

AMERICAN UNIVERSITY OF RAS AL KHAIMAH

BIOL 380: Biotechnology and Genetic Engineering

Course Description

Course Title **Biotechnology and Genetic Engineering**

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Credit Hours 3

Catalog Description (3:3:0) Emphasizes theory and applications, including significance and societal applications of biotechnology applied to real-world problems

Prerequisites BIOL 270

Textbook and other learning resources

Molecular Biotechnology: Principles and Applications of Recombinant DNA, 4th edition, Bernard R. Glick, B., Pasternak, J. and Patten, C, 2009, American Society of Microbiology. ISBN-13: 9781555814984

Genetic Engineering and Biotechnology News website: <http://www.genengnews.com/> Provides information on advances in Biotechnology and Genetic engineering as well as links to useful websites, podcasts and information related to the field.

Pubmed website of the National Centre for Biotechnology Information: <http://www.ncbi.nlm.nih.gov>

Course materials will be available through AURAK Blackboard, including the syllabus, PowerPoint slides of lectures, assignments, model answers to quizzes etc

Course Goals

- To educate and prepare undergraduates for possible employment in the field
- To educate and prepare undergraduates so students can learn to make informed, rational decisions concerning the impact on society resulting from advances in this scientific field

Student Learning Outcomes

At the end of this course the student will be able to:

CSLO 1: Describe the applications of Biotechnology in various areas such as the medical, microbial, environmental, agricultural fields as well as bioremediation and forensics.

CSLO 2: Discuss the significance and societal implications of molecular biotechnology

CSLO 3: Apply biotechnology and genetic engineering principles to current societal problems and concerns

CSLO 4: Understand the concepts of recombinant DNA technology and genetic engineering

CSLO 5: Describe DNA fingerprinting and restriction fragment length polymorphism (RFLP) analysis and their applications

CSLO 6: Describe the steps involved in the production of biopharmaceuticals in microbial and mammalian cell systems

CSLO 7: Explain the general principles of generating transgenic plants, animals and microbes.

Teaching and Learning Methodologies

The principle method of teaching is conducted via lectures using up-to-date audiovisuals and students are encouraged to use the textbook and other learning resources in parallel. Assignments, essays and presentations are intended to reinforce learning and involve self-study. Homework assignments will comprise mainly of problem-solving questions requiring application of principles and concepts learned in the classroom. Quizzes and examinations will assess student knowledge, understanding and application of the concepts. Group discussions are also adopted to encourage team interaction and self-learning.

Evaluation Plan

• Homework Assignments	10%
• Essays and presentations	20%
• Quizzes	20 %
• Midterm Exam	20%
• Final Exam	30%

Assessment Tool (number)	CSLO achieved	Weightage
Homework Assignments (5)	CSLO 1, CSLO 2, CSLO 3, CSLO 4, CSLO 5, CSLO 6, CSLO 7	10%
Essays-Presentations (2) (Each essay: 1200- 1500 words; Presentation: 10 minutes)	CSLO 1, CSLO 2, CSLO 3, CSLO 4, CSLO 5	20% (each essay is worth 7% and each presentation is worth 3%)
Quizzes (4) [closed book, consisting of multiple choice (30%) and short answer questions (70%)]	CSLO 1, CSLO 2, CSLO 3, CSLO 4, CSLO 5, CSLO 6, CSLO 7	20%
Midterm Examination (closed book, consisting of multiple choice and short answer questions in equal weightage, 1 1/2 hours)	CSLO 1, CSLO 2, CSLO 3, CSLO 4, CSLO 5, CSLO 6, CSLO 7	20%
Final Examination (closed book consisting of multiple choice, and short answer questions in equal weightage, 3 hours)	CSLO 1, CSLO 2, CSLO 3, CSLO 4, CSLO 5, CSLO 6, CSLO 7	30%

Knowledge, understanding and application of the course based on the material taught in class will be examined by “closed-book” quizzes and midterm and final examinations. Self-study and directed learning will be assessed by assignments, essays and presentations. Written feedback will be provided to students on assignments, quizzes, essays and presentations and examinations to highlight deficiencies in student responses and aspects that need particular attention by way of improvement.

Topic Breakdown

Week	Topic
1	Introduction to Course: Overview of Assignments and Course Format
2	The many facets of Biotechnology; Gene expression
3	The basis of recombinant DNA technology/In-class discussions related to DNA recombination methods. How these methods are used in modifying, deleting or adding new DNA sequences.
4	Techniques in Molecular Biotechnology: DNA sequencing and PCR/In-class discussions about production of correctly folded proteins from recombinant DNA. This discussion is focused on the importance of correct folding to produce recombinant proteins.
5	Introduction to Molecular diagnostics
6	Protein purification
7	Therapeutic agents and their production
8	Vaccines and vaccine production / Midterm Examination
9	Microbial synthesis of commercial products
10	Microbial insecticides
11	Plant genetic engineering
12	Animal genetic engineering
13	Bioinformatics, genomics and proteomics – the basics
14	Introduction to Environmental Biotechnology
15	Introduction to regulations, ethics & patenting in Biotechnology
Jan 16, 2017	Final Examination, 14:00 – 16:00 PM, Room B103