

# Syllabus for ABT700

## Principles of Biotechnology

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**NOTE:** This syllabus document contains the basic information of this course. The most current syllabus is available in the full course.

### Course Description

Principles and techniques pertaining to biotechnology and its applications to our society. Survey of classical and emerging techniques.

### Prerequisite(s)

None.

### Course Outcomes

Upon completing this course, you will be able to do the following:

- Appraise applications of biotechnology in various settings.
- Demonstrate an understanding of genes, genomes and their organization, gene expression, genetic variation, genetic engineering, protein expression, and post-translational modifications.
- Understand the core technologies currently used in biotechnological research.
- Compare various biotechnological approaches and recommend appropriate strategies for problem solving.
- Critique journal articles and ascertain the broader impacts of such studies.
- Synthesize and communicate ideas to solve biotechnological problems.

### Course Requirements/Components

#### **WRITTEN ASSIGNMENTS:**

The course features a variety of written assignments. This includes response questions to module topics, case studies, scenarios, and journal article reviews.

#### **DISCUSSIONS:**

You will discuss selected topics with your peers through a series of discussion prompts.

### **ORAL PRESENTATION of RESEARCH PAPER:**

During module 9, you will select a research paper to present at the end of the semester in an oral presentation. Sign-up is on a first-come/first-served basis. Most of the papers that we cover during the semester are eligible for this presentation as are relevant papers that you find in the literature and have me approve. My only criteria for approval are that the paper should be related to a topic we cover in this class, you may not be an author on the paper, and it should be sufficiently complex so as to be somewhat challenging.

The guidelines on preparing the presentations will be made available in Canvas. This activity is like a cumulative final as you will apply what you have learned throughout the semester to understand. In addition to submitting your presentation (worth 50 points), you will be randomly assigned two presentations prepared by your fellow classmates for peer evaluation and reflection of what you have learned. This activity will enable you to appraise the applications of biotechnology in many different fields.

Note that the oral presentation and peer grading assignments in modules 14 and 15 cannot be submitted late, as they are due in the last two weeks of the course. The oral presentations must be submitted on time to give other students ample time to perform their peer grading during the last week of the course.

### **PRE- and POST-COURSE SURVEYS:**

You will be asked to complete a pre-course survey during week 1 to understand your backgrounds and educational experiences, and a post-course survey during the last week to assess your learning and the quality of instruction. These surveys will be graded based on whether or not you participated and completed, not based on 'right or wrong answers'. Students will receive 10 easy points for completing each survey.

## **Grading**

The following grading scale will be used to evaluate all course requirements and to determine your final grade:

Grade	Percentage Range
A	93.5 - 100%
A-	90 – 93.49%
B+	87 – 89.9%
B	83 – 86.9%
B-	80 – 82.9%
C+	77 – 79.9%
C	73 – 76.9%
C-	70 – 72.9%
F	0 – 69.9%

<b>Module</b>	<b>Assignments</b>	<b>Points</b>
1	Pre Course Survey, Instructor and Student Introductions, Response Questions, Survey of Career Opportunities, and Investigating and Communicating Biotechnology	53
2	Response Questions, The Central Dogma, Epigenome Literature Search, Noncoding RNAs in SARS-CoV-2, and Optional Genetic Code, Mutation Analyses, Decryption	58
3	Response Questions, SARS-CoV-2 Spike Protein Cloning Exercise, High-level Literature Search	53
4	Response Questions, Fixing a Broken PCR Reaction, Design a PCR Reaction, The SARS-CoV-2 RT-PCR Diagnostic Panel	62
5	Response Questions, Video-based Case Studies on Forward and Reverse Genetics, Forward and Reverse Genetics Journal Article Review, Optional Reverse and Forward Genetics Journal Article	52
6	Response Questions, Proteins as Products, Protein Expression and Purification Journal Article Critique	56
7	Response Questions, Monitoring Gene Expression at the Transcript-Level Journal Article, Monitoring Gene Expression at the Protein and Metabolite-Levels Journal Article	57
8	Response Questions, The Hunt for the Golden State Killer, Modern DNA Forensic Analysis and Implications, SARS-CoV-2 Journal Article Review	62
9	Oral Presentation Topic, Response Questions, SARS-CoV-2 Vaccine Literature Review, Ethics in Microbial Biotechnology	55
10	Response Questions, Communicating Plant Biotechnology for Crop Improvement, GMO or OMG?, Optional Food Evolution	45
11	Response Questions, CRISPR/Cas9 Modern Transgenic Animals, Genetically Modified Animals, SARS-CoV-2 Animal Model Journal Article Review	56
12	Response Questions, Immunotherapy Review Article Review	37
13	Response Questions, Gene Therapy – Prospects and Challenges, Limitations of Personalized Medicine	45

14	Response Questions, Environmental DNA Sampling (2), Oral Presentation	95
15	Response Questions, SARS-CoV-2 Ethics and Biotechnology, Biotechnology Regulations, Post Course Survey	49
<b>Total Points</b>		<b>835</b>