

Course Code & Number:	BIO 110
Course Title:	Introduction to Modern Biology
Level of Course:	BS
Credits:	(3+0+0) 3 TEDU Credits, 5 ECTS Credits
Catalog Description:	Overview of the chemical elements of life, the chemistry of water, acids and bases, biomolecules of life, organisation of the cells, cellular processes (transportation, metabolism, and cell cycle), cancer, genetics, molecular biology of the gene, genetic diseases, evolution, biotechnology/recombinant DNA technology, the practical applications of biotechnology, development in animals
Pre-requisites & Co-requisites:	Pre-requisites: NONE Co-requisites: NONE
Grading:	Attendance - 5% 1. Midterm exam - 25% 2. Midterm exam - 25% Final exam - 45%
Year of Study:	Sophomore
Semester:	Fall
Mode of Delivery:	Face-to-face
Language of Instruction:	English
Course Type:	Elective
Required Reading:	<ul style="list-style-type: none"> • Campbell NA, Reece JB, Urry LA, Cain ML, Wasserman SA, Minorsky PV, Jackson RB. (2011) Campbell Biology, 9th Edition, Pearson education. • Campbell NA, Reece JB, Urry LA, Cain ML, Wasserman SA, Minorsky PV, Jackson RB. (2015) Campbell Biology, 10th Edition, Pearson education. • Sadava D, Hillis DM, Heller HC, Berenbaum M. (2011) Life - The Science of Biology, 9th Edition, Sinauer Associates.
Course Objectives:	<ul style="list-style-type: none"> • The principal aim of the course is to equip students with a basic knowledge of biology. From this fundamental perspective, students are introduced to important scientific literature on the subject of modern biology and to increase the perspective of the students to solve real life questions.
Learning Outcomes:	<p>Upon successful completion of this course, a student will be able to:</p> <ol style="list-style-type: none"> 1. Develop an understanding on the chemical elements of life, describe how elements are combined into molecules and compounds, 2. List different types of bonds that occur between elements, compare the relative strengths of ionic, covalent, and hydrogen bonds. 3. Describe how water associates with other molecules in solution, evaluate which property of water is important for biological life. 4. Explain the terms acid, bases and buffers, identify common acidic and basic substances, analyse how buffers prevent large pH changes in solutions.

5. Explain how the properties of carbon enable it to produce diverse organic molecules, compare what is added and what is produced during biomolecule synthesis and degradation reactions.
6. Outline the basic structure of biomolecules of life.
7. List several examples of important monosaccharides disaccharides and polysaccharides, compare the structure and importance of starch, glycogen, chitin, and cellulose.
8. Describe why lipids are essential to living organisms, contrast the structures of fats, phospholipids, and steroids, and compare the functions of phospholipids and steroids in cells.
9. Describe functions of proteins in cells, explain how a polypeptide is constructed from amino acids.
10. Distinguish between a nucleotide and nucleic acid, compare the structure and function of DNA and RNA nucleic acids,
11. List the tenets of cell theory, compare the structure of prokaryotic and eukaryotic cell, describe the structure and function of the nucleus, ribosome, ER, Golgi, lysosome, peroxisomes, mitochondrion, chloroplast, centrosomes, vacuoles, and cell wall, apply the endosymbiosis theory to eukaryotic cell structure, and describe the function of cytoskeleton.
12. Distinguish between the different structural components of membranes, explain the permeability of the cell membrane.
13. Differentiate between hypotonic, isotonic, and hypertonic solutions, explain how passive transport, active transport and bulk transport move substances across a membrane, and explain the role of the extracellular matrix in animal cell behaviour.
14. Explain the structure of chromosomes and the cell cycle and summarize the major events that occur during mitosis, meiosis and cytokinesis.
15. List the checkpoints that regulate the progression of cells through the cell cycle, describe the abnormal cell cycle control systems and how cancer develops, and describe the basic characteristics of cancer cells.
16. Explain Mendel's law of segregation and demonstrate how a pedigree may be used to determine the mode of inheritance of a genetic trait, use the law of probability to predict the chances of producing gametes and offspring, contrast incomplete dominance and codominance, explain the test cross and human blood groups, describe the effects of pleiotropy on phenotypic traits, and sex-linked inheritance and its gender-based effects.
17. Explain the genetic diseases, genetic testing and counselling.
18. Explain the chemical structure of DNA as defined by the Watson and Crick model, examine the steps of DNA replication, explain the central dogma of molecular

	<p>biology, and distinguish the events of transcription and translation.</p> <p>19. Describe the steps involved in making a recombinant DNA molecule, explain the purpose of the polymerase chain reaction (PCR), and identify how PCR may be used to analyse DNA.</p> <p>20. Identify the benefits of genetically modified bacteria, plants, and animals to human society, describe the steps involved in the production of a transgenic animal, distinguish between in vivo and ex vivo gene therapy in humans and list examples of how in vivo and ex vivo gene therapy has been used to treat human disease.</p> <p>21. Explain the Darwin's theory of evolution, summarize the stages of evolution by natural selection, compare and contrast the processes of microevolution and macroevolution. Identify and compare features of pre-zygotic and post-zygotic reproductive isolation, and define two modes of speciation.</p> <p>22. Identify the structures of an egg and sperm that are directly involved in fertilization, Compare and contrast the cellular, tissue, and organ stages of embryonic development, name the membranes surrounding the human embryo, and list their functions, chronologically list the major events that occur during embryonic and fetal development, describe the structure and functions of the placenta</p>
Planned Learning Activities and Teaching Methods:	<p>Explaining</p> <p>Discussion</p> <p>Questioning</p> <p>Lecturing</p> <p>Oral - visual presentations</p>
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Tentative Course Outline

1. Chemical elements of life (Week: 9/26-30)
2. Chemistry of water, acids and bases (Week: 10/03-07)
3. Biomolecules of life (Week: 10/10-14)
4. Cell structure and function (Week: 10/17-21)
5. Cell membrane (Week: 10/24-28)
6. Cell cycle (Week: 10/31- 11/04)

1. MIDTERM EXAM (05.11.2016)

7. Cancer (Week: 11/07-11)
8. Genetic (Week: 11/14-18)
9. Genetic diseases (Week: 11/21-25)
10. Molecular biology of the gene (Week: 11/28- 12/02)

2. MIDTERM EXAM (03.12.2016)

11. Biotechnology /recombinant DNA technology (Week: 12/05-09)
12. The practical applications of biotechnology (Week: 12/12-16)
13. Evolution (Week: 12/19-23)
14. Speciation and Macroevolution (Week: 12/19-23)
15. Development in animals (Week: 12/26-30)

Course policies

a. Attendance

- It is extremely important to follow the course.
- Classes start on the hour. Please be respectful of your classmates by being on time.
- Cell phones should be turned off and kept out of sight.

b. Make up

If you have a legitimate reason for missing an exam, then you must arrange to make up the exam before the scheduled time of the exam. The only exceptions are illness or emergency (e.g., death in family, a traffic accident, etc.). In case of an illness or emergency you need to supply a documentation that supports your claim. The dates for make-up exam for Final are decided by Make-up Exam Commission according to the rules and regulation of TEDU. Please see the link

<http://registrar.tedu.edu.tr/tr/registrar/yonetmelikler-ve-yonergeler>