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## **JINAN UNIVERSITY**

### **Introductory Biology (With Lab)**

**Lecturer:** Jennifer D'Antonio

**Time:** Monday through Friday (June 18, 2018-July 20, 2018)

**Office hours:** 2 hours (according to the teaching schedule)

**Contact Hours:** 60 (50mins each)

**Credits:** 4

**Location:** MBA Center

**Office:** MBA Center 107

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#### **Course Description**

Biological Science is all around us, and affects every aspect of our lives and every facet of life on Planet Earth. The goal of this course is to furnish students with the basic foundation, information, and analytical tools necessary to grasp the fundamental concepts central to the study of biology.

This is a vast and highly diverse subject, and thus will require an overview approach in a short course such as this one. We will cover the most important areas in some detail, both in the classroom and in the laboratory, while striving to achieve a balanced view of the big picture ideas.

### Required Text

*Biology Today and Tomorrow, With Physiology*, 5<sup>th</sup> Edition, by Starr, Evers, and Starr  
ISBN-13: 9780495561576

### Course Hours

The course has 20 lecture sessions and 5 lab sessions in total. Each session is 120 minutes in length. Lecture session meets from Monday to Thursday. Lab session meets on each Friday.

### Assessment

Your final grade is based on the following components:

Quizzes/Homework	20%
Practical Exercises	25%
Midterm Exam	25%
Final Exam	30%
Total	100%

### Grading Scale

The instructor will use the grading system as applied by JNU:

Definition	Letter Grade	Score
Excellent	A	90-100
Good	B	80-89
Satisfactory	C	70-79
Poor	D	60-69
Failed	E	Below 60

### Quizzes/Homework

Multiple self-assessment quizzes and homework assignments will be offered for students to practice their concept understanding and to prepare for the lectures. These

quizzes and homework assignments will be POSTED ON BLACKBOARD on a weekly basis. Many of these assignments will be discussed during class and/or recitation. Late homework will NOT be accepted, except in the case of a documented medical reason (documentation is required).

### **Attendance Policy**

Attendance at lectures, recitations, and labs is expected. Continued absences will detract from your final grade. If you have missed/will be missing a class or recitation session for an acceptable reason, such as illness or religious observance, please let me know in person with a written document. Ideally, you should let me know of your absence prior to missing the class. In addition, missing a class for an acceptable reason **will not excuse you from completing the class exercises and the out-of class assignments** so, if you miss a class, it is your responsibility to obtain notes from a classmate and contact the instructor in order to complete all the assignments by their original or extended deadlines.

### **WEEK ONE:**

1. Invitation to Biology.
2. Molecules of Life.
3. Cell Structure.
4. Energy and Metabolism.
5. Capturing and Releasing Energy.

### **WEEK TWO:**

6. DNA Structure and Function.
7. Gene Expression and Control.
8. How Cells Reproduce.
9. Patterns of Inheritance.
10. Biotechnology.

### **WEEK THREE:**

11. Evidence of Evolution.
12. Processes of Evolution.

13. Early Life Forms and the Viruses.
14. Plants and Fungi.
15. Animal Evolution.

**WEEK FOUR:**

16. Population Ecology.
17. Communities and Ecosystems.
18. The Biosphere and Human Effects.
19. Animal Tissues and Organs.
20. How Animals Move.
21. Circulation and Respiration.
22. Immunity.

**WEEK FIVE:**

23. Digestion and Excretion.
24. Neural Control and the Senses.
26. Reproduction and Development.
27. Plant Form and Function.
28. Plant Reproduction and Development.

**LAB TOPICS:**

WEEK ONE: Exploration of the scientific method and its applications. Examination and comparison of cellular structure and function, including microscopic analysis of organelles. Comparison of cell structure in various Prokaryotes and Eukaryotes. Some of the activities include the following:

- a. Scientific Method
  - Observe
  - Develop hypothesis
  - Identify variables and controls
  - Collect and analyze data
  - Draw conclusions
  - Calculate measurements relative to percent error, significance, etc. towards

- scientific reasoning.
- Explore the process for organizing, formatting and preparing a lab report.
- b. Cell Organelles Worksheet
  - Match cell part or organelle to its structure/function.
  - Create your own analogy of the cell.
  - Indicate whether certain organelles are found in plant cells, animal cells or both.
- c. Photosynthesis & Cellular Respiration Worksheet
  - Describe the relationship between photosynthesis and cellular respiration.
  - Identify the general chemical equation of photosynthesis and cellular respiration.
- d. Cell Membrane Transport
  - Use an interactive online simulation to explore cell membrane transport

WEEK TWO: Genetics experiment using computer simulations to study, analyze, and make verifiable predictions involving patterns of inheritance, dominance, co-dominance, and related aspects of genetics. Use of manipulable models to study how the structure and function of DNA molecules produces these inheritance patterns. Microscopic study of cells at various stages of mitosis and meiosis. Some of the activities include the following:

- a. Cell Structure and Function
  - Discuss the application of cell theory
  - Contrast and compare the structure and function of eukaryotic and prokaryotic cells.
  - Identify eukaryotes and prokaryotes based on cellular structure.
- b. Population Genetics
  - Understand the Hardy-Weinberg Theorem.
  - Calculate allele and genotypic frequencies in a population from one generation to the next.
  - Explore the forces that can disrupt Hardy Weinberg equilibrium.
  - Practice using the Chi Square Test to evaluate if the collected data support the null hypothesis.
- c. Pedigree Chart Analysis Lab
  - Create a pedigree chart based on provided information.

WEEK THREE: Exercises in developing and analyzing phylogenetic relationships. Use of taxonomic methods to compare various alternative means of categorizing various life forms. Study of evidence from succession in multiple communities as a window into adaptive radiation and evolution. Some of the activities include the

following:

- a. Mitosis and Meiosis
  - Identify chromosomal structures while exploring the stages of the cell cycle (chromatin, sister chromatids, homologous chromosomes and centromeres).
  - Compare and contrast animal and plant mitosis.
  - Compare and contrast Mitosis and meiosis.
  - Explore parent and daughter cell division.
- b. Natural Selection
  - Explore natural selection by controlling the environment using an interactive online simulation.

WEEK FOUR: Comparison of environmental quality challenges, methods, and areas of emphasis in industrial, residential, and rural regions. Some of the activities include the following:

- a. Mendelian Genetics
  - Review the work of Mendel in terms of the formation of modern genetics (law of segregation and the law of independent assortment)
  - Explore homozygous, heterozygous, dominant and recessive alleles and genotype and phenotype.
  - Use of crosses (monohybrid and dihybrid) to analyze inheritance patterns (dominance, incomplete dominance and co-dominance).
- b. Ecology
  - Review selective pressures and the impact on population.
  - Identify climate patterns, & plant and animal species in different terrestrial biomes.

WEEK FIVE:

- a. Neuron Interactive Online Simulation
  - Stimulate a neuron and monitor what happens.
  - Describe why ions can or cannot move across neuron membranes.
  - Identify leakage and gated channels, and describe the function of each.
  - Describe how membrane permeability changes in terms of different types of channels in a neuron.
- b. Reproductive System Worksheet
  - Describe the effects the sex hormones have on development.
  - Identify the anatomy of the female and male reproductive systems.
  - Describe some of the most common sexually transmitted diseases.
- c. Animal and Plant Diversity

- Explore plant groups and distinguishing characteristics (Bryophytes, Pterophytes, Gynomsperms and Angiosperms).
- Compare and contrast monocots and dicots.
- Identify reproductive structures of plant groups.
- Draw and label systems of a vascular plant and the parts of a flower.
- Review structure and leaf arrangement exploration of various plants.

All chapter topics may be subject to change based on the timeline and the instructor's discretion.

### **Academic Honesty**

Jinan University defines academic misconduct as any act by a student that misrepresents the student's own academic work or that compromises the academic work of another. Scholastic misconduct includes (but is not limited to) cheating on assignments or examinations; plagiarizing, i.e. misrepresenting as one's own work any work done by another; submitting the same paper, or substantially similar papers, to meet the requirements of more than one course without the approval and consent of the instructors concerned; sabotaging another's work. Within these general definitions, however, instructors determine what constitutes academic misconduct in the courses they teach. Students found guilty of academic misconduct in any portion of the academic work face penalties ranging from lowering of their course grade to awarding a grade of E for the entire course.