



East China Normal University International Summer Session

BIO 11 - Introduction to Biology

Term: 5 July – 8 August 2018

Instructor: Mary Montgomery

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Teaching Assistant: TBA

Course Overview

This class is a broad introduction to the study of biology with particular emphasis on basic concepts in cell biology, genetics, molecular biology, developmental biology and evolution. Evolution is the paradigm that unifies the study of biology and thus we will begin and end the course with a discussion of evolutionary theory and our understanding of how organisms have and continue to evolve; moreover, all course content will be grounded using an evolutionary perspective. The cell is the fundamental unit of all living organisms and thus we will devote much of the course to understanding how cells grow, metabolize, reproduce, communicate and differentiate to create a diversity of cell types. The principles of genetics explain how the information in the genome is used to build cells and organisms, how traits are inherited, and how mutations can lead to genetic diseases and cancer but also evolutionary innovation and new species. Finally, we will also discuss bioethical and sociocultural issues related to advances in biotechnology and medicine such as genetically modified organisms, genome editing, and stem cell therapy.

Course Goals

A student who satisfactorily completes this course should be able to

- 1. Demonstrate knowledge of basic concepts in cell biology, genetics, molecular biology, and evolution and an introductory level understanding of the methodologies associated with these disciplines;*
- 2. Appreciate that science is a continual process of investigation and interpretation, and that scientific knowledge progresses via the support and rejection of competing hypotheses, collective decisions that are based on empirical evidence and logical interpretation using inductive and deductive reasoning;*
- 3. Develop a scientifically informed position on some of the ethical and social issues related to the practice and application of biological research.*

Required Text

Biology Today and Tomorrow without Physiology 5th Edition

ISBN-13: 978-1305117396

ISBN-10: 1305117395



Course Hours

The course has 25 class sessions in total. Each class session is 110 minutes in length, for a total of 2750 minutes of in-class time. The course meets from Monday to Friday from July 5 to August 10. ECNU awards 4 credits for this course. Different universities may count course credits differently. Consult officials at your own home institution.

Attendance

Summer school is very intense and to be successful, students need to attend every class. Occasionally, due to illness or other unavoidable circumstance, a student may need to miss a class. ECNU policy requires a medical certificate to be excused. Any absence may impact on the student's grade. Moreover, ECNU policy is that a student who has more than 3 absences will fail the course. Arriving late or leaving early will count as a partial absence.

Grading Policy

ECNU awards grades of A, A-, B+, B, B-, C+, C, D, and F. Most colleges and universities do not award transfer credit for grades of D or F.

In this course, grading will be based on the following:

- 10% Two short writing assignments and one problem set
- 50% Two midterm exams
- 30% Final exam
- 10% Classroom engagement (attendance, attention, participation in discussions)

General expectations

Students are expected to:

- *Attend all classes and be responsible for all material covered in class and otherwise assigned. Any unexcused absence may impact a student's grade. Moreover, ECNU policy is that a student who has more than 3 unexcused absence will fail the course.*
- *Complete the day's required reading and assignments before class.*
- *Review the previous day's notes before class; make notes about questions you have about the previous class or the day's reading.*
- *Refrain from texting, phoning or engaging in computer activities unrelated to class during class (不要用手机). Students who do not do this will be asked to leave the class.*
- *While class participation is welcome, even required, you are expected to refrain from private conversations during the class period.*

Course Schedule

The planned schedule sketched out below may be modified to suit the interests or abilities of the enrolled students or to take advantage of special opportunities or events that may arise during the term.



WEEK ONE (July 5 – July 11):

Thurs: Biology as a process of inquiry

Read Chapter 1

Fri: Diversity of life and Evolutionary theory

Read Chapters 12.7, 12.8 and 13.3

Mon: Chemistry and intro to macromolecules

Read Chapter 2

Tues: Cell structure and function

Read Chapter 3

Wed: Metabolism and cellular respiration

Read Chapter 4

WEEK TWO (July 12 – July 18):

Thurs: Photosynthesis

Read Chapter 5

Fri: Review

Mon: Exam 1

Tues: Nucleic acids and the structure of DNA

Read Chapter 6 and handout

Wed: DNA replication and repair

Read Chapter 6.4

Short writing assignment 1 due

WEEK THREE (July 19 – July 25):

Thurs: Gene expression: transcription and translation

Read Chapter 7

Fri: Regulation of gene expression at the level of DNA

Read Chapter 7.7

Mon: Regulation of gene expression at the level of RNA

Read handout

Tues: Biotechnology

Read Chapter 10

Wed: Gene therapy and genome editing

Read Chapter 10.5 and handout

WEEK FOUR (July 26 – August 1):

Thurs: Exam 2

Fri: Cell reproduction: mitosis and meiosis

Read Chapter 8

Mon: Patterns of inheritance: mendelian genetics

Read Chapter 9

Short writing assignment 2 due

Tues: Patterns of inheritance: complex traits

Read Chapter 9

Wed: Human genetic disorders

Read Chapter 9

WEEK FIVE (August 2 – August 8):

Thurs: Cell cycle regulation, cell signaling and cancer

Read Chapter 8.3

Fri: Animal development and stem cells

Read Chapters 8.5, 11.6 and 11.7

Problem Set due

Mon: Population genetics and speciation

Read Chapter 12

Tues: Species interactions and co-evolution

Read Chapter 17.1 to 17.4

Wed: Final Exam

Academic Honesty

Students are expected to maintain high standards of academic honesty. Specifically, unless otherwise directed by the professor, students may not consult other students, books, notes, electronic devices or any other source, on examinations. Failure to abide by this may result in a zero on the examination, or even failure in the course.