Ontario eSecondary School
Course Outline
2023-2024

Ministry of Education Course Title: Grade 11 Biology, University	
Ministry Course Code: SBI3U	
Course Type: University Preparation	
Grade: 11	
Credit Value: 1.0	
Prerequisite(s): Science, Grade 10 Academic	
Department: Science	
Course developed by: Kristine Strybosch and Quan Ly	**Date: July 20, 2024** **Revised:**
Length: One Semester	**Hours:** 110

This course has been developed based on the following Ministry documents:
  1. _Science, The Ontario Curriculum Grades 11 and 12 (2008)_
  2. _Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools (2010)_
  3. _Learning for All (2013)_

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

Unit	Length
Unit 1: Animal Systems	19 hours
Unit 2: Genetics	20.5 hours
Unit 3: Evolution	19.5hours
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
Total	**110 Hours**

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.

Video presentations and technological aids with videos embedded to enrich the course content and clarify concepts and skills being studied.

Practice (formative) quizzes as a review for students with access to answers for timely feedback to help reinforce the concepts and skills being studied.

Inquiry activities that will allow students to develop/practice problem solving and critical thinking skills, as well as enrich the course content and clarify concepts and skills being studied.

Visuals and graphic organizers are a great way for students to demonstrate their knowledge of subject matter through graphic organizers, pictures, and texts.

Research is completed in an online environment and the use of using reliable sources/A.P.A. formatting is reinforced.

Individual assignments - the teacher can support the student in these activities with ongoing feedback.

Oral presentations are facilitated through the use of video conferencing.

Practical extension and application of knowledge helps students develop their own voice, and gives them the ability to make personal connections, and connections to the world throughout their course.

General

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.

STEM – Science, Math, Physics, Chemistry, Geography

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.

Tables involve organizing information in terms of categories (rows and columns). This helps us to understand the relationships between ideas and data, as well as highlight trends.

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.

Cases are summaries of real-life problems wherein students relate scientific theories/concepts/formulas towards solving the problem in a real-world context. This helps students to understand the application and use of knowledge.

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.

Design projects are an opportunity for students to put their learning to the test in a real-world scenario, to address a design problem with a direct connection to people, the environment, economics, etc. Students collect information, apply problem solving, and use critical thinking to develop practical solutions that directly address their design problems.

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
- ❏ Practice (formative) quizzes
- ❏ Research projects (STSE focused)
- ❏ Inquiry Assignments
- ❏ Discussion forums
- ❏ Completed templates and graphic organizers
- ❏ Video assignment
- ❏ Reflections
- ❏ Oral presentations
- ❏ Tests
- ❏ True and false questions
- ❏ Short answer questions
- ❏ Long answer questions

- ❑ Reflections

- ❑ Graphs - plotting and analyzing

- ❑ Drawings / diagrams / sketches / schematics - creating, labeling, and analyzing

- ❑ Problem solving

- ❑ Simulation, lab, and case study worksheets

- ❑ Research projects and reports

- ❑ Design projects and reports

- ❑ Google meets

- ❑ Speech Recording

- ❑ 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
Course Work	**70**
Knowledge/Understanding (K)	21
Thinking/Inquiry (T)	21
Communication (C)	10.5
Application (A)	17.5
Final	**30**
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	
Midpoint of the course			
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 4.3Viruses 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

AAL	AFL	AOL
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

AAL	AFL	AOL
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

AAL	AFL	AOL
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

AAL	AFL	AOL
		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.