



University of International Business and Economics International Summer School

BIO 130 Introduction to Biology II (with Lab)

Term: June 12th – July 7th, 2023

Instructor: Shichao Chen

Home Institution: Tongji University

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Class Hours: Monday through Friday, 120 minutes each day (2,400 minutes in total)

Office Hours: TBD

Discussion Session: 2 hours each week

Total Contact Hours: 64 contact hours (45 minutes each, 48 hours in total)

Location: WEB

Credit: 4 units

Course Description:

The goal is to provide an understanding of fundamental principles and to develop analytical thinking skills in the context of biology. Students will explore the field of biology from the biochemical and molecular level, starting with cells, tissues, organs, and ultimately the organism. We will emphasize the fundamental principles and theories of biology. Topics will include the nature of molecules and properties; the chemical building blocks of life; cell structure and function, cellular and sexual reproduction which including meiosis and mitosis; energy and metabolism; photosynthesis; chromosomes, genetics with genes, gene expression, and biotechnology; biodiversity of plant, animal, virus, and immunity; classification, ecology, and evolution. Students will investigate the properties of life that unite all living organisms, how they are a constructed, reproduce, and function. In this course, the students will complete hands-on laboratory experiments during all units and will learn how the processes of scientific investigation can lead to new discoveries, including use of microscopy and observing cell organelles, cell's structure, cell division, DNA extraction and analyses, physiology, biochemistry, and ecology. Students will be engaged with fun and interesting during the experiments.

Course Goals:

1. Demonstrate mastery of the foundational knowledge and core concepts of cell, metabolism, DNA and genetics, biodiversity, evolution, and ecology.
2. Apply foundational knowledge and core concepts in these areas to solve novel problems, and analyze realistic problems.
3. Utilize information and data from a wide range of sources to construct knowledge and communicate that knowledge effectively.

Required Textbook:

- 1) Raven, Johnson, Mason, Losos, and Singer. Biology, 9th Ed. McGraw-Hill Companies, Inc., NY. Publishers, 2011. **ISBN 978-0-07-893649-4; MHID 0-07-893649-7**
- 2) Sadava, Hillis, Heller & Berenbaum, Life: The Science of Biology, 9th addition, Freeman Publishers, 2009
ISBN 978-1-4292-1962-4 (hardcover) — 978-1-4292-4645-3 (pbk.: v. 1) — ISBN 978-1-4292-4644-6 (pbk.: v. 2) — ISBN 978-1-4292-4647-7 (pbk.: v. 3)

Grading Policy:

Assessment of your learning will include 2 quiz and a final exam. There will also be a cumulative score based on online presentation, home work, and lab. Each exam may consist of multiple choice, fill-in-the-blanks, T or F questions, some short answer questions. These will be graded and returned to you, approximately one week after they are taken. Questions about grades should be addressed with the TAs or teacher. We encourage students to discuss all activities with teacher or students. However, when you are writing assignments, you must write your answer in your own words.

TOTAL COURSE POINTS 350 points

Homework & Participation will be worth 60 points

Lab Reports & Presentations 50 points

Two scheduled Mid Term exams each worth 70 points for a total of 140 points

One Final Exam on last day of class worth 100 points

Grading Scale:

Assignments and examinations will be graded according to the following grade scale:

A	90-100	C+	72-74
A-	85-89	C	68-71
B+	82-84	C-	64-67
B	78-81	D	60-63
B-	75-77	F	below 60

Class Rules:

Students are expected to do all the readings for the week before the class. All Students must be finish homework after class.

Course Schedule:

Day	LECTURE TOPICS	Lab ACTIVITIES & Discussions
Week 1		Experiment 1
Mon	Introductions, The Science of Biology	

	Elements in Living Systems & Chemical bonds. The Chemical Building Blocks of Life	a. Scientific Investigation b. The structure and use of Light Microscopy c. Observation the morphology and structure of plant and animal cell Experiment 2 a. The morphology and structure of Bacteria, Yeast, and mould. b. Cell, Tissues, Organs, System and Organism of plant and animal c. Plant physiology (Diffusion and Osmosis) d. Aquatic Ecology
Tue	The structure and function of Carbohydrates, Nucleic Acids, Proteins and Lipids.	
Wed	Cell structure of prokaryotes and eukaryotes	
Thurs	How Cells Divide: Cell Cycle, Mitosis and Meiosis	
Fri	Cell Respiration in Mitochondria. Plant cell Photosynthesis Experiment 1&2	
Week 2		Experiment 3
Mon	DNA replication and transcription	Cell reproduction a. Amitosis b. Mitosis c. Meiosis d. Individual development
Tue	Gene and how they work: translation	
Wed	Genetic Engineering and their application	
Thurs	Experiment 3	
Fri	Mid Term exam 1 and discussion	
Week 3		Experiment 4
Mon	Biodiversity of plant and animal Biodiversity protection	a. Cellular Respiration b. Ethanol fermentation in yeast c. Lactic acid fermentation in bacteria
Tue	Biodiversity of virus	
Wed	Biodiversity of Immunity	
Thurs	Experiment 4	
Fri	Mid Term exam 2 and discussion	
Week 4		Experiment 5
Mon	Cell, tissue, Organs, Systems, individual and Ecology	a. Science Communication b. DNA extraction c. DNA agarose Electrophoresis d. Presentations
Tue	Classification of organism	
Wed	The origin of life and evolution. Review	
Thurs	Experiment 5	
Fri	FINAL EXAM	

Lab Guidelines:

The labs are to complement the lecture component of this class and give you an opportunity to do some hands-on science. In order to learn science, you must do science. So hands-on activities are essential for this course. Depending on the lab exercise you may need to download software to run simulations or provide materials to complete hands-on exercises. This is necessary since the lab portion of the class is completed away from campus. Most supplies are household items, which mean you probably have many of the items at your home already. It is the students' responsibility to provide lab items and software downloads to complete the labs.

Each module will contain a Lab Activity document where you will find the instructions and procedures for that module's labs. These activity documents are designed to act as a study guide for the module test.

Each Lab Activity Document has the following:

- Purpose
- Learning Objectives
- Assignment Submission Checklist (Experimental Photographs, Formal Lab Reports, Graphs, Lab Assessment, etc.)
- Lab Activity Number
 - Introduction
 - Procedure
 - Analysis and Questions

You will only be submitting what is in the Assignment Submission Checklist Area. You aren't going to submit the handouts or analysis and questions section. Your instructor will have those answers if you are stuck and need clarification.

All reports/handouts will need to be submitted in a word document and uploaded as an attachment. Please make sure you title your file with your last name and the title of the lab. Your name should also be included on the actual document itself.