEACHING AND LEARNING STRATEGIES

In this course, students will experience the following activities.

**Presentations with embedded videos** are utilized to outline concepts, explain theory with the use of examples and practice questions, and incorporate multi-media opportunities for students to learn more (e.g. online simulations, quizzes, etc.).

**End of unit conversations and Poodlls** are opportunities for students to express their ideas, problem solving, and thought processes with a teacher who provides timely feedback.

**Reflection** is an opportunity for students to look back at concepts and theories with new eyes, to relate theory to practice, and to align learning with their own values and beliefs.

**Discussions with the instructor** are facilitated through video conferencing, discussing the concepts and skills being studied. This enables two-way communication between the student and the instructor, to share ideas and ask questions in dialogue. This also helps to build a relationship between the student and instructor.

**Instructor demonstrations** (research skills, etc.) are opportunities for the instructor to lead a student through a concept or skill through video conferencing, videos, or emailing with the student.

**Discussion forums** are an opportunity for students to summarize and share their ideas and perspectives with their peers, which deepens understanding through expression. It also provides an opportunity for peer-to-peer feedback.

**Practical extension and application of knowledge** are integrated throughout the course. The goal is to help students make connections between what they learn in the classroom and how they understand and relate to the world around them and their own lives. Learning becomes a dynamic opportunity for students to be more aware that their learning is all around them and enable them to create more meaning in their lives.

**Individual activities/assignments** assessments are completed individually at a student's own pace and are intended to expand and consolidate the learning in each lesson. Individual activities allow the teacher to accommodate interests and needs and to assess the progress of individual students. For this reason, students are encouraged to discuss IEPs (Individual Education Plans) with their teacher and to ask to modify assessments if they have a unique interest that they feel could be pursued in the assessment. The teacher plays an important role in supporting these activities by providing ongoing feedback to students, both orally and in writing.

**Research** is an opportunity to apply inquiry skills to a practical problem or question. Students perform research to gather information, evaluate quality sources, analyze findings, evaluate their analysis, and synthesize their findings into conclusions. Throughout, students apply both creative thinking and critical thinking. New questions are also developed to further learning.

**Writing** as a learning tool helps students to think critically about course material while grasping, organizing, and integrating prior knowledge with new concepts. Good communication skills are important both in and out of the classroom.

**Virtual simulations** are interactive websites that provide students with an opportunity to ask questions, explore hypotheses, relate variables, examine relationships, and make connections between theory and application in a safe environment that promotes intellectual risk taking and curiosity.

**Virtual labs** are interactive websites that provide students with an opportunity to follow a procedure to test hypotheses using scientific apparatus, gather and record observations, analyze observations using formula and relevant theory/concepts, and then formulate conclusions that relate hypotheses to analysis.

**Diagrams** are visual representations of scientific ideas and concepts. They provide another perspective to organize ideas. Visuals are thought to promote cognitive plasticity - meaning, they can help us change our minds or help us to remember an idea.

**Graphics/images** are visual representations of ideas/concepts. Visuals are thought to promote cognitive plasticity - meaning, they can help us change our minds or help us to remember an idea.

**Charts** are visual representations of scientific ideas and concepts using math that support analysis.

**Drawings and schematics** are scientific and engineering ideas explained visually. For example, an electric circuit can be explained using symbols, which makes it possible to communicate ideas universally, clearly, and succinctly.

**Articles** are examples of concepts and theories being discussed in the public realm and with respect to current events. They are snapshots not only of why scientific theories/concepts/applications are relevant but also provide a window into the broader context of scientific knowledge and understanding. Students learn through reading and analysis that science is deeply related to, and intertwined with, society and the diverse perspectives of lived experience.

**Practice problems** provide students with a scenario/problem to solve by applying concepts and skills learned in a context. This helps students to understand the relevance of their learning.

## ASSESSMENT, EVALUATION, AND REPORTING

**Assessment:** The process of gathering information that accurately reflects how well a student is achieving the identified curriculum expectations. Teachers provide students with descriptive feedback that guides their efforts towards improved performance. These assessments are not for marks.

- In assessment for learning (AFL), teachers provide students with descriptive feedback and coaching for improvement.
- In assessment as learning (AAL), teachers help students develop their capacity to be independent, autonomous learners who are able to set individual goals, monitor their own progress, determine next steps, and reflect on their thinking and learning.

**Evaluation:** Assessment of Learning (AOL) focuses on evaluation which is the process of making a judgement about the quality of student work on the basis of established criteria over a limited, reasonable period of time.

**Reporting:** Involves communicating student achievement of the curriculum expectations and Learning Skills and Work Habits in the form of marks and comments as determined by the teacher's use of professional judgement.

## STRATEGIES FOR ASSESSMENT

Assessment practices can nurture students' sense of progress and competency and information instruction. Many diagnostic tools, e.g. checklists and inventories, are used at regular intervals throughout the units to encourage students' understanding of their current status as learners and to provide frequent and timely reviews of their progress.

Teachers are encouraged to share goals with students early in the course and to connect Unit learning experiences frequently and explicitly with big ideas, overall expectations, and performance tasks.

## **ASSESSMENT ACTIVITIES**

- Virtual lab assignments
- Individual conference meetings (Google meets )
- Practice (formative) quizzes
- Research projects (STSE focused)
- Inquiry Assignments
- Discussion forums
- Completed templates and graphic organizers
- Video assignment
- Reflections
- Oral presentations
- Graphs - plotting and analyzing
- Simulation, lab, and case study worksheets
- Research projects and reports
- Final exam

## **EVALUATION**

The final grade will be determined as follows:

- 70% of the grade will be based on evaluation conducted throughout the course. This portion of the grade should reflect the student's most consistent level of achievement throughout the course, although special consideration will be given to more recent evidence of achievement.
- 30% of the grade will be based on a final evaluation administered at the end of the course. This evaluation will be based on evidence from a final project and final exam, both comprehensive of the course. The final evaluation is an opportunity for the student to demonstrate comprehensive achievement of the overall expectations for the course.

*(Growing Success: Assessment, Evaluation and Reporting in Ontario Schools. Ontario Ministry of Education Publication, 2010 p.41)*

Weight	
<b>Course Work</b>	<b>70</b>
Knowledge/Understanding (K)	21
Thinking/Inquiry (T)	21
Communication (C)	10.5
Application (A)	17.5
<b>Final</b>	<b>30</b>
Exam	20
Culminating Project	10

### TERM WORK EVALUATIONS (70%)

Evaluation Item	Description	Category	Weight
Unit 1.2 Digestive System Quiz	Students will complete a multiple choice question online	K	15
Unit 1.4 Circulatory & Respiratory System Graphing Analysis Assignment	Students will complete the graphing and analysis investigation	T,C	
Unit 1.5 Unit 1 Test	Students will complete a Unit Test consisting of multiple choice, diagram and short answer questions	K, T, C, A	
Unit 2.3 Mouse Genetics (Two Traits)- Gizmos Follow-up Quiz (AOL)	Students will complete a multiple choice question online, reflecting on the lab	A	15
Unit 2.3 Genetic Disease Report	Students will research a genetic disorder and share their findings	A,C	
Unit 2.4 Unit 2 Test	Students will complete a Unit Test consisting of multiple choice, diagram and short answer questions	K, T, C, A	
Unit 3.3 Gizmos: Natural Selection Student Exploration Sheet	Students will complete a virtual lab, studying peppered moths and they will investigate natural selection in the simulation	T, C, A	15
Unit 3.5 Halfway Quiz	Students will complete a multiple choice question online	K	
Unit 3 Unit 3 Test	Students will complete a Unit Test consisting of multiple choice, diagram and short answer questions	K, T, C, A	
Unit 4.1 Dichotomous Key Creation Assignment	Students will create a dichotomous key and explain their key	C, A	14
Unit 4.3 Viruses and Bacteria Quiz	Students will complete a multiple choice question online	K	

Unit 4.6 Unit 4 Test	Students will complete a Unit Test consisting of multiple choice, diagram and short answer questions	K, T, C, A	
Unit 5.5 Exploring the Role of Plants in Canadian Society – Brochure	Students will research plants and their role in society and organize their learning on a Brochure	K,I,C,A	11
Unit 5.6 Unit 5 Minitest	Students will complete a Unit test consisting of multiple choice questions	K	

## FINAL EVALUATIONS (30%)

Evaluation Item	Description	Category	Weight
Final Project	Course Summative task: students pick 1 of 2 options, to create a poster highlighting the 5 most common medical disorder in Canada, or a brochure focusing on reproductive technology	T, C	10
Final Exam	Students will complete a final exam, covering unit 1-5 material, the exam will include multiple choice, diagram, and short answer questions	K, A	20

## AAL/AFL/AOL TRACKING SHEET

### Unit 1: Animal Systems

AAL	AFL	AOL
Concept check Questions (all lessons)	Study notes/cue cards (All lessons)	Digestive System Quiz
Digestive Disorders Research Activity	Gizmos Diffusion Case Study	Circulatory & Respiratory System Graphing Analysis Assignment
Breathing Lab		Unit 1 Test
Explain a Process Discussion		
Unit 1 Review		
Unit 1 End-of-Unit Learning Log		

### Unit 2: Genetics

AAL	AFL	AOL
Concept check Questions (all lessons)	Study notes/cue cards (All lessons)	Mouse Genetics (Two Traits)- Gizmos Follow-up Quiz (AOL)
Human Karyotyping Gizmos Lab - Student worksheet	Human Karyotyping Gizmos Reflection Questions	Genetic Disease Report
Applications of Genetics Practice Problems		Unit 2 Test
Mouse Genetics (Two Traits) Gizmos Lab		

### Unit 3: Evolution



<b>AAL</b>	<b>AFL</b>	<b>AOL</b>
Concept check Questions (all lessons)	Study notes/cue cards (All lessons)	Gizmos: Natural Selection Student Exploration Sheet
Class Discussion Activity 'Modeling Genetic Drift'		Halfway Quiz
Unit Review		Unit 3 Test

#### **Unit 4: Diversity of Living things**

<b>AAL</b>	<b>AFL</b>	<b>AOL</b>
Concept check Questions(all lessons)	Study notes/cue cards (All lessons)	Dichotomous Key Creation Assignment
Discussion: Exploring the Dual Nature of Bacteria: Helpful or Harmful?	Gizmos: Dichotomous Key Activity	Viruses and Bacteria Quiz
Discussion - Exploring Viruses: Structure, Reproduction, Classification, and Impact	Gizmos Lytic Cycle	Unit 4 Test
Gizmos Lytic Cycle	Unit Review - Explain a Solution to your teacher	
Unit Review Questions		
Unit 1 End-of-Unit Learning Log		

#### **Unit 5: Plant Systems**

<b>AAL</b>	<b>AFL</b>	<b>AOL</b>
Concept check Questions(all lessons)	Study notes/cue cards (All Lessons)	Exploring the Role of Plants in Canadian Society – Brochure
Adaptation of Plants Discussion	Plant Systems, Structures, and Transport Quiz	Unit 5 Minitest
Leaf Anatomy Handout		
Gizmos Lab Handout - Pollination Flower Fruit		
Unit Review Questions		
End-of-Unit Learning Log		

#### **Cumulative Assessments**

<b>AAL</b>	<b>AFL</b>	<b>AOL</b>
		Final Project
		Final Exam

## **CONSIDERATION FOR PROGRAM PLANNING**

### **PLANNING PROGRAMS FOR STUDENTS WITH SPECIAL EDUCATION NEEDS**

Classroom teachers are the key educators of students who have special education needs. They have a responsibility to help all students learn, and they work collaboratively with special education teachers, where appropriate, to achieve this goal. Special Education Transformation: The Report of the Co-Chairs with

the Recommendations of the Working Table on Special Education, 2006 endorses a set of beliefs that should guide program planning for students with special education needs in all disciplines. Those beliefs are as follows: All students can succeed. Universal design and differentiated instruction are effective and interconnected means of meeting the learning or productivity needs of any group of students. Successful instructional practices are founded on evidence-based research, tempered by experience.

### **PROGRAM CONSIDERATIONS FOR ENGLISH LANGUAGE LEARNERS**

Ontario schools have some of the most multilingual student populations in the world. The first language of approximately 20 percent of the students in Ontario's English language schools is a language other than English. Ontario's linguistic heritage includes several Aboriginal languages; many African, Asian, and European languages; and some varieties of English, such as Jamaican Creole. Many English language learners were born in Canada and raised in families and communities in which languages other than English were spoken, or in which the variety of English spoken differed significantly from the English of Ontario classrooms. Other English language learners arrive in Ontario as newcomers from other countries; they may have experience of highly sophisticated educational systems, or they may have come from regions where access to formal schooling was limited. When they start school in Ontario, many of these students are entering a new linguistic and cultural environment.

### **THE ROLE OF TECHNOLOGY IN THE PROGRAM**

Information and communications technologies (ICT) provide a range of tools that can significantly extend and enrich teachers' instructional strategies and support students' language learning. ICT tools include multimedia resources, databases, Internet websites, digital cameras, and word-processing programs. Tools such as these can help students to collect, organize, and sort the data they gather and to write, edit, and present reports on their findings. Information and communications technologies can also be used to connect students to other schools, at home and abroad, and to bring the global community into the local classroom. Whenever appropriate, therefore, students should be encouraged to use ICT to support and communicate their learning.

### **ACCOMMODATIONS**

Accommodations will be based on meeting with parents, teachers, administration and external educational assessment reports. The following three types of accommodations may be provided:

- Instructional accommodations:** such as changes in teaching strategies, including styles of presentation, methods of organization, or use of technology and multimedia.
- Assessment accommodations:** such as allowing additional time to complete tests or assignments or permitting oral responses to test questions.

Other examples of modifications and aids, which may be used in this course, are:

- Provide step-by-step instructions.
- Help students create organizers for planning writing tasks.
- Allow students to report verbally to a scribe (teacher/ student) who can help in note taking.
- Permit students a range of options for reading and writing tasks.
- Where an activity requires reading, provide it in advance.
- Provide opportunities for enrichment.