

GRADE 12 BIOLOGY (SBI4U) COURSE OUTLINE

Course Title: Biology, Grade 12 University Preparation

Ministry Course Code: SBI4U

Name of School: Lighthouse Academy

Department: Science

Course Developer: Dr. A B M Shamsur Rahman

Course Development Date: September, 2019

Course Revision date: September, 2019

Credit Value: 1.0

Secondary Policy Document: The Ontario Curriculum, Grades 11 and 12: Science, 2008 (**revised**)

Prerequisite: Biology, Grade 11 University Preparation

Course Description/Rationale

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, 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.

Curriculum Strands and Expectations

The expectations identified for the course describe the knowledge and skills that students are expected to develop and demonstrate in their class work, on tests, and in various other activities on which their achievement is assessed and evaluated.

By the end of this course, students will:

A. Scientific Investigation Skills and Career Exploration

- **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 contributions of scientists, including Canadians, to those fields.

B. Biochemistry

- **B1.** analyse technological applications of enzymes in some industrial processes, and evaluate technological advances in the field of cellular biology;
- **B2.** investigate the chemical structures, functions, and chemical properties of biological molecules involved in some common cellular processes and biochemical reactions;
- **B3.** demonstrate an understanding of the structures and functions of biological molecules, and the biochemical reactions required to maintain normal cellular function

C. Metabolic Processes

- **C1.** 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;

- **C2.** investigate the products of metabolic processes such as cellular respiration and photosynthesis;
- **C3.** Demonstrate an understanding of the chemical changes and energy conversions that occur in metabolic processes.

D. Molecular Genetics

- **D1.** analyse some of the social, ethical, and legal issues associated with genetic research and biotechnology;
- **D2.** investigate, through laboratory activities, the structures of cell components and their roles in processes that occur within the cell;
- **D3.** demonstrate an understanding of concepts related to molecular genetics, and how genetic modification is applied in industry and agriculture.

E. Homeostasis

- **E1.** evaluate the impact on the human body of selected chemical substances and of environmental factors related to human activity;
- **E2.** investigate the feedback mechanisms that maintain homeostasis in living organisms;
- **E3.** demonstrate an understanding of the anatomy and physiology of human body systems, and explain the mechanisms that enable the body to maintain homeostasis.

F. Population

- **F1.** 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;
- **F2.** investigate the characteristics of population growth, and use models to calculate the growth of populations within an ecosystem;
- **F3.** demonstrate an understanding of concepts related to population growth, and explain the factors that affect the growth of various populations of species.

Unit Titles (Sequence and Time Inclusive of final exam)

The course content has been divided into the following units of study, which has been developed to achieve the expectations outlined in Biology Grade 12 curriculum guideline.

Unit	Title	Hours
1	Biochemistry	20
2	Metabolic Processes	18
3	Molecular Genetics	28
4	Homeostasis	28
5	Population Dynamics	16
	TOTAL	110

“Scientific Investigation Skills and Career Exploration” will be incorporated throughout the above units

Teaching Strategies

A wide variety of instructional strategies will be used to provide learning opportunities that accommodate a range of learning styles and interests. These include:

Direct instruction	Individual work/ team work	Computer aided demonstrations
Laboratory activities	Problem solving	Molecular model construction
Multimedia presentations	Report/Project presentation	Discussion/ Question and answer sessions.

Learning Strategies

To ensure student's skills such as the ability to work independently or in a team, efficient work habits, study skills and initiative, a variety of learning strategies will be used in order to obtain optimal understanding and application.

Brainstorming Webs	Discussion
Cooperative Learning	Independent Study
Role-playing	Work sheets
Researching	Reports

Learning Skills

The following criteria will be used to assess Learning Skills:

- (i) Work habits (ii) Initiative (iii) Team Work (iv) Organization (v) Works independently

Assessment

For student success various assessment tools will be used such as a checklist, rubric, to assess their knowledge and skills. These criteria will be to ensure assessment as learning and assessment for learning that needs to take place and will include strategies such as sharing learning goals and success criteria, providing feedback in relation to goals, and developing students' ability to self-assess – as a way of increasing student's engagement in and commitment to learning.

Evaluation of Student Performance

Evaluation will be based on assessment of learning. Evidence of student achievement for evaluation will be collected over time from three different sources –observations, conversations, and student products using multiple sources of evidence to ensure the reliability and validity of the evaluation of student learning.

Evaluation will be focused on student's achievement of the overall expectations based on the four Ministry of Education achievement categories: knowledge and understanding, thinking and inquiry, communication and application. A single evaluation may include one, more than one, or all of the above-mentioned categories in the weighting listed below.

Category	Description	Weighting
Knowledge and Understanding	Subject-specific knowledge acquired in course content	30%
Thinking/Inquiry	Critical thinking processes as follows: Planning Skills (research, organization) Processing Skills (analyzing, evaluating), Critical thinking processes (problem solving, decision making, research)	20%
Application	The use of knowledge and skills to make connections with texts. Biochemistry, metabolic process, genetics, homeostasis and population related problem solving and drawing figures.	25%
Communication	Conveying of meaning: presentations, participation Oral: in class oral discussion Visual: multimedia presentation	25%

Final Grade

Term work will be **70%** of the final evaluation and conducted throughout the course in all the four categories. Students will use a variety of checklists, rubrics, rating scales, marking schemes, provided by the teacher from time to time.

Final evaluation of **30%** will comprise an ISU of **10%**, and an exam of **20%**, which will incorporate the work of the whole term, meeting all the overall expectations of the course in each achievement category.

% of Final Grade		Evaluation Components
70%	40 %	Test (Student Product) (Tests of 5% each on the following units) <ol style="list-style-type: none"> Biochemistry (2) Metabolic Processes (2) Molecular Genetics (2) Homeostasis (2)
	10%	Assignments (Observation, Conversation, Student Product) (Assignments of 5% each on the following units) <ol style="list-style-type: none"> Biochemistry (A1) Molecular Genetics (A2)
	10%	Projects (Observation, Conversation, Student Product) (Projects of 5% each on the following units) <ol style="list-style-type: none"> Metabolic Process (P1) Homeostasis (P2)
	10%	Lab (Observation, Conversation, Student Product) Lab: Osmosis (L1)
30%	10%	ISU (Observation, Conversation, Student Product) Research project related to any one or more of the following topics: Population Dynamics Report and Presentation.
	20%	Final Exam (Student Product)

Student's Expectation

- Come to class daily with proper materials (binder, pencil, eraser etc.)
- To use and care for books and study materials safely.
- Submit work that is original and represents your own effort.
- To seek clarification from your teacher if assignment criteria, theory or marking rubric is not fully understood.
- To take part in field trips.
- To hand in all projects and assignments on or before the assigned due date.

Late Assignments/ Missed Tests

- Student will be allowed a window to hand in work without penalty up to one day for minor assignments, and up to two days for major projects.

- You must present an acceptable reason for the late assignment on the missed due date to avoid consequences and a contract for an alternative assignment due date may be drawn up. Where possible, present reasons to the teacher prior to the due date.
- After this period, unless there are extenuating circumstances (accepted at the teacher's discretion), late assignments may receive a reduced mark based on the contract and situation and the expectations tied to the assignment.
- If a test is missed while you are absent for an acceptable reason, you must be prepared to write the missed test on the day you return to school. Consult with your teacher before the test is missed (if possible) or as soon as possible in other circumstances.

Rules and Regulations

1. **Plagiarism / Dishonest Activity:** It is the responsibility of every student to ensure that all assignments and projects which are to be evaluated are original, personal works and are accurately documented as outlined by the teacher. Examples of plagiarism are:
 - the submission of someone else's work (in whole or in part) as your own; giving work to someone else to be copied and submitted; directly copying an existing work and claiming it is your own original creation.
 - buying or selling of assignments and projects
 - submitting work from one course as work in another course

Consequences of Plagiarism

- the teacher will inform parents/guardians that the student has submitted work which is not original.
 - student caught plagiarizing in any other forms as well, will get a straight zero for that assignment, project or test as a penalty for cheating. It will be teacher's discretion to allow/decline the student to resubmit the assignment and project after having discussion with parents and approval/disapproval from the principal.
2. **Conduct:** Students must follow the school's Code of Conduct, participate fully in discussions, and complete all assignments in time to the best of their ability.
 3. **Responsibility:** It is also the student's responsibility to make up for any missed work during their absences.

Program and Planning

For an effective program related to biology, a variety of activities will be conducted that will integrate expectations from different strands and provide for the explicit teaching of knowledge and skills. It will provide frequent opportunities for students to rehearse, practice, and apply skills and strategies, and to make their own choices. These considerations may include, but not be limited to:

- Provide effective instructional approaches and learning activities draw on students' prior knowledge, capture their interest, and encourage meaningful practice both inside and outside the classroom.
- Provide students with opportunities to learn in a variety of ways – individually, cooperatively, independently, with teacher direction, through hands-on experiences, and through examples followed by practice.

- Provide activities and challenges that actively engage students in inquiries that honor the ideas and skills students bring to them, while further deepening their conceptual understandings and essential skills.
- Provide students with opportunities to use of a variety of equipments and materials that helps deepen and extend their understanding of scientific concepts and further extends their development of scientific investigation skills.
- Make sure to follow safe practices at all times and communicate safety expectations to students in accordance with school board and Ministry of Education policies and Ministry of Labour regulations.
- Motivate students to examine the opinions and values of others, detect bias, look for implied meaning in their readings, and use the information gathered to form a personal opinion or stance.
- Provides opportunities for students to engage in various oral activities in connection with expectations in all the strands, such as brainstorming to identify what they know about the new topic they are studying, discussing strategies for solving a problem, presenting and defending ideas or debating issues, and offering critiques of models and results produced by their peers.
- Encourage students to use ICT to support and communicate their learning.
- Motivate students to develop a variety of important capabilities, including the ability to identify issues, conduct research, carry out experiments, solve problems, present results, and work on projects both independently and as a team.
- Provide students with opportunities to explore various careers related to the areas of science under study and to research the education and training required for these careers.

Resources

A number of resources are required for this course:

1. Text book: Biology 12, McGraw-Hill Ryerson: ISBN: 0-07-0916-74-8
2. Text book: Biology 12, Nelson:
3. Handouts: Relevant handouts will be given to students.
4. Multimedia and presentation packages: will be presented from time to time.

Materials

1. Subject Binder
2. Stationary set; pen, pencils, eraser, sharpener, rule
3. Lined/grid graph paper
4. Blank paper

(Please sign and return the acknowledgement below)

Acknowledgment

I have read and understood the course expectations, teaching and assessment strategies in the course outline for Biology 12.

Student's Name: _____

Student's Signature: _____ Date: _____

Parent's Signature: _____ Date: _____