



# NORTH SOUTH UNIVERSITY

## Department of Biochemistry & Microbiology

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### Course Syllabus

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#### General Education Course (GED): Biology

**BIO103 (Section 11) : Biology I** Semester : Summer 20  
Class Hours : MW 2.40 pm – 4.10 pm; Class Room : SAC209  
Instructor : **Mahjabeen Hossain (MjH1)**  
Lecturer  
Room : SAC 821  
Phone: 55668200, ext. 6260  
Email : mahjabeen.hossain@northsouth.edu

#### Consulting Hours

Tues: 9.00 am- 3pm, Mon, Wed: 9.00 am -11.00 am,  
Thursday: 9.00 am - 11.00 am

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*If my scheduled consulting hours are not convenient for you, please make an appointment. The best ways to reach me is by e-mail, but feel free to talk to me after class o. If you are having problems in class, please see me as soon as possible. I will do everything I can to help you with your problems, but don't wait until mid-semester or immediately before exams to contact me.*

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#### **Disclaimer**

*The instructor holds the right to make necessary changes to the syllabus and the grading policies outlined here to best accommodate the interest of the class.*

#### **1. RATIONALE**

All university graduates are expected to have at least a basic knowledge of the core science courses. Students will need to take Biology I (BIO 103) to have a thorough understanding of the fundamental concepts in general biology of living organisms.

#### **2. OBJECTIVES**

- Familiarize with the concept of chemistry of life and biological macromolecules associated with living systems.
- Understand the basic structural make up of cells, how the organelles function to keep the cells functional and generation of food and energy required for survival of cells.
- Grasp the idea of central dogma of life, understand how stored information get expressed and how cellular division results in continuity of life.
- Understand the processed involved in homeostasis in human and get familiarized with human physiology.
- Get an overview on the diseases involved with different organ systems, food and nutrition, and diseases or disorders related to life style.

### 3. LEARNING OUTCOMES

By attending classes regularly, and through participation in the assessment exams (Quizzes, Mid-Terms, and Final), students of this course should be able to:

- Ability to understand the basic concepts and principles of general biology.
- Ability to recognize chemical makeup of living organisms
- Ability to identify and describe the structural components of the cell and their function.
- Ability to understand and explore the importance of DNA in terms of regulating the function of living organisms, genetics and biotechnology.
- Ability to understand chemical and the physiological processes operated in human body.
- Ability to explore the knowledge of biology to be applied in health and life style related disorders.

### 4. COURSE CONTENT

#### Course Description

This course aims to provide a basic knowledge and understanding of the major integrating concepts of biological science. Principle emphasis of the course will be on studying living organisms and processes. Upon completion, students will have basics concepts on what is life and characteristics of life, Proper definition of biology and its areas, Cells and cell division, Macromolecules and Nutrition, Biological levels of organization, Human physiology concentration on major systems and diseases. This course is appropriate for non-science students and also for those who do not have biology as major.

#### Course Timeline

	Topic
<b>1</b>  <b>Week</b> <b>to 4</b>	<b>Lecture 1&amp;2: Introduction to Biology:</b> Scope, Biology, What is life and Characteristics of living things. <b>Lecture 4&amp;5: Chemistry of life:</b> Atoms & elements; Molecules & bonds; Electronegativity; Polar & non-polar bonds; Diffusion & osmosis; pH. <b>Lecture 6&amp;7: Biological Macromolecules:</b> Carbohydrate, Lipid, Protein and Nucleic acids.  <b>Assessment: At least 1 Quiz exam</b>
<b>Week</b> <b>5 to 10</b>	<b>Lecture 8&amp;9: Cell structure and function:</b> Organelles description & level of organization.  <b>Lecture 10: Central Dogma of life:</b> Gene, genome, Flow of genetic information, Transcription and Translation.  <b>Lecture 11&amp;12: Energy of Life:</b> Cellular respiration (anabolism & catabolism); Enzymes definition and characterization; Photosynthesis.  <b>Lecture 13&amp;14: Cellular Reproduction:</b> Cell cycle, Cell Division

	<b>Assessment: At least 2 Quiz exam and Midterm</b>
<b>11 Week o 13</b>	<b>Human Physiology:</b> <b>Lecture15</b> -Homeostasis, <b>Lecture16</b> -digestive system, <b>Lecture17</b> -circulatory system, <b>Lecture18</b> -excretory and respiratory systems. 1. <b>Health and Disease: Lecture19</b> -Diabetes and lipid profile, <b>Lecture20</b> - Food & Nutrition.  <b>Assessment: At least 1 Quiz exam and Final</b>

### Textbooks

- Kathleen Anne Ireland. Visualizing Human Biology 5<sup>th</sup> Edition. John Wiley & Sons, Inc. 2018
- Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, Jane B. Reece. Campbell Biology 11th Edition. Pearson, 2016

### Academic Dishonesty

Cheating during the Quizzes or Exams is not acceptable. NSU is very strict about its academic dishonesty policies, and the Instructor is obligated to report any case of violation.

### 5. TEACHING–LEARNING STRATEGY (TENTATIVE)

Detailed lesson plans or activities to be undertaken for each lecture session have been provided below:

<b>Lecture 1</b>	
<b>Activity</b>	<b>Time</b>
• <b>Lecture on:</b> Discussion on the rationale, objectives and learning outcomes of the course; Course content	40 min
• Discussion about tentative lesson plan for the course; Assessment strategy: Marks distribution, Question pattern for quizzes, Midterm and Final Exams. Talk about Class Attendance, Make Up Exam and Academic Dishonesty Policy	30 min
• Topic 1 <b>Introduction to Biology:</b> Scope, definition, brief History, Modern biology, Unifying themes of biology	20 min
	Total: 90 min

<b>Lecture 2</b>	
<b>Activity</b>	<b>Time</b>
• Recap and review on previous lecture	10 min
• <b>Lecture on:</b> Topic 1 <b>Introduction to Biology:</b> What is life, Characteristics of living things: The need for energy, Movement, Cellular structure and organization, Growth and development, Maintenance and repair, Reproduction, Response to stimuli, Variation and adaptation, Metabolism); Hierarchical organization level of life with examples of Human and Plant	70 min
• Interactive question answer session	10 min
	Total: 90 min
<b>Lecture 3</b>	
<b>Activity</b>	<b>Time</b>
• Recap and review on previous lecture	10 min
	70 min

<ul style="list-style-type: none"> <li><b>Lecture on: Topic 2 Chemistry of Life:</b> (Atoms, Elements vs compound, isotopes, Ions, Molecules, Chemical bonds: Ionic, Covalent, Hydrogen bonds) Atoms &amp; elements; Molecules &amp; bonds; Electronegativity; Polar &amp; non-polar bonds; All with examples in Biological system especially in Human System</li> </ul>	
<ul style="list-style-type: none"> <li>Interactive question answer session</li> </ul>	10 min
	Total: 90 min
<b>Lecture 4</b>	
<b>Activity</b>	<b>Time</b>
<ul style="list-style-type: none"> <li>Recap and review on previous lecture</li> </ul>	10 min
<ul style="list-style-type: none"> <li><b>Lecture on: Topic 2 Chemistry of Life:</b> Water: Properties, Characteristics, Distribution inside human body; Solutions, Acids, Bases, pH, Biological Buffers; Diffusion, Osmosis, Active Transport</li> <li>All with examples in Biological system especially in Human System</li> </ul>	55 min
<ul style="list-style-type: none"> <li>Interactive question answer session</li> </ul>	10 min
<ul style="list-style-type: none"> <li><b>Quiz 1 on Lecture 1 – 3</b></li> </ul>	15 min
<b>Lecture 8&amp;9</b>	
<b>Activity</b>	<b>Time</b>
<ul style="list-style-type: none"> <li>Recap and review on previous lecture</li> </ul>	10 min
<ul style="list-style-type: none"> <li><b>Lecture on: Topic 5 Cell structure and function: Cell:</b> Definition, Theory; Types of cells; Prokaryote, Eukaryote with examples; Common cell features of both Prokaryote and Eukaryotes: Cell Membrane, Genetic Material, Cytoplasm; Characteristic structural features of Prokaryotes; Characteristic structural features of Eukaryotes; Name of one Bacteria Escherichia coli. Structural organization of bacteria showing major organelles; Structural organization of animal cell showing major organelles; Structural organization of plant cell showing major organelles; Differences between prokaryotes and eukaryotes</li> </ul>	70 min
<ul style="list-style-type: none"> <li>Interactive question answer session</li> </ul>	10 min
<b>Lecture 10</b>	
<b>Activity</b>	<b>Time</b>
<ul style="list-style-type: none"> <li>Recap and review on previous lecture</li> </ul>	10 min
<ul style="list-style-type: none"> <li><b>Lecture on: Topic 4 Central Dogma of Molecular Biology:</b> Gene, Genome: Definition; Nuclear and Mitochondrial genome; Flow of Genetic Information: Sketch the pathway of protein synthesis by mentioning process involved; Transcription, Translation: Definition; where those occurs (in which organelle).</li> </ul>	55 min
<ul style="list-style-type: none"> <li>Interactive question answer session</li> </ul>	10 min
<ul style="list-style-type: none"> <li><b>Quiz 2 on Lecture – 6,7-8,9</b></li> </ul>	15 min
	Total: 90 min
	Total: 90 min
<b>Lecture 13-14</b>	
<b>Activity</b>	<b>Time</b>
<ul style="list-style-type: none"> <li>Recap and review on previous lecture</li> </ul>	10min
<ul style="list-style-type: none"> <li><b>Lecture on: Topic 6 Cell cycle:</b> Definition, Name of Different phases of cell cycle, What happens in each phase; Cell reproduction: Definition, Types of cellular production; Asexual reproduction: Definition, Names of asexual production in animal, plant and bacteria with examples</li> <li><b>Cell Division:</b> Definition, Types of cell division; Mitosis:</li> </ul>	80 min

Characteristic features of mitosis, Overview of mitosis, Instances of Mitosis; Meiosis: Characteristic features of Meiosis, Overview of Meiosis, Instances of Meiosis; Number of Chromosomes in Human, Autosomes, Sex Chromosome; Somatic cell or Body cells, Sex cells or Gametes; Name of Organs that produces Gametes in Human and Plants; Zygote; Definition; Difference between mitosis and meiosis.	
• Interactive question answer session	10 min
	Total: 90 min
<b>Activity</b>	<b>Time</b>
Review Class on Mid Term Syllabus	90 min
<b>Activity</b>	<b>Time</b>
<b>Mid Term Exam Lecture 1– 14 (Except lecture 11-12)</b>	90 min
<b>Lecture 11-12</b>	
<b>Activity</b>	<b>Time</b>
• Recap and review on previous lecture	10 min
• <b>Lecture on: Topic 7 Energy of Life: Metabolism:</b> Definition, Types of metabolism with examples, specific functions of metabolism; Aerobic and Anaerobic respiration with examples; Circumstances of anaerobic respiration with examples; Enzymes: Definition, Characteristics of enzymes; Cellular respiration: types of cellular respiration; Equation of aerobic respiration, Where it occurs; Equation of anaerobic respiration by bacteria, What is it called; Equation of anaerobic respiration by Yeast; Instances anaerobic respiration occurs in animals including human, Equation for that; Photosynthesis: Respiration by Plant, Definition, Complete Equation, Role of Chloroplast.	80 min
	Total: 90 min
• <b>Mandatory Quiz 3 Lectures 13,14</b>	15 min
<b>Activity</b>	<b>Time</b>
• Recap and review on previous lecture	10 min
• <b>Lecture on: Topic 8 Human Physiology:</b> • <b>Homeostasis:</b> Definition; Name organs involved in homeostasis; Basic mechanism by which homeostasis is maintained-Feedback mechanism; Role of thermoregulatory centre (TRC); Name of regions of hypothalamus of brain responsible for the maintenance of different homeostatic, autonomic functions; Core body temperature: how it can vary normal ways; how temperature variation is retained to normal: regulation steps; What happens when we get too hot; What happens when we get too cold	70 min
• Interactive question answer session	10 min
	Total: 90 min
<b>Lecture 15</b>	
• Recap and review on previous lecture	10 min
• <b>Lecture on: Topic 8 Human Physiology:</b> • <b>Homeostasis:</b> Responding organ: Skin; Name three primary layers of skin; Functions of skin; Condition when variation of normal core body temperature cannot be corrected: Fever and hyperthermia.	55 min
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• Interactive question answer session	10 min
	Total: 90 min
<b>Lecture 16</b>	
<b>Activity</b>	<b>Time</b>
• Recap and review on previous lecture	10 min
• <b>Lecture on: Topic 8 Human Physiology:</b> <b>Digestive system:</b> Digestive system: Digestion definition; components of Human Digestive System; different parts of human alimentary canal; Saliva, and its components; Role of Oral Cavity, Esophagus in digestion; Peristalsis; functions of Stomach; Chyme; functions of small Intestine ; Name and definition of accessory organs; Bile and role of bile in digestion; role of liver and pancreas	70 min
• Interactive question answer session	10 min
	Total: 90 min
<b>Lecture 17</b>	
<b>Activity</b>	<b>Time</b>
• Recap and review on previous lecture	10 min
• <b>Heart:</b> Components; Function; Illustration on how heart pumps blood and discuss; Illustration and discussion on heart disease and stroke can be developed; Preventive measures to avoid heart disease in terms of life and food styles.	70 min
• <b>Circulatory system:</b> Definition; Components; How it works; <b>Blood:</b> Definition; Function; Composition; Functions of blood cells and fluid part; Blood cells count how related with functional disorders or diagnosis; knowing Blood groups	
• <b>Blood Vessels:</b> Definition; Types; Difference between Artery and Veins. <b>Respiratory system:</b> Definition; Two Phases of respiration; Components; Illustration and discussion on how red blood cell carries oxygen from lung to tissue and tissue to lung.	
• <b>Excretory system:</b> Definition; components with figure; functional unit of kidney; Osmoregulation; Functions of kidney	
• Interactive question answer session	10 min
	Total: 90 min
<b>Lecture 18</b>	
<b>Activity</b>	<b>Time</b>
• <b>Quiz 4 on Lectures 15-16</b>	15 min
• Recap and review on previous lecture	10 min
• <b>Lecture on: Topic 9 Health and Diseases:</b> • Food & Nutrition: Food: Definition, Function, Classification with examples; Name of basic nutrients requirement of human body; Unit of energy, Calorie value of Carbohydrates, Fats and Proteins; Balanced diet: Definition, Components; Name factors to be considered to formulate a balanced diet; Illustration of balanced diet chart for adult, total calorie requirements for adult Male and Female;	55 min
• Interactive question answer session	10 min
	Total: 90 min
<b>Lecture 19</b>	
<b>Activity</b>	<b>Time</b>
• Recap and review on previous lecture	10 min
• <b>Lecture on: Topic 9 Health and Diseases: BMI:</b> Definition,	70 min

Equation, BMI range for underweight, normal, overweight and obese: Significance of BMI; Vitamins: Definition, Classification, One deficiency disorder of each vitamins and food sources; Minerals: Important minerals of life: Sources, deficiency disorder name.	
• Interactive question answer session	10 min
	Total: 90 min
<b>Lecture 20</b>	
<b>Activity</b>	<b>Time</b>
• Recap and review on previous lecture	10 min
• <b>Lecture on: Topic 9 Health and Diseases:</b> Vitamins: Definition, Classification, One deficiency disorder of each vitamins and food sources; Minerals: Important minerals of life: Sources, deficiency disorder name.	70 min
• Interactive question answer session	10 min
	Total: 90 min
<b>Lecture 21</b>	
<b>Activity</b>	<b>Time</b>
• Recap and review on previous lecture	10 min
• <b>Lecture on: Topic 9 Diabetes and Lipid Profile:</b> Diabetes Mellitus: Definition; Hyperglycemia, Possible causes of hyperglycemia; Type of Diabetes: Characteristics features, Mechanisms involved for the development of type I and type II diabetes; Differences of type I and type II Diabetes;	70 min
• Interactive question answer session	10 min
	Total: 90 min
<b>Lecture 22</b>	
<b>Activity</b>	<b>Time</b>
• Recap and review on previous lecture	10 min
• <b>Lecture on: Topic 9 Diabetes and Lipid Profile:</b> Gestational diabetes: Definition, how it develops, possible fates of a baby born to mother having diabetes during pregnancy; Sign and symptoms of Diabetes; Diabetes diagnosis, Normal blood glucose level, glucose level considered as diabetic; Lipid profile: Definition, Tests included in lipid Profile, Implication of doing Lipid Profile test	70 min
• Interactive question answer session	10 min
	Total: 90 min
<b>Lecture 23</b>	
<b>Activity</b>	<b>Time</b>
Review Class on Final Syllabus	90 min
<b>Lecture 24</b>	
<b>Activity</b>	<b>Time</b>
<b>Final Exam Lectures 15 – 20</b>	90 min
	Total: 90 min

**6. TENTATIVE ASSESSMENT STRATEGY (All of these can be changed by the instructions from the higher authority or according to the decision of UGC .)**

**Grade Distribution**

Attendance/ Class Participation (5 + 5)	= 10% of final grade
Four QUIZZES (Best 3)	= 30% of final grade
MID-TERM	= 25% of final grade
FINAL EXAM	= 35% of final grade

**Grading Policy:**<http://www.northsouth.edu/academic/grading-policy.html>

**Attendance**

Attendance is 5% of the final grade and is strongly encouraged. If a student is unable to attend class due to some **legit reasons** (e.g. sickness, tragedy in the family, etc.), then they should contact the Instructor with proper proof/documentation. Attendance is strictly monitored and is regularly updated on NSU Online Attendance website. ***If a student misses three consecutive lectures, their name will be reported to the Registrar's office and may be forwarded to the Police.***

**Quizzes**

There are four Quizzes which will be based on the lectures and assigned text book. Quiz is worth 10 points, and consists of MCQ, True/ False and matching and fills in the gap. The time allowed for each Quiz is 15 minutes. **BEST THREE WILL BE COUNTED.**

**Mid-Terms or Assignment**

The two Mid-Terms will cover all the materials up until the week before. Each Mid-Term is worth 40 points and will be 1 hour 30 minutes long. The break-down for Mid-Term questions is provided below:

	<b>Questions</b>	<b>Points</b>	<b>Time</b>
<b>Part I (MCQs)</b>	15 multiple-choice questions	$15 \times 1.0 = 15$ pts	30 min
<b>Part II</b>	Mix of Assay and Short questions (short) questions	20 pts	60 min
<b>Total</b>		35 pts (25 will be counted)	90 min (1 hr 30 min)

**Final Exam or Assignment (Depends on the instructions of UGC)**

The Final is worth 35 points and will be 1 hour 30 minutes long. The break-down for the Final Exam questions is identical to that of the Mid-Terms shown above.