



Shanghai Jiao Tong University

BI003 Introduction to Biology (with Lab) (Online)

| | | | |
|-----------------------------------|--|-----------------|---------|
| Instructor Information | TBD | | |
| Term | June 29, 2020 - July 30, 2020 | Credits: | 4 units |
| Class Hours | Monday through Thursday, 120 minutes per teaching day | | |
| Discussion Sessions | 2 hours each week, conducted by teaching assistant(s) | | |
| Total Contact Hours | 66 contact hours (1 contact hour = 45 mins, 3000 mins in total) | | |
| Required Texts (with ISBN) | Recommended: 1. Modern Biology, John H. Postlethwait & Janet L. Hopson, ISBN13: 9780030651786 2. What Is Life? 1st edition, Jay Phelan, ISBN: 1429246669 | | |
| Prerequisite | N/A | | |



Course Overview

This is a general overview of biology for students who are not majoring in biology. This course relates man to his environment and to the living organisms around him. In this course students will be introduced to the basic ideas, principles, theories, research methods, and important disciplines and cutting-edge knowledge of modern life sciences; introduce the latest research progress of modern life sciences, and the interaction and acquisition of modern life sciences and other disciplines; inspire and encourage students to think and understand life phenomena from different perspectives. Cooperate with other disciplines to promote scientific development.

General Course Goals

Upon the completion of this course, students will be able to:

1. Describe the steps in the scientific process and list the importance of biology to society and their everyday life.
2. Understand the themes and characteristics of life.
3. Describe the complexity of cell structure and function.
4. Compare and contrast different methods of energy production and explain the importance of energy to sustain the organizational levels of life.
5. List the components and complexity of heredity and explain how its accuracy is maintained.
6. Understand diversity to compare and contrast the interactions of life forms, their responses to the environment, their adaptation-evolution, and their behavior.

General Education Objectives

All students regardless of major who have completed the general education component of their studies, they should be able to:

1. Apply critical thinking and problem solving skills across disciplines.
2. Apply life skills in areas such as teamwork, interpersonal relationships, ethics, and study habits.
3. Communicate clearly in written or oral formats.
4. Use technology appropriate for learning.
5. Discuss issues of a diverse global society.
6. Demonstrate math and/or statistical skills.

Specific Course Goals

Upon successful completion of this course students will be able to:

1. Define biology and identify characteristics common to all life forms.
2. List and recognize each component of the scientific process.
3. Explain the basic chemical composition and processes occurring in living organisms.
4. Identify cell components and their functions.
5. Identify and describe the process and individual reactions of photosynthesis and its relation to energy.
6. Identify and describe the process and individual reactions of fermentation/respiration and



its relation to energy.

7. Identify Mendelian genetics, work problems and compare Mendelian genetic principles with other patterns of inheritance.
8. Compare normal and abnormal patterns of inheritance.
9. Describe the basic concepts of Biotechnology and its impact on everyday life.
10. Define mitosis and meiosis; identify each step in the processes and compare/contrast the two processes.
11. Define natural selection, adaptation and evolution. Identify support for these processes and give examples.
12. Describe various systems of classification and basic properties of organisms found in each Domain or Kingdom.
13. Compare and contrast characteristics of plants, animals, fungi, protista, bacteria, viruses and sub-viral entities.
14. Learn phylogenetic analysis skills using the DNA sequence. Know the Great Tree of Life and its value.
15. Human evolution history and migration routes from Africa by molecular evidence.
16. Define ecology, describe each component of an ecosystem and explain the energy flow through ecosystems.
17. Select and operate basic laboratory equipment and demonstrate knowledge of laboratory skills in specific laboratory settings required for gathering, analyzing and interpreting data in a scientific manner.

HOW TO SUCCEED IN THIS COURSE:

(1) Read the textbook before class (2) Ask questions during lecture to clarify material you did not fully understand while reading before class (3) Do not miss class (4) Arrive on Time (5) Take full advantages of bonus points offered (6) Contact the instructor for additional tutoring outside class with specific questions. It is your responsibility to learn the material – I will be more than happy to assist you in learning as long as you put effort into it. The teacher cannot do the learning for the student.

Resources Needed:

1. Personal computer - The student is expected to have access to a computer with the system requirements listed on portal (MAC & Windows). If you have any problems with your computer (i.e. computer crashes, internet goes down, etc.) it is your responsibility to have a backup plan.
2. Textbook:
 - 1) Concepts of Biology; Sylvia S. Mader. Third Edition. 2014. McGraw-Hill. (ISBN: 978-0-07-352553-7)
 - 2) Modern Biology; John H. Postlethwait & Janer L. Hopson Volume 5-Holt, Rinehart, and Winston 2006 (ISBN: 978-0-03-065178-6)
 - 3) Phylogenetic Trees Made Easy: A How-To Manual. Fourth Edition, Barry G. Hall. 2014. (ISBN-13: 978-0878936069) helps students get started in creating phylogenetic trees from protein or nucleic acid sequence data.



Student Responsibilities

1. Read the college catalog and all materials you receive during registration. These materials tell you what the college expects of you.
2. Read the syllabus for each class. The syllabus tells you what the instructor expects of you.
3. Attend all class meetings. Something important to learning happens during every class period. If you must miss a class meeting, talk to the instructor **IN ADVANCE** about what you should do.
4. Be on time. If you come in after class has started, you disrupt the entire class.
5. Never interrupt another class to talk to an instructor or a student in that class.
6. Be prepared for class. Complete reading assignments and other homework before class so that you can understand the lecture and participate in discussion. Always have pen/pencil, paper, and other specific tools for class.
7. Learn to take good notes. Write down ideas rather than word-for-word statements by the instructor.

Grading Policy

| | | |
|------------------------------------|-------------------|-----|
| Exam Paper (70%) | Quiz 1 | 20% |
| | Quiz 2 | 20% |
| | Final exam | 60% |
| Daily Performance (30%) | class performance | 40% |
| | Attendance | 60% |

Grading Scale

| Number grade | Letter grade | GPA |
|--------------|--------------|-----|
| 90-100 | A | 4.0 |
| 85-89 | A- | 3.7 |
| 80-84 | B+ | 3.3 |
| 75-79 | B | 3.0 |
| 70-74 | B- | 2.7 |
| 67-69 | C+ | 2.3 |
| 65-66 | C | 2.0 |
| 62-64 | C- | 1.7 |
| 60-61 | D | 1.0 |
| ≤59 | F (Failure) | 0 |



Absences: If you are too ill to take the final exam or complete a quiz or assignment, please contact the teaching assistant within 24 hours of the class period in which the exam was taken. You must be seen by and receive written documentation from a professional health care practitioner on the day (or period) of the exam in order for a make up to be given. Persons arriving late for the final exam will not be offered an exam after the first person has finished. Other serious personal problems will be considered, in advance, but on an individual basis. In all instances, documentation supporting the excused absence will be required. Lack of transportation, loss of electricity, travel plans, etc. will not be considered as valid excuses and you will receive a “0”. Make ups for missed exams and quizzes may be in a different format than the scheduled exam or quiz.

Note: Check the date and time of the final examination now and make sure that this time does not conflict with your future plans. No early final exams will be given. Students must contact their course teacher within two days of the original missed class date. There is no opportunity for a makeup assignment if a student contacts his/her course teacher on the third day or later.

LATE ASSIGNMENTS POLICY: Late assignments turned in within 24 hours after the due date is worth a maximum of half credit. Any assignment turned in past the 24 hour deadline is worth no credit. If possible, students should deliver late assignments directly to their course teacher in person. This policy will be enforced so that all students in the course are treated equally.

Class Policies

Attendance: Missing three or more courses will result in the student being automatically assigned a failing grade for the course. If you have any questions about any of the above policies please contact the Teaching Assistant.



Class Schedule

| Date | Lecture | Lab |
|--------|--|---|
| Day 1 | Introduction: What is life science? | Lab 1: Microscopy 1) Identification of parts and their function 2) Basic operation 3) Estimating the size of a specimen 4) Staining 5) Dissecting microscopy |
| Day 2 | Cell structure and function | |
| Day 3 | Membrane biology & The Molecules of Life | |
| Day 4 | Cellular Respiration: Obtaining Energy from Food | |
| Day 5 | Three Hours Lab Section: Microscopy | |
| Day 6 | Quiz 1 & Presentation | Lab 2: Cell Diversity, Animal Tissues 1) Epithelial tissue or surface tissue 2) Connective tissue or structural tissue 3) Muscle tissue or contractile tissue 4) Nervous tissue or conducting tissue |
| Day 7 | Photosynthesis: using light to make Food | |
| Day 8 | Cellular Reproduction: Cells from Cells | |
| Day 9 | Patterns of Inheritance | |
| Day 10 | Three Hours Lab Section: Animal Tissues and Cell Diversity | |
| Day 11 | Basic concept of genetics | Lab 3: Genetics 1) Distribution of alleles in this lab section 2) Inheritance 3) Observe our own characteristics 4) Predict appearance of our children |
| Day 12 | The Structure and Function of DNA | |
| Day 13 | Principles and techniques of genetic engineering & Genetic engineering application | |
| Day 14 | Quiz 2 & Presentation | |
| Day 15 | Three Hours Lab Section: Genetics | |
| Day 16 | How Populations Evolve | Lab 4: Campus plant diversity Observation 1) Take a close look at the park 2) Learn about botany 3) Meet the plant friends around us. |
| Day 17 | How Biological Diversity Evolves & made Phylogeny tree | |
| Day 18 | Population Genetics and Speciation | |
| Day 19 | The Great Tree of Life & Intro to Ecology & Biosphere | |
| Day 20 | Campus observation: Campus plant diversity observation | |