



# zoo school



## OUTLINE OF COURSE OF STUDY 2023

<b>School Name:</b>	Toronto Zoo School
<b>Department:</b>	Science
<b>Course Developer:</b>	Toronto Zoo
<b>Classroom Program teacher:</b>	Nia Gibson
<b>Development Date:</b>	2010
<b>Revision Date:</b>	2023
<b>Course Title:</b>	Biology
<b>Grade:</b>	11
<b>Course Type:</b>	University Preparation
<b>Course Code:</b>	SBI3U
<b>Credit Value:</b>	1.0
<b>Prerequisite:</b>	Science, Grade 10, Academic (SNC2D)
<b>Curriculum Policy Document:</b>	Science, The Ontario Curriculum, Grades 11 and 12, 2008 (revised)

### Course Description/Rationale

This course furthers students' understanding of the processes that occur in biological systems. Through classroom lessons, virtual lessons, behind-the-scenes tours, and discussions with Zoo staff, students will not only learn the complexities of biological systems, but will see them in practice at the Toronto Zoo. Students will study theory and conduct investigations in the areas of diversity of living things; 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 their skills related to scientific investigation. Students will also have an opportunity to meet several Zoo staff to understand the scope of careers that the study of biology can lead to.

Zoo School takes an experiential approach to learning. We pride ourselves in offering engaging, dynamic lessons, with a hands-on approach. Our teaching tools will include Zoo Staff discussions, behind-the-scenes tours, debates, practical investigations, research, class discussions, and individual and group assignments.

## Overall Curriculum Expectations, Outline of Course Content, and Teaching and Learning Strategies

Unit	Unit description	Time
<b>Unit A</b>	<p style="text-align: center;"><b><u>Scientific Investigation Skills and Career Exploration</u></b></p> <p><b>Overall Expectations:</b></p> <ul style="list-style-type: none"> <li>● 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);</li> <li>● A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields.</li> </ul> <p><b>At Zoo School Students will:</b></p> <ul style="list-style-type: none"> <li>● Use their investigation skills to examine scientific theory, throughout units B-F.</li> <li>● Get the opportunity to meet and question various Zoo staff to discuss their career choices.</li> </ul>	<b>Incorporated throughout all units of study</b>
<b>Unit B</b>	<p style="text-align: center;"><b><u>Diversity of Living Things</u></b></p> <p><b>Overall Expectations:</b></p> <ul style="list-style-type: none"> <li>● B1. analyse the effects of various human activities on the diversity of living things;</li> <li>● B2. investigate, through laboratory and/or field activities or through simulations, the principles of scientific classification, using appropriate sampling and classification techniques;</li> <li>● B3. demonstrate an understanding of the diversity of living organisms in terms of the principles of taxonomy and phylogeny.</li> </ul> <p><b>At Zoo School Students will:</b></p> <ul style="list-style-type: none"> <li>● Virtually visit examples of endangered animals in the Zoo collection, and analyse the effects of various human activities on the diversity of living things.</li> <li>● Investigate the principles of scientific classification, using appropriate sampling and classification techniques.</li> <li>● Investigate the vast array of animals at the Zoo to gain an understanding of the diversity of living organisms in terms of the principles of taxonomy and phylogeny.</li> </ul>	<b>30 hours</b>

<p><b>Unit C</b></p>	<p style="text-align: center;"><b><u>Evolution</u></b></p> <p><b>Overall Expectations:</b></p> <ul style="list-style-type: none"> <li>● 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;</li> <li>● C2. investigate evolutionary processes, and analyse scientific evidence that supports the theory of evolution;</li> <li>● C3. demonstrate an understanding of the theory of evolution, the evidence that supports it, and some of the mechanisms by which it occurs.</li> </ul> <p><b>At Zoo School Students will:</b></p> <ul style="list-style-type: none"> <li>● Analyse the economic and environmental advantages and disadvantages of artificial selection technology, and evaluate the impact of environmental changes on natural selection and endangered species.</li> <li>● Investigate evolutionary processes, and analyse scientific evidence and Zoo animal characteristics that support the theory of evolution.</li> </ul>	<p style="text-align: center;"><b>21 hours</b></p>
<p><b>Unit D</b></p>	<p style="text-align: center;"><b><u>Genetic Processes</u></b></p> <p><b>Overall Expectations:</b></p> <ul style="list-style-type: none"> <li>● 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;</li> <li>● D2. investigate genetic processes, including those that occur during meiosis, and analyse data to solve basic genetics problems involving monohybrid and dihybrid crosses;</li> <li>● D3. demonstrate an understanding of concepts, processes, and technologies related to the transmission of hereditary characteristics.</li> </ul> <p><b>At Zoo School Students will:</b></p> <ul style="list-style-type: none"> <li>● Evaluate the importance of some recent contributions to our knowledge of genetic processes, and how these can be used in Zoo breeding programs.</li> <li>● Analyse social and ethical implications of genetic and genomic research.</li> <li>● Investigate genetic processes, including those that occur during meiosis, and analyse data to solve basic genetics problems involving monohybrid and dihybrid crosses.</li> <li>● Demonstrate an understanding of concepts, processes, and technologies related to the transmission of hereditary characteristics.</li> </ul>	<p style="text-align: center;"><b>21 hours</b></p>

<p><b>Unit E</b></p>	<p style="text-align: center;"><b><u>Animals: Structure and Function</u></b></p> <p><b>Overall Expectations:</b></p> <ul style="list-style-type: none"> <li>● E1. analyse the relationships between changing societal needs, technological advances, and our understanding of internal systems of humans;</li> <li>● 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;</li> <li>● E3. demonstrate an understanding of animal anatomy and physiology, and describe disorders of the respiratory, circulatory, and digestive systems.</li> </ul> <p><b>At Zoo School Students will:</b></p> <ul style="list-style-type: none"> <li>● Investigate, through laboratory inquiry the functional responses of the respiratory and circulatory systems of animals, and the relationships between their respiratory, circulatory, and digestive systems.</li> <li>● Demonstrate an understanding of animal anatomy and physiology, and describe disorders of the respiratory, circulatory, and digestive systems.</li> <li>● Investigate, through dissection the interrelatedness of the digestive system, circulatory system and respiratory system. When offered on-line the dissection will be carried out in an on-line format.</li> </ul>	<p style="text-align: center;"><b>20 hours</b></p>
<p><b>Unit F</b></p>	<p style="text-align: center;"><b><u>Plants: Anatomy, Growth, and Function</u></b></p> <p><b>Overall Expectations:</b></p> <ul style="list-style-type: none"> <li>● F1. evaluate the importance of sustainable use of plants to Canadian society and other cultures;</li> <li>● F2. investigate the structures and functions of plant tissues, and factors affecting plant growth;</li> <li>● F3. demonstrate an understanding of the diversity of vascular plants, including their structures, internal transport systems, and their role in maintaining biodiversity.</li> </ul> <p><b>At Zoo School Students will:</b></p> <ul style="list-style-type: none"> <li>● Evaluate the importance of sustainable use of plants to Canadian society and other cultures.</li> <li>● Using the Zoo's diverse plant collection investigate the structures and functions of plant structures.</li> <li>● Investigate factors that affect plant growth through means of a scientific investigation.</li> <li>● Through observing plants in different geographical Zoo exhibits demonstrate an understanding of the diversity of vascular plants, including their structures, internal transport systems, and their role in maintaining biodiversity.</li> </ul>	<p style="text-align: center;"><b>18 hours</b></p>
	<p style="text-align: center;"><b>Total</b></p>	<p style="text-align: center;"><b>110 hours</b></p>

## **TEACHING AND LEARNING STRATEGIES**

In addition to the strategies identified in the assessment for, as, and, of learning charts below, teaching and learning strategies will include (but not be limited to):

- Scientific Investigations
- Real-world examples
- Peer discussions
- One-on-one help
- Socratic teaching
- Student-centred lessons
- Class discussions
- Individual assignments
- Virtual behind-the-scenes tours
- Group work

Students will need to have access to the internet and will be asked to join Google Classrooms, through which the on-line component of Zoo School will be hosted. Lessons conducted online will be delivered synchronously with the classroom teacher. Students will be expected to participate in online class discussions, chats, and group work, as well as completion of some assignments while viewing live and pre-recorded Zoo tours and staff interviews.

## **Strategies for Assessment & Evaluation of Student Performance**

### **Evaluation**

Student performance will be continually assessed throughout the course based on practices outlined in the Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools, 2010, document. This includes individual assignments, group assignments, quizzes, teacher-student discussions, and observations. Every effort is made to include the co-construction of success criteria in student assessment.

The categories of knowledge and skills are described as follows:

***Knowledge and Understanding.*** Subject-specific content acquired in each course (knowledge), and the comprehension of its meaning and significance (understanding).

***Thinking and Investigation.*** The use of critical and creative thinking skills and inquiry, research, and problem-solving skills and/or processes.

***Communication.*** The conveying of meaning through various forms.

***Application.*** The use of knowledge and skills to make connections within and between various contexts.

Teachers will ensure that student work is assessed and/or evaluated in a balanced manner with respect to the four categories and that achievement of particular expectations is considered within the appropriate categories. The balance of the weighting of the categories of the achievement chart throughout the course is approximately:

<i>Knowledge &amp; Understanding:</i>	25%	<i>Communication:</i>	15%
<i>Thinking &amp; Inquiry:</i>	35%	<i>Application:</i>	25%

Student work will be assessed with reference to the achievement chart:

<b>Achievement Chart</b>		
<b>Percentage Grade Range</b>	<b>Achievement Level</b>	<b>Summary Description</b>
80–100%	Level 4	A very high to outstanding level of achievement. Achievement is <i>above</i> the provincial standard.
70–79%	Level 3	A high level of achievement. Achievement is <i>at</i> the provincial standard.
60–69%	Level 2	A moderate level of achievement. Achievement is <i>below, but approaching</i> , the provincial standard.
50–59%	Level 1	A passable level of achievement. Achievement is <i>below</i> the provincial standard.
below 50%	Level R	Insufficient achievement of curriculum expectations. A credit will not be granted.

Individual students' needs will be taken into account for assessment. The requirements of Individual Education Plans (IEPs) for assessment accommodations will be followed wherever applicable.

The tools highlighted in yellow will be used for the three different types of assessments:

Assessment as Learning	Assessment for Learning	Assessment of Learning
<p><b>Student Product</b></p> <ul style="list-style-type: none"> <li>• Journals/Letters/Emails</li> <li>• Learning Logs</li> <li>• Entrance tickets</li> <li>• Exit tickets</li> </ul>	<p><b>Student Product</b></p> <ul style="list-style-type: none"> <li>• Assignment</li> <li>• Journals/Letters/Emails</li> <li>• Pre-tests</li> <li>• Quizzes</li> <li>• Rough drafts</li> <li>• Portfolios</li> <li>• Posters</li> <li>• Graphic organizers</li> <li>• Peer feedback</li> <li>• Reports</li> <li>• Essays</li> <li>• Webbing/Mapping</li> <li>• Entrance ticket</li> <li>• Vocabulary notebooks</li> <li>• Visual Thinking Networks</li> </ul>	<p><b>Student Product</b></p> <ul style="list-style-type: none"> <li>• Assignment</li> <li>• Journals/Letters/Emails</li> <li>• Tests</li> <li>• Exam</li> <li>• Rough drafts</li> <li>• Portfolio</li> <li>• Posters</li> <li>• Graphic organizers</li> <li>• Reports</li> <li>• Essays</li> <li>• Visual Thinking Networks</li> <li>• Teacher student conversations</li> <li>• Observations</li> </ul>
<p><b>Observation</b></p> <ul style="list-style-type: none"> <li>• Whole class discussions</li> <li>• Self-proofreading</li> </ul>	<p><b>Observation</b></p> <ul style="list-style-type: none"> <li>• Class discussions</li> <li>• Debate</li> <li>• PowerPoint presentations</li> <li>• Performance tasks</li> </ul>	<p><b>Observation</b></p> <ul style="list-style-type: none"> <li>• Debate</li> <li>• PowerPoint presentations</li> <li>• Performance tasks</li> </ul>
<p><b>Conversation</b></p> <ul style="list-style-type: none"> <li>• Student teacher conferences</li> <li>• Small Group Discussions</li> <li>• Pair work</li> <li>• Debate</li> </ul>	<p><b>Conversation</b></p> <ul style="list-style-type: none"> <li>• Student teacher conferences</li> <li>• Emails</li> <li>• Small group discussions</li> <li>• Pair work</li> <li>• Peer-feedback</li> <li>• Peer-editing</li> <li>• Oral pre-tests</li> <li>• Oral quizzes</li> </ul>	<p><b>Conversation</b></p> <ul style="list-style-type: none"> <li>• Student teacher conferences</li> <li>• Question and Answer Session</li> <li>• Oral tests</li> </ul>

## **Final Grade**

The percentage grade represents the quality of the student's overall achievement of the expectations of the course and reflects the corresponding level of achievement described in The Ontario Curriculum Grades 11 and 12 Achievement Chart for Science. A credit is granted for this course if the student's final grade is 50% or higher. The final grade for this course will be determined as follows:

70% of the grade will be based on the student's performance throughout the course including, individual assignments, group assignments, mid-term test, quizzes, teacher-student discussions, and observations.

30% of the grade will be based upon a final exam.

## **Disclosure Policy**

Students will receive a mid-term report nearing the midpoint of the Zoo School session. Upon receiving their grade students will have the option to drop the course; however, no refund will be available. Dropping the course at this stage would result in no record of this course appearing on their Ontario Student Transcript and a "W" for withdrawal with no associated grade appearing on the report card issued subsequent to the withdrawal. Withdrawals from the Zoo School course must be made in writing to the school at the point where 75% of the course has been completed, and following issue of the mid-term report card. Dates for withdrawal for each Zoo School session will be communicated to the parents/guardians and students at the start of their chosen session. For all students continuing after this point, Zoo School is required to disclose student's achievement and final grade on their Ontario Student Transcript.

## **Considerations for Program Planning**

Zoo School incorporates, as appropriate, considerations for program planning that align with ministry and board policy and initiatives.

## **Health and Safety in Science**

Zoo School takes every effort to ensure the health and safety of students. Policies and procedures are in place to prevent students from adverse health effects including what is deemed acceptable online behavior.

## **Planning Science Programs for Students with Special Needs**

Zoo School recognizes that each student has their own unique patterns of learning. Student tasks will be varied to accommodate different students' learning needs.

## **Students requiring accommodations only**

Instructional accommodations, environmental accommodations and assessment accommodations will be provided to students with an IEP (Individual Education Plan) that allow access to the course without changes to the knowledge and skills the student is expected to demonstrate. The accommodations required to facilitate the student's learning must be identified on their IEP.



### **Students requiring modified expectations**

Some students will require modifications to the course expectations, which differ from the regular course expectations. Unfortunately, Zoo School is not able to modify course expectations.

### **Program Considerations for English Language Learners**

Zoo School is delivered in English only. We acknowledge that 20% of the students in Ontario's English-language schools do not have English as a first language. Due to the nature of the Zoo School course, students must be able to comprehend and communicate in the English language.

### **Environmental Education**

The preservation of the environment is valued highly by Zoo School. Lesson plans have been developed with special consideration of the expectations listed in "The Ontario Curriculum, grades 9-12, Environmental Education Scope and Sequence of Expectations, 2011 edition" document.

### **Antidiscrimination Education**

Zoo School uses materials that reflect diversity with respect to gender, race, culture, and ability. We also engage in many behind-the-scenes tours with a diversity of Zoo Staff. All of our tours are accessible to students with physical disabilities. Zoo School is open to adjusting instruction, if feasible, when concerns are brought to our attention.

### **Critical Thinking and Critical Literacy in Science**

Zoo School course material is designed with critical thinking in mind. Students use critical thinking skills in science when they assess, analyse, and/or evaluate the impact of something on society and the environment; when they form an opinion about something and support that opinion with logical reasons; or when they create personal plans of action with regard to making a difference. During their time at Zoo School students will use their critical thinking skills to analyse the impacts humans are having on biodiversity, to form their own opinions on emerging genetic technologies and to evaluate the societal and technological changes that have occurred over the past 100 years with regards to medicine and diet.

### **Literacy, Mathematical Literacy, and Investigation (inquiry/Research) Skills**

Many of the activities and tasks that students undertake during their time at Zoo School involve the literacy skills related to oral, written, and visual communication. They build upon their previous skills through individual presentations, group presentations, written products and conversations with the teacher.

Investigations are at the heart of learning in science. During Zoo School students will have multiple opportunities to develop their ability to ask questions and conduct inquiries and research as they plan and carry out investigations.

### **The Role of Information and Communications Technology in Science**

Zoo School students are encouraged to use information and communications technology to support and communicate their learning. This could include using the internet for research purposes, creating visual presentations and using programs to create graphs and tables. Zoo School also offers an online platform where students can gain access to pre-recorded lessons, zoo content videos and view the lessons' slide presentations.

## **The Ontario Skills Passport and Essential Skills**

N/A

## **Career Education**

Students are given numerous opportunities to virtually explore and discuss career options in the field of science and wildlife conservation with various members of Zoo staff. Including but not limited to nutritionist, reproductive physiologist, veterinarian technician, conservation field biologist, and wildlife keepers.

## **Cooperative Education and Other Forms of Experiential Learning**

N/A

## **Planning Program Pathways and Programs Leading to a Specialist High Skills Major**

N/A

## **Assessment and Evaluation**

Assessment and evaluation are performed in accordance with "Growing Success: Assessment, Evaluation and Reporting in Ontario's Schools, First Edition Covering Grades 1 to 12".

## **Resources**

Textbooks are not essential for the delivery of the Zoo School SBI3U course. Course programming is designed to be student-centered, engaging students in their online learning and achievement while connecting to the Toronto Zoo's conservation programs and wildlife.

### **Contact Information**

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