



## Ontario eSecondary School Course Outline 2019-2020

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|--|----------------------------|
| <b>Ministry of Education Course Title: Biology, College Preparation</b>  |                            |
| <b>Ministry Course Code: SBI3C</b>   |                            |
| <b>Course Type: College Preparation</b>  |                            |
| <b>Grade: 11</b>   |                            |
| <b>Credit: 1.0</b>   |                            |
| <b>Prerequisite(s): Science, Grade 10, Academic or Applied</b>   |                            |
| <b>Department: Science</b>   |                            |
| <b>Course developed by:<br/>Sabrina Bieber</b>   | <b>Date: March 1, 2019</b> |
| <b>Length:<br/>One Semester</b>  | <b>Hours:<br/>110</b>      |
| This course has been developed based on the following Ministry documents:<br>1. <i>The Ontario Curriculum, Grades 11 and 12, 2008, revised</i> |                            |

### **COURSE DESCRIPTION/RATIONALE**

This course focuses on the processes that occur in biological systems. Students will learn concepts and theories as they conduct investigations in the areas of cellular biology, microbiology, genetics, the anatomy of mammals, and the structure of plants and their role in the natural environment. Emphasis will be placed on the practical application of concepts, and

on the skills needed for further study in various branches of the life sciences and related fields.  
Prerequisite: Science, Grade 10, Academic or Applied

## **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 communicating);
2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields.

### ***Cellular Biology***

By the end of this course, students will:

1. evaluate the impact of environmental factors and medical technologies on certain cellular processes that occur in the human body;
2. investigate the structures and functions of cells, and the factors that influence cellular activity, using appropriate laboratory equipment and techniques;
3. demonstrate an understanding of the basic processes of cellular biology

### ***Genetics***

By the end of this course, students will:

1. evaluate some social, ethical, and environmental implications of genetic research and related technologies;
2. investigate the process of meiosis, and analyse data related to the laws of heredity;
3. demonstrate an understanding of the process of meiosis, and explain the roles of genes in the transmission of hereditary characteristics.

### ***Microbiology***

By the end of this course, students will:

1. assess the effects of microorganisms in the environment, and analyse the ethical issues related to their use in biotechnology;
2. investigate the development and physical characteristics of microorganisms, using appropriate laboratory equipment and techniques;
3. demonstrate an understanding of the diversity of microorganisms and the relationships that exist between them.

### ***Anatomy of Mammals***

By the end of this course, students will:

1. analyse the social or economic impact of technology used to treat systems in the human body, and the impact of lifestyle choices on human health;

2. investigate, through laboratory inquiry or computer simulation, the anatomy, physiology, and response mechanisms of mammals;
3. demonstrate an understanding of the structure, function, and interactions of the circulatory, digestive, and respiratory systems of mammals.

### ***Plants in the Natural Environment***

By the end of this course, students will:

1. analyse the roles of plants in ecosystems, and assess the impact of human activities on the balance of plants within those ecosystems;
2. investigate some of the factors that affect plant growth;
3. demonstrate an understanding of the structure and physiology of plants and their role in the natural environment.

## **COURSE CONTENT**

| <b><i>Unit</i></b>                        | <b><i>Length</i></b> |
|---|----------------------|
| Unit 1: Cellular Biology                  | 20 hours             |
| Unit 2: Genetics                          | 25 hours             |
| Unit 3: Microbiology                      | 15 hours             |
| Unit 4: Anatomy of Mammals                | 25 hours             |
| Unit 5: Plants in the Natural Environment | 20 hours             |
| Culminating Activity                      | 7 hours              |
| Final Exam                                | 3 hours              |
| <b>Total</b>                              | <b>110 hours</b>     |

## **UNIT DESCRIPTIONS**

### ***Cellular Biology***

Students will analyze life processes that are determined by the structures and functions of biochemical compounds, cell organelles, and body systems. They will explore different technological devices that support cellular functions and processes can be used to improve human health. They will reflect on how substances that are present in our everyday lives can affect cellular functions and processes in positive and negative ways.

### ***Genetics***

Students will be able to connect real world genetic research and biotechnology from an applicable point of view and how they have social, environmental, and ethical implications. Looking at various theories and studying hereditary, student will connect the variability and diversity of living organisms and how it results from the distribution of genetic materials during the process of meiosis.

### ***Microbiology***

Students will compare and contrast groups of microorganisms that have common characteristics, and these characteristics enable them to interact with other organisms in the environment. They will be able to understand how microorganisms can have both positive and negative effects on the environment. Students will study the technological use of microorganisms and how it may or not may raise many ethical issues.

### ***Anatomy of Mammals***

Students will identify different groups of organs with specific structures and summarize how their functions work together as systems, which interact with other systems in the body. Students will review and connect different technologies that are used to maintain human health have social and economic benefits and costs. Students will reflect on environmental factors, including natural factors and those resulting from human activity, and how they can have a wide range of effects on human health.

### ***Plants in the Natural Environment***

Students will be able to identify different plants and their specialized structures with distinct functions that enable each plant to respond and adapt to their environment. Students will be able to highlight and argue how plants are critical to the survival of ecosystems. Students will connect the humans effects on sustainability of ecosystems and when humans alter the balance of plants within those ecosystems.

## **TEACHING AND LEARNING STRATEGIES**

**The students will experience a variety of activities:**

### **Whole-Class Activities**

Whole class activities are designed to introduce concepts and skills that are directly applicable to the workplace and to build on the content being studied during small group and individual activities. These activities include the following:

**The whole group activities include the following:**

**Class discussions** that are facilitated through video conferencing and telephone conversations with their subject teacher or discussions with other students concerning the concepts and skills being studied. This is done with the use of Socratic circles for discussions.

**Video presentations** and technological aids (research) with videos embedded to enrich the course content and clarify concepts and skills being studied. Also the use of online pre-approved quizzes and games to help a student become more familiar with the concepts and skills being studied.

**Diagnostic and review activities** (audio and video taping) can be student-led or teacher lead to work as a review for students through audio and video made to share among each other to help reinforce the concepts and skills being studied.

### **Small Group Activities**

The teacher sets up small group activities to provide opportunities for active and oral learning as well as to bolster practical communication and teamwork skills. The teacher plays a critical role during group

activities by monitoring group progress as well as answering questions that arise and using questions to assist students in their understanding. In this way, the teacher also facilitates student understanding of effective learning, communication, and team building during group activities.

**The small group activities include the following:**

**Practical extension and application of knowledge** is used as an effective learning strategy in this course because it allows the students to read and listen to the texts and stories and reflect back with connections to themselves, other texts and the world. Students are encouraged to share their understandings through work submitted each day, phone conversations about course work, or videoconferencing.

**Oral presentations** in an online environment we have the equipment to have student either live video conference oral presentations, or make videos and submit them for their oral presentations. These oral presentations can be viewed by fellow students (when appropriate) and the teacher. Students can learn from one another, and from their teacher. Such activities include dramatic readings and performances.

**Charts and graphs** are used to present effective learning opportunities of concepts and skills to students who would benefit from visual objects to learn. Every student learns differently, and it is used to help students discover another way to present their information such as graphic organizers, lists, and pictures.

### **Individual Activities**

The teacher should provide a variety of individual assignments to expand and consolidate the learning that takes place in the whole-class and small group activities. Individual activities allow the teacher to accommodate interests and needs and to access the progress of individual students. The teacher plays an important role in supporting these activities through the provision of ongoing feedback to the students, both orally and in writing. Teachers are encouraged to include individual activities such as the following in the course:

**Research** is completed in an online environment by teaching the students first about plagiarism rules and giving examples of good sources to use. The students are not only limited to the online search for information, but have the resources available by links on the Moodle page of information that has been scanned and uploaded.

**Individual assignments** are worked on at a student's own pace. The teacher can support the student in these activities with ongoing feedback.

**Oral presentations** are facilitated through the use of video conferencing and video recording.

**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. Students are given a variety of reading and viewing texts to give them many chances to apply their new concepts, skills, and knowledge.

**Ongoing project work** is something that is valued in the earning of an English credit. The ongoing project can be submitted to the teacher for ongoing feedback in both written and oral work.

**Reading** students are able to read a variety of texts online. The students may print out the reading material to use it to highlight, take notes, and have with them when a computer is not available.

**Written assignments** are used to allow students to develop their skills in writing, comprehension, and communication. With the online format students submit their work, and have a chance to get feedback from the teacher, and submit their best work. This can be demonstrated with reading responses,

personal writing, report writing, essay writing, script writing, business and technical writing, and individual research assignments.

**Reflective/Comparative analysis** for students working in their portfolios, giving them an opportunity for self-reflection on their accomplishments, skills, and concepts learned over the year. This can be accomplished with student and teacher conferences as well.

## **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.

**Evaluation:** Assessment of Learning 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. Assessment of student acquisition of listening and talking, reading and viewing and writing skills also occurs regularly through unobtrusive teacher observation and conferencing.

Units conclude with performance tasks, e.g., interviews and from essays that build towards and prepare students for the end-of-course culminating task in Unit Five. 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, i.e. check bricks; teacher-adapted generic rubrics available in many sources, including the *Ontario Secondary School Literacy Course (OSSLC) Profile*, so that they are more task-specific. The teacher might ask: "What does the criteria look like for this particular task?" Or "What does limited effectiveness look like?" The teacher could involve students in the discussion, modification, or creation of rubrics, and teach students to use rubrics as a learning tool that can support the writing process and practice.

## **ASSESSMENT ACTIVITIES**

- Homework assignments
- Individual conference meetings
- Online Discussion Forums
- Online Conferences

- Readings Activities and Case Studies
- Diagnostic tests and writing tasks
- Reflections Forums
- Online Oral presentation
- Tests & Exam
- Lab Report Writing
- Lab Gizmos (Online Simulations)
- Self-Assessment Tasks

## EVALUATION

The final grade will be determined as follows:

- Seventy per-cent 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.
- Thirty per-cent of the grade will be based on a final evaluation administered at or towards the end of the course. This evaluation will be based on evidence from one or a combination of the following: an examination, a performance, an essay, and/or another method of evaluation suitable to the course content. The final evaluation allows the student an opportunity 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)

| <b>Weightings</b>       |           |
|-------------------------|-----------|
| <b>Course Work</b>      | <b>70</b> |
| Knowledge/Understanding | 17.5      |
| Thinking/Inquiry        | 17.5      |
| Communication           | 20        |
| Application             | 15        |
| <b>Final</b>            | <b>30</b> |
| Culminating Activity    | 15        |
| Final Exam              | 15        |

## TERM WORK EVALUATIONS (70%)

| Evaluation Item | Description   | Category       |
|-----------------|---|----------------|
| Lab(s)          | Unit 1: Cell Structure Lab<br>Unit 2: Genetics Lab<br>Unit 3: Virus Lab<br>Unit 4: Digestive System Lab<br>Unit 5: Seed Germination Lab | K/U, T/I, C, A |

|                           |  |                |
|---------------------------|--|----------------|
| Unit(s)                   | Unit 1: Cellular Biology Test<br>Unit 2: Genetics Test<br>Unit 3: Microbiology Test<br>Unit 4: Anatomy in Animals Test<br>Unit 5: Plants in the Environment Test   | K/U, T/I, C, A |
| Culminating Assignment(s) | Unit 1: Newspaper Articles and Rationale<br>Unit 2: Newspaper Articles and Rationale<br>Unit 3: Newspaper Articles and Rationale<br>Unit 4: Newspaper Articles and Rationale<br>Unit 5: Newspaper Articles and Rationale | K/U, T/I, C, A |
| Online Conferences        | AAL Reflections  | K/U, T/I, C, A |

### FINAL EVALUATIONS (30%)

| Evaluation Item     | Description  | Category       |
|---------------------|--|----------------|
| Culminating project | Newspaper: Science in the News Assignment<br>Portfolio | K/U, T/I, C, A |
| Final Exam          | Final Examination                                      | K/U, T/I, C, A |

### AFL/AAL/AOL Tracking sheet:

#### Unit 1:

| AAL                    | AFL   | AOL  |
|------------------------|---|--|
| Unit 1 Self Reflection | 1.1 Lesson Questions                                | Culminating Assign. Checkpoint 1                           |
| Forum Reflections      | 1.2 Lesson Questions                                | STSE Presentation: Canadian Scientists in Cellular Biology |
|                        | 1.3 Lesson Questions                                | Unit 1 Test  |
|                        | 2.1 Cell Alive! And Microscope Assignment Questions |  |
|                        | 2.2 Lesson Questions                                |  |

#### Unit 2:

| AAL                    | AFL                                    | AOL                              |
|------------------------|--|----------------------------------|
| Unit 2 Self Reflection | 3.1 GIZMOS Questions                   | Culminating Assign. Checkpoint 2 |
| Forum Reflections      | 4.2 Punnett Square Questions           | Gene Expression Lab Simulation   |
|                        | 4.3 Genetic Disorder Slideshow Assign. | Unit 2 Test                      |

#### Unit 3:

| AAL                    | AFL                  | AOL                              |
|------------------------|----------------------|----------------------------------|
| Unit 3 Self Reflection | 6.1 Lesson Questions | Culminating Assign. Checkpoint 3 |
| Forum Reflections      | 6.2 Lesson Questions | Unit 3 GIZMO Lab                 |
|                        | 6.3 Lesson Questions | Vaccine Research Assignment      |
|                        |                      | Unit 3 Test                      |

#### Unit 4:

| AAL | AFL | AOL |
|-----|-----|-----|
|     |     |     |

|  |   |  |
|--|---|--|
| Unit 4 Self Reflection<br>Forum Reflections                | 8.1 Lesson Questions                              | Culminating Assign. Checkpoint 4         |
|  | 8.2 Worksheet Assignment                          |  |
|  | 8.3 Health and Care Circulatory System Assignment | Career Exploration Audio<br>Presentation |
|  | 9.1 Respiratory Assignment                        |  |
|  | 9.2 Health and Care Respiratory System Assignment |  |
|  | 10.1 Digestive Assignment                         | Unit 4 Test                              |
| 10.2 Health and Care of the Digestive System<br>Assignment |   |  |

**Unit 5:**

| AAL   | AFL                                   | AOL                              |
|---|---------------------------------------|----------------------------------|
| Unit 5 Self Reflection<br>Forum Reflections | 11.1 Sustainable Ecosystems Worksheet | Culminating Assign. Checkpoint 5 |
|   | 11.2 Lesson Questions                 |                                  |
|   | 12.1 Dichotomous Assignment           | Unit 5 Test                      |
|   | 12.2 Lesson Questions                 |                                  |
|   | 12.3 Lesson Questions                 |                                  |

**Finals**

|                        |
|------------------------|
| <b>AOL</b>             |
| Culminating Assignment |
| Final Exam             |

## CONSIDERATION FOR PROGRAM PLANNING

### PLANNING ENGLISH 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 per-cent 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 SCIENCE 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.

## ACCOMODATIONS

Accommodations will be based on meeting with parents, teachers, administration and external educational assessment report. 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.
- Ⓒ **Environmental accommodations:** such as preferential seating or special lighting.
- Ⓒ **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
  - Ⓒ Record key words on the board or overhead when students are expected to make their own notes
  - Ⓒ 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.