NORTH SOUTH UNIVERSITY

Department of Biochemistry & Microbiology

Course Outline

General Education Course (GED): Biology

BIO103 (Section 8) : Biology I Semester : Fall 2017

Class Hours : ST 2:40 – 4:10 pm; Class Room : SAC 404

Instructor **: Dr. Kazi Nadim Hasan (KNH)**
Professor

Room : SAC 804 Phone: 55668200, ext. 1916; 01747367550 (cell)

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Office Hours

Sun, Tues: 10:00 am – 11:00 am Mon, Wed: 4:20 pm – 5:20 pm
Thurs: 12:00 pm – 2:00 pm; 3:00 pm – 5:00 pm

If my scheduled office hours are not convenient for you, please make an appointment. The best way to reach me is by e-mail, but feels free to talk with me after class or phone me at my office. 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.

COURSE OBJECTIVES:

This class is an introduction to the science of biology for non-majors. We cover the fundamentals of biology for the non-major: Scientific inquiry, biological chemistry, cell structure and function, DNA and genetics, evolution and ecology, and an overview of living organisms. As an introductory course, I will also be addressing study skills for Biology and biological thinking.

LEARNING OUTCOMES:

- 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.

Lectures arrangement:

Lectures 1 – 6

1. Introduction to Biology:

Biology, Scope, Themes; Life: definition, examples history, characteristics; classification; Hierarchical organization of life

2. Chemistry of life:

Atoms & elements; Molecules & bonds; Electronegativity; Polar & non-polar bonds; Water: Properties, Characteristics, Distribution inside human body; Solutions, Acids, Bases, pH, Biological Buffers; Diffusion, Osmosis, Active Transport

3. Biological Macromolecules:

Carbohydrate, Lipid, Protein and Nucleic acids: Compositional and functional features; Classes; Sources in nature; Examples; Occurrence as component of organisms and nutritional; DNA: genetic information of Life; Differences between DNA and RNA.

Assessment : 2 Quiz exams and Midterm I

Lecture 7 : Midterm 1

Lectures 8 – 13

4. Central Dogma of Molecular Biology:

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).

5. Cell structure and function:

Cell: 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; Name of organelles found in Eukaryotes; **Structure and Functions** of Cell membrane, Nucleus, Mitochondria, Chloroplasts, Ribosomes, Endoplasmic Reticulum, Golgi apparatus, Lysosomes, Peroxisomes. Difference between Plant and Animal cell structure.

6. Cellular Reproduction

Cell cycle: Definition, Name of Different phases of cell cycle, What happens ineach phase; **Cell reproduction:** Definition, Types of cellular production; Asexual reproduction: Definition, Names of asexual production in animal, plant and bacteria with examples;

Cell Division: Definition, Types of cell division; Mitosis: 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 Gamets; Name of Organs that produces Gamets in Human and Plants; Zygote; Definition; Difference between mitosis and meiosis.

5. Energy of Life:

Metabolism: 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.

Assessment : 2 Quiz exams and Midterm II

Lecture 14 : Midterm II

Lectures 15 – 22

8. Human Physiology:

Homeostasis: 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; 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.

Circulatory system: Definition; Components; How it works;
Blood: Definition; Function; Composition; Functions of blood cells and fluid part; Blood cells count how related with functional disorders or diagnosis; knowing Blood groups
Blood Vessels: Definition; Types; Difference between Artery and Veins.
Heart: 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.

Respiratory system: Definition; Two Phases of respiration; Components; Illustration and discussion on how red blood cell carries oxygen from lung to tissue and tissue to lung.

Excretory system: Definition; components with figure; functional unit of kidney; Osmoregulation; Functions of kidney.

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.

9. Health and Diseases:

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; BMI: Definition, 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.
Diabetes and Lipid Profile: 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; 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.

Assessment **: 2 Quiz exams and Term Final**

Lecture 23 **: Review on Term Final**

Lecture 24 **: Term Final**

Textbook:

1. Kathleen Anne Ireland. **Visualizing Human Biology** 3rd Edition. John Wiley & Sons, Inc. 2011.

Performance Evaluation:

1. Distribution of marks:

	Section	Marks %
1.	Attendance/Participation	5
2.	Quiz (Best four) out of 5 quizzes	20
3.	Mid Term Examination (20 + 20)	40
4.	Final Examination	35
Total Marks		**100**

2. Attendance: Marks in attendance will be given according to the following list.

Attendance	Marks %
90% and above	5
85% to less than 90%	4
80% to less than 85%	3
75% to less than 80%	2-3
70% to less than 75%	0-1
Less than 70%	0

3. Grading: NSU grading policy will be followed.

BASIC RULES OF THE COURSE:
FAILURE TO READ OR UNDERSTAND THE COURSE OUTLINE AND THE BASIC RULES OF THE COURSE WILL NOT BE CIONSIDERED A VALID EXCUSE FOR ANY MISSED WORK OR OTHER PROBLEMS.

1. TOPIC & SCHEDULE: The chapter references given in each lecture are a helpful guide. You are strongly advised to look up further references in scientific papers in order to enhance your understanding of the topic.

2. CLASS ATTENDANCE: Class attendance is compulsory. Test questions will be based upon the information presented in class as well as the information in the text and readings.

3 MAKE UP EXAM: Absence from the class for any reason is not, by itself, considered justification for the 'make-up' of any exam. You may be allowed to retake missed midterms in case of mitigating circumstances supported by relevant documentation. In case of illness, Medical Certificate is necessary but may not be sufficient.

5. UNFAIRMEANS and PLAGIARISM: Plagiarizing or 'Copying and pasting' without referencing your work will yield zero marks.

Your attention is also specifically directed to the definition and rules of unfair means detailed out in the NSU Regulations. In case of unfair means, the relevant procedure will be followed.

NOTE: The above topics are subject to change.

CLASSROOM ETIQUETTE: The following is a list of suggestions to make our classroom experience as enjoyable and productive as possible for all of us:

- Please turn off your mobile phone before class.
- Obviously, if you need to use the rest room during class, please do so. However, please attempt to use the rest room before class so that you do not disturb class proceedings when leaving/returning to your seat or miss any class activities
- Unless you absolutely need to leave class before the period ends, please wait for me to dismiss the class before packing up your books, etc.

REQUIRED MATERIALS: In general, you will be supplied with everything you need.

TEACHING PHILOSOPHY: I think that learning should be enjoyable. Hopefully we will laugh together and have fun. We will always be respectful of one another.