



Course Name: Biology, Grade 12	Course Code: SBI 4U	Course Pre-requisite: SBI 3U
Course Type: University Preparation	Grade Level: 12	Credit Value: 1
Textbook: Biology 12U	Publisher: Nelson	Textbook Value: \$ 106.92
Teachers: P. Pigeon and K. Wiener		

Course Description:

This course provides students with the opportunity for in-depth study of the concepts and processes that occur in biological systems. Students will study theory and conduct investigations in the areas of biochemistry, metabolic processes, molecular genetics, homeostasis, evolution, and population dynamics. Emphasis will be placed on the achievement of detailed knowledge and the refinement of skills needed for further study in various branches of the life sciences and related fields.

Link 11-12 Science - http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.pdf

Course Overall Expectations:

Strand	Overall Expectations
	As a component of every strand:
Scientific Investigation Skills and Career Exploration	<ul style="list-style-type: none"> 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); identify and describe a variety of careers related to the fields of science under study, and identify scientists, including Canadians, who have made contributions to those fields.
Biochemistry	<ul style="list-style-type: none"> analyse technological applications of enzymes in some industrial processes, and evaluate technological advances in the field of cellular biology; investigate the chemical structures, functions, and chemical properties of biological molecules involved in some common cellular processes and biochemical reactions; demonstrate an understanding of the structures and functions of biological molecules, and the biochemical reactions required to maintain normal cellular function.
Metabolic Processes	<ul style="list-style-type: none"> analyse the role of metabolic processes in the functioning of biotic and abiotic systems, and evaluate the importance of an understanding of these processes and related technologies to personal choices made in everyday life; investigate the products of metabolic processes such as cellular respiration and photosynthesis; demonstrate an understanding of the chemical changes and energy conversions that occur in metabolic processes.
Molecular Genetics	<ul style="list-style-type: none"> analyse some of the social, ethical, and legal issues associated with genetic research/biotechnology; investigate, through laboratory activities, the structures of cell components and their roles in processes that occur within the cell; demonstrate an understanding of concepts related to molecular genetics, and how genetic modification is applied in industry and agriculture.
Homeostasis	<ul style="list-style-type: none"> evaluate the impact on the human body of selected chemical substances and of environmental factors related to human activity; investigate the feedback mechanisms that maintain homeostasis in living organisms; demonstrate an understanding of the anatomy and physiology of human body systems, and explain the mechanisms that enable the body to maintain homeostasis.
Population Dynamics	<ul style="list-style-type: none"> analyse the relationships between population growth, personal consumption, technological development, and our ecological footprint, and assess the effectiveness of some Canadian initiatives intended to assist expanding populations; investigate the characteristics of population growth, and use models to calculate the growth of populations within an ecosystem; demonstrate an understanding of concepts related to population growth, and explain the factors that affect the growth of various populations of species.

Assessment and Evaluation Strategies:

The purpose of assessment and evaluation is to improve student learning. Assessment and evaluation is based on the provincial curriculum expectations and the achievement levels outlined in the curriculum document. In order to ensure that assessment and evaluation are valid and reliable, and that they lead to the improvement of student learning, teachers use a variety of strategies throughout the course, including: providing students with feedback about their work (known as assessment for learning), helping to set learning goals and monitor their own progress (known as assessment as learning), and evaluation and reporting of progress in the form of grades and marks (known as assessment of learning).

<p style="text-align: center;">Unit Overview</p> <p style="text-align: center;">Students will work with related scientific investigation skills and explore scientific careers as part of each unit.</p>	<p style="text-align: center;">Assessment and Evaluation Methods</p> <p style="text-align: center;">(May include major evaluations)</p>
<p>Biochemistry Topics</p> <ul style="list-style-type: none"> cellular roles of organelles, structure and cellular function of biochemical compounds, biochemical functional groups, biological tests to identify biochemical compounds in food, chemical structures and mechanisms of enzymes, factors affecting enzyme action, the four main types of biochemical reactions, fluid mosaic model of cell membranes, cell membranes transport processes, enzyme applications and advancements in cellular biology and related technological applications 	<ul style="list-style-type: none"> assignments, debates, exam, group work, laboratory investigations, presentations, projects, quizzes, reports and tests
<p>Metabolic Processes Topics</p> <ul style="list-style-type: none"> chemical changes and energy conversions associated aerobic/anaerobic cellular respiration and photosynthesis, energy transfer during cellular respiration and photosynthesis, the roles of oxygen and organelles such as mitochondria and chloroplasts, factors affecting cellular respiration and photosynthesis, the role of metabolic processes in interactions between biotic and abiotic systems, and assess the relevance of an understanding of cell biology and related technologies 	<ul style="list-style-type: none"> assignments, debates, exam, group work, laboratory investigations, presentations, projects, quizzes, reports and tests
<p>Molecular Genetics Topics</p> <ul style="list-style-type: none"> DNA replication and sequencing repair mechanisms; structures and functions of RNA and DNA; protein synthesis; interpretation of the genetic code; DNA extraction; control/regulation of genetic expression in prokaryotes and eukaryotes; causes of genetic mutation; industrial and agricultural application of genetic modification; functions of cell components used in biotechnology; historical scientific contributions that have advanced our understanding of molecular genetics; social, ethical, and legal implications of biotechnology and Canadian regulations pertaining to biotechnology 	<ul style="list-style-type: none"> assignments, debates, exam, group work, laboratory investigations, presentations, projects, quizzes, reports and tests
<p>Homeostasis Topics</p> <ul style="list-style-type: none"> response mechanisms of an invertebrate to external stimuli; anatomy and physiology of the endocrine, excretory, and nervous systems; role of reproductive hormones in human feedback mechanisms; water, ionic and thermal balance and acid–base equilibrium in response to environmental change/effects of medical treatments; effects on the human body of taking health improving/performance enhancing chemical substances and human health issues arising from the impact of human activities on the environment 	<ul style="list-style-type: none"> assignments, debates, exam, group work, laboratory investigations, presentations, projects, quizzes, reports and tests
<p>Population Dynamics Topics</p> <ul style="list-style-type: none"> inter-species interactions; population characteristics/dynamics/interactions; factors causing population fluctuations; population growth models and calculations; the growth flow of food energy in the production, distribution, and use of food resources in human populations; effects of human population growth, personal consumption, and technological development on our ecological footprint; and effectiveness of some Canadian technologies and projects intended to nourish expanding populations 	<ul style="list-style-type: none"> assignments, debates, exam, group work, laboratory investigations, presentations, projects, quizzes, reports and tests
<p>Course Culminating Activity/Independent Study</p> <ul style="list-style-type: none"> Debates Involving Contemporary Biological Issues 	<ul style="list-style-type: none"> due within the last six-eight weeks of the conclusion of the course
<p>Exam</p>	<ul style="list-style-type: none"> written exam in June

Assessment and Evaluation Categories and Weights:

Achievement Chart Categories	
Term Achievement Category	Comprises
Application/Making Connections	<ul style="list-style-type: none"> ● transfer of concepts between self and science ● transfer of concepts between science and other subjects ● transfer of concepts between subjects and the world outside ● access impacts of science
Communication	<ul style="list-style-type: none"> ● oral, writing, listening and visual skills ● mathematical/data communication, presentation and precision/accuracy ● journals, portfolios and models
Knowledge/Understanding	<ul style="list-style-type: none"> ● facts, terms and relationships between concepts ● transfer of concepts to new contexts ● solving math/formula problems
Thinking/Inquiry	<ul style="list-style-type: none"> ● design skills (formulate hypotheses, create and test procedures) ● thinking skills (inductive reasoning, deductive reasoning and data analysis, interpretation and evaluation)

Evaluation/Weight of Marks			
Evaluation	Components	Component Percentage	Overall Percentage
Term Evaluation	Application/Making Connections	25	70
	Communication	25	
	Knowledge/Understanding	25	
	Thinking/Inquiry	25	
Final Evaluation	Culminating Activity	10	30
	Exam	20	

Learning Skills and Work Habits Assessment:

The development of learning skills and work habits is an integral part of student learning. These skills are:

- Responsibility
- Organization
- Independent Work
- Collaboration
- Initiative
- Self-Regulation

Learning skills and work habits influence student achievement and are included as a formal part of the assessment and evaluation process. Learning skills and work habits will be assessed through a variety of teacher strategies. (e.g. observation, student /teacher conference, self-reflection, checklists, exit cards, etc.) These important learning skills and work habits will be formally reported on the Provincial Report Card according to the following scale: E- Excellent, G- Good, S- Satisfactory, N- Needs Improvement.

Academic Dishonesty - Cheating and Plagiarism:

Learning tasks that students complete as well as the assignments, tests and exams that students submit for evaluation must be their own work. Cheating and plagiarism is a serious offence that will not be condoned. Academic consequences will result.

Late and Missed Assignments - Student Roles and Responsibilities - Students are expected to:

- be responsible for providing evidence of their achievement of the overall expectations within the time frame specified by the teacher, and in a form approved by the teacher;
- understand that there will be consequences for not completing assignments for evaluation and/or for submitting those assignments late;
- use class time productively;
- in extenuating circumstances, request an extension from the teacher before the due date.

Mark deductions for late and missed assignments may apply to **major assignments only**.

References: *TVDSB Assessment & Evaluation Policy, September 2011; Growing Success - Assessment and Evaluation, and Reporting in Ontario Schools, 2010. Student Planner and School Web site*