

# **Sample Syllabi – Subject to Change**

## **Biology and its Modern Applications**

**INSTRUCTOR: Amr Amin**

### **COURSE DESCRIPTION:**

This course aims at developing the basic concepts that form the crux of life from both structural and functional perspectives. It will cover cellular functioning and organization and the transformation of energy. In addition, concepts of evolution and natural selection will be investigated. The course also introduces the student to the continuity of life from genetic and molecular perspectives. The course will extrapolate to demonstrate how cells communicate through cell signaling and how defects in such communication often lead to diseases. The course will conclude by discussing current applications of biology in fields such as medicine, drug discovery, nanotechnology, forensics, and bioengineering. The goals of this course will be realized through various course activities including virtual labs, group projects and presentations, and team-based learning. Both synchronous and asynchronous modes of interaction and communication will be used in this course.

This course would be particularly appealing to students who would like to learn more about principles of biology and the multiple innovative careers that the study of biology can prepare them for.

### **COURSE OBJECTIVES:**

- Students will gain a comprehensive understanding of all characteristics of life.
- Students will study various biochemical processes that are required for the proper functioning of cells.
- Students will understand the principles of both photosynthesis and cellular respiration.
- Students will gain an understanding of the genetic makeup, the regulation of gene expression and the cell cycle of eukaryotic cells and will have an appreciation of how cells crosstalk.
- Students will discover different recent applications of biology in disciplines such as Law, Engineering, IT and Medicine.

### **COURSE OUTCOMES:**

By the end of this course, students should be able to:

- A. Differentiate between hypotheses and theories that are under constant scrutiny and subject to revision based on new observations.
- B. Explain how the scientific knowledge covered in the course relates to real world laws of chemistry and physics.
- C. Define structures of a eukaryotic cell.

- D. Describe the importance of course topics to further study in advanced biology courses.
- E. Interpret graphs and other representations of data.
- F. Acquire a knowledge of the need for statistical analysis and hypothesis testing in quantitative fields.
- G. Access and navigate scientific literature databases.

**COURSE CONTENT:**

Introduction	Peer-evaluation tool / <b>Reading # 1 assigned</b>	<b>Understanding experimental design</b> / SimBio virtual lab & assessment
What is life?	Team video bio-application assignment / Old examples for guidance	Literature searching among other tools to be used / Flipgrid <b>(FG) # 1</b>
Macromolecules	Revision / General Features of Cells <b>Team-based learning (TBL) # 1</b> assessment	<b>Diffusion</b> / SimBio virtual lab & assessment
TBL revision	DNA replication <b>TBL # 2</b>	Topics' selection for group presentation / <b>FG#2</b> & <b>FG1 due</b> Mid-Course Poll
Transcription and translation	TBL revision / Genes to genomes <b>TBL # 3</b>	<b>DNA explored</b> / SimBio virtual lab & assessment / <b>Reading # 2 assigned</b>
Gene regulation	<b>FG#3 activity</b> & <b>FG2 due</b>	Lab reports discussions
Cell division	TBL revision / Mutation <b>TBL # 4</b>	<b>Mitosis explored</b> / SimBio virtual lab & assessment
Cancer	Metastasis & angiogenesis / <b>FG#4 activity</b> & <b>FG3 due</b>	Lab reports catching up
<b>Movie followed by open discussion</b> / <b>Reading # 3 assigned</b>		<b>Sickle-cell alleles</b> / SimBio virtual lab & assessment
Metabolism	Preparation for Redox reactions TBL	Redox reactions / <b>TBL #5</b>
Preparation for Evolution TBL / <b>FG#5</b> & <b>FG4 due</b>	Reaching out with each individual group for team assignments	<b>Cell respiration</b> / SimBio virtual lab & assessment
Inheritance	Topic-of-choice make-up presentations	Evolution <b>TBL # 6</b>
Presentations of team video bio-application assignment		Makeup opportunity for Labs & other course activities / <b>FG5 due</b>

**Subject to changes**

- |   |     |                                      |
|---|-----|--------------------------------------|
| ○ Team-Based Learning (TBL) Assessments | 20% | Highest 4/6 grades will count        |
| ○ Reading assignments (RA) thru Kritik  | 20% | Total of 3 assignments               |
| ○ Course participation                  | 10% | Timely submission of all assignments |
| ○ Flipgrid participation                | 10% | Total of 5 assignments               |
| ○ Lab Activities                        | 20% | Highest 5/6 grades will count        |
| ○ Team assignments                      | 20% | See rubric for project below         |

Each presentation (no more than 10 PowerPoint slides) should discuss one of the course or course-related topics; one or all members can present the group's work when it is due, each presentation will be set for 7 min followed by 3 min for discussion.

Makeups will only be allowed when requests are made within same week that the assignment is originally administered.

### GRADING SCALE:

Final grades will be determined using the following scale:

93-100%, A	83-86.9%, B	73-76.9%, C	60-66.6%, D
90-92.9%, A-	80-82.9%, B-	70-72.9%, C-	Below 60%, F
87-89.9%, B+	77-79.9%, C+	67-69.9%, D+	

### LATE SUBMISSION POLICY:

Without a prior and approved notice, ONE week past the due date will carry 10% grade deduction. There will be another 10% for TWO weeks late submissions & a maximum of 50% deductions for submissions on final class day.

### COURSE PARTICIPATION:

Students submitted all assignments on time or late with prior permission will earn a full grade. Late/no submissions will carry a deduction. As we have 5 main activities; a full mark in participation will be granted to students who submitted all on time (or late with prior permission). One percent will be deducted for late (or missed) activity; that is, a maximum of 5% (1/2 the participation grade) deduction for any late/missed activity for all 5 course activities.

### COURSE TEXTBOOK:

You may refer to any basic Biology textbook from the library. Additional reading materials will be posted on Canvas. Those may include:

- BIOLOGY, by Dr. Rob Brooker & colleagues, or
- Human Biology by Sylvia Mader & Michael Windelspecht,

## **PLAGIARISM STATEMENT:**

In this course, there may be individual and group assignments. It is important that your individual assignments be completed with your thoughts alone. Please read and understand the following information regarding academic dishonesty. The instructor cannot and will not tolerate academic dishonesty.

What is cheating?

- Supplying or using work or answers that are not your own.
- Providing or accepting assistance with completing assignments or examinations.
- Faking data or results.
- Interfering in any way with someone else's work.
- Stealing an examination or solution from the teacher.

What is plagiarism?

- Copying a paper from a source text without proper acknowledgment.
- Buying a paper from any source.
- Turning in another student's work with or without that student's knowledge.
- Copying materials from a source text, supplying proper documentation, but leaving out quotation marks.
- Paraphrasing materials from a source text without appropriate documentation.
- Turning in a paper from a term paper website.