

**University of International Business and Economics
International Summer School**

BIO 110 Introduction to Biology (with Lab)

Term: December 19th, 2022 – January 13th, 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:

Biology study the law of life, and biology is very important for sciences and also for application. This introductory course will explore biology from different level such as biochemistry, cell structure and function, genetics and ecology. After studying, the students will understand the principles, theories, and studying methods of life sciences, and also understand the relationship between life and environments. The content of biology includes cells, tissues and organ systems; genetics, DNA and protein synthesis, life cycles and development, the internal workings of the cell, and the physiology of organisms from single celled bacteria through multi-cellular plants and animals. In this course, we put great emphasis on fundamental principles and current research efforts and trends in biology. We attempt to bring the interest of life science in classroom, and we also attempt to motivate students interesting in lecture and in lab exercise.

Course Goals:

The goals of this course will introduce the structure and function of life. Understanding the mechanism of life. The students will realize the important of life sciences, and also realizing the interaction of life sciences with other sciences.

1. Students understand the basic facts, principles, theories and methods of Biology.
2. Students learn main structure and function of Biology.
3. Students will understand the important of Biology in sciences and in application.
4. Students will understand the relationship between biology and other sciences, between biology and our life, between biology and environments.

Required Textbook:

- 1) Raven, Johnson, Mason, Losos, and Singer. Biology, 10th 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, 10th 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:

Homework 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
 TOTAL COURSE POINTS 350 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:

Week 1

(What is life. What themes biology study. The importance of biology.)

- Introduction to Biology
- The important of biology & Properties of Life.
- Chemistry and molecules of Life. Elements in Living Systems

(What is cell. Cell is the basic unit of life.)

- Macromolecules: The chemical building block of life.
- The structure and function of Carbohydrates, Nucleic Acids, Proteins and lipids.
- Cell structure of Prokaryotes and Eukaryotes.

Week 2

(All organism made up of cell. Diversity of living things)

- The structure and function of Prokaryotes (bacteria mainly studied).
- Cell structure of Eukaryotes.
- Diversity of living things

- Mid Term Exam 1 (15 min)
(How cell get energy. The important of enzyme. Why we need oxygen.)
- Energy and Metabolism.
- Cell Respiration and Fermentation.
- Enzymes and its important functions in life

Week 3

(Cell division and development of organism. Cell division and cancer.)

- The importance of cell division in life. How cell Divide.
- Cell cycle, Mitosis and meiosis.
- Mid Term Exam 2 (15min)
(What is gene. Where gene located.)
- DNA is Genetic materials.
- DNA Replication.
- Biotechnology: Gene Engineering.

Week4

(Human impact on Ecosystems)

- Human population growth presents challenges.
- People are working to protect ecosystems.
- Human impact on Ecosystems
(Ecology and Biodiversity)
- Ecology and Biodiversity of life.
- The resources from biodiversity.
- Final Exam

Lab Schedule:

The instructor offers some instruction through distance learning.

Lab1. Microscopy and its use, Morphology and structure of plant cell and animal cell

Lab2. Observation of Bacteria, yeast and mold by Microscopy

Lab3. Cell, tissues and organ of plant.

lab 4. Cell, tissues, organ and system of animal.

lab 5. Respiration and ethanol fermentation by yeast

Lab 6, The effect of temperature on enzyme activity

lab 7, Mitosis of plant cell and observation

lab 8, DNA Extraction and Manipulation (DNA extraction from Cheek cell)

lab 9, PCR (Polymerase Chain Reaction)

lab 10, Biodiversity Protection

Online 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.