

Course Syllabus

BIOTECHNOLOGY: UNLOCKING NATURE'S SECRETS

Can we bring back extinct species? Will the cures for cancer, malaria, and other diseases come from the combination of natural materials and new technologies? How is science changing the foods we eat? Welcome to the world of biotechnology! In this course, you will explore the history of biotechnology, including early attempts at food preservation, the development of antibiotics, and changes to food crops around the world. You'll also learn more about some of the challenges of biotechnology, such as the growth of antibiotic resistant bacteria and questions about the safety of commercially produced genetically modified organisms (GMOs). Finally, you'll research new biotechnologies and how they are changing the world we live in.

Unit 1: Biotechnology Basics

Learning Objectives:

After studying this unit, you will be able to:

- Recognize different types of cells.
- Categorize organisms.
- Define taxonomy and scientific naming of organisms.
- Explain the basics of evolutionary theory.

UNIT 1 Assignments

Assignment	Type	Score
Biotechnology Basics: Unit Text Questions	Homework	10 points
Biotechnology Basics: Online Biotechnology Lab Questions	Homework	10 points

Unit 1 Discussion Assignment 1	Discussion	5 points
Unit 1 Discussion Assignment 2	Discussion	5 points
Unit 1 Quiz – Biotechnology Basics	Quiz	15 points

Unit 2: The Beginning of Biotechnology

Learning Objectives:

After studying this unit, you will be able to:

- Explain the differences between the Paleolithic and Neolithic.
- Describe how humans domesticated plants and animals.
- Categorize the regional variances in agriculture and domestication.
- Summarize the changes that occurred as humans domesticated plants and animals.

UNIT 2 Assignments

Assignment	Type	Score
The Beginning of Biotechnology: Unit Text Questions	Homework	10 points
The Beginning of Biotechnology: Online Biotechnology Lab Questions	Homework	10 points
Biotechnology Unit 2 Activity 1	Activity	15 points
Unit 2 Discussion Assignment 1	Discussion	5 points
Unit 2 Discussion Assignment 2	Discussion	5 points
Unit 2 Quiz – The Beginning of Biotechnology	Quiz	15 points

Unit 3: Food Preservation and Fermentation

Learning Objectives:

After studying this unit, you will be able to:

- Classify the various ways to store and preserve food.
- Describe the different types of fermentation.
- Explain the process of fermentation.
- Discuss the study of microbiology and the work of Pasteur.

UNIT 3 Assignments

Assignment	Type	Score
Food Preservation & Fermentation: Unit Text Questions	Homework	10 points
Food Preservation & Fermentation: Online Biotechnology Lab Questions	Homework	10 points
Unit 3 Discussion Assignment 1	Discussion	5 points
Unit 3 Discussion Assignment 2	Discussion	5 points
Unit 3 Quiz – Food Preservation & Fermentation	Quiz	15 points

Unit 4: Collection and Breeding

Learning Objectives:

After studying this unit, you will be able to:

- Discuss the importance of early collectors and their collections.
- Describe how collectors bred plants.
- Illustrate the importance of hybridization and the impact of hybrids.

- Explain how early breeding programs led to genetics.

UNIT 4 Assignments

Assignment	Type	Score
Collection & Breeding: Unit Text Questions	Homework	10 points
Collection & Breeding: Online Biotechnology Lab Questions	Homework	10 points
Biotechnology Unit 4 Activity 1	Activity	15 points
Unit 4 Discussion Assignment 1	Discussion	5 points
Unit 4 Discussion Assignment 2	Discussion	5 points
Unit 4 Quiz – Collection & Breeding	Quiz	15 points

Unit 5: The Beginning of Genetics

Learning Objectives:

After studying this unit, you will be able to:

- Discuss the function of genes.
- Summarize the historical development of the study of genetics.
- Describe Mendel's experiments and explain their significance.
- Create a timeline describing the history of genetics from Mendel's time through the late twentieth century.

UNIT 5 Assignments

Assignment	Type	Score
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The Beginning of Genetics: Unit Text Questions	Homework	10 points
The Beginning of Genetics: Online Biotechnology Lab Questions	Homework	10 points
Unit 5 Discussion Assignment 1	Discussion	5 points
Unit 5 Discussion Assignment 2	Discussion	5 points
Unit 5 Quiz – The Beginning of Genetics	Quiz	15 points

Unit 6: Early Industrial Discoveries

Learning Objectives:

After studying this unit, you will be able to:

- Summarize the developments in biotechnology that accompanied the Industrial Revolution.
- Identify the changes that occurred during the period defined as classical biotechnology.
- Explain the role of enzymes in an industrial setting.
- Describe how war drove productivity and innovation in biotechnology.

UNIT 6 Assignments

Assignment	Type	Score
Early Industrial Discoveries: Unit Text Questions	Homework	10 points
Workplace Safety: Online Biotechnology Lab Questions	Homework	10 points
Biotechnology Unit 6 Activity 1	Activity	15 points
Unit 6 Discussion Assignment 1	Discussion	5 points

Unit 6 Discussion Assignment 2	Discussion	5 points
Unit 6 Quiz – Early Industrial Discoveries	Quiz	15 points

Biotechnology Midterm Exam

Learning Objectives:

- Review information acquired and mastered from this course up to this point.
- Take a course exam based on material from the first six units in this course (Note: You will be able to open this exam only one time.)

MIDTERM Assignments

Assignment	Type	Score
Biotechnology Midterm Exam	Exam	50 points
Midterm Discussion Assignment	Discussion	5 points

Unit 7: The Discovery of Antibiotics

Learning Objectives:

After studying this unit, you will be able to:

- Explain the origin of antibiotics.
- Arrange the timeline of antibiotic development.
- Describe how antibiotics treat bacterial infections.
- Discuss the concerns about antibiotic resistance and possible solutions.

UNIT 7 Assignments

Assignment	Type	Score
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The Discovery of Antibiotics: Unit Text Questions	Homework	10 points
The Discovery of Antibiotics: Online Biotechnology Lab Questions	Homework	10 points
Unit 7 Discussion Assignment 1	Discussion	5 points
Unit 7 Discussion Assignment 2	Discussion	5 points
Unit 7 Quiz – The Discovery of Antibiotics	Quiz	15 points

Unit 8: Agricultural Biotechnology through the Green Revolution

Learning Objectives:

After studying this unit, you will be able to:

- Describe the changes in agricultural biotechnology in the late nineteenth century.
- Explain how double crossbreeding changed plants.
- Report on the developments that led to the Green Revolution.
- Discuss how technological advances led to genetic modification in modern agriculture.

UNIT 8 Assignments

Assignment	Type	Score
Agricultural Biotechnology through the Green Revolution: Unit Text Questions	Homework	10 points
Agricultural Biotechnology through the Green Revolution: Online Biotechnology Lab Questions	Homework	10 points
Biotechnology Unit 8 Activity 1	Activity	15 points

Unit 8 Discussion Assignment 1	Discussion	5 points
Unit 8 Discussion Assignment 2	Discussion	5 points
Unit 8 Quiz – Agricultural Biotechnology through the Green Revolution	Quiz	15 points

Unit 9: Mapping the Human Genome

Learning Objectives:

After studying this unit, you will be able to:

- Relate the history of the Human Genome Project.
- Recognize the accomplishments of the Human Genome Project.
- Describe developments since the completion of the Human Genome Project.
- Explain the potential for genetic research and understanding.

UNIT 9 Assignments

Assignment	Type	Score
Mapping the Human Genome: Unit Text Questions	Homework	10 points
Mapping the Human Genome: Online Biotechnology Lab Questions	Homework	10 points
Unit 9 Discussion Assignment 1	Discussion	5 points
Unit 9 Discussion Assignment 2	Discussion	5 points
Unit 9 Quiz – Mapping the Human Genome	Quiz	15 points

Unit 10: Modern Industrial Biotechnology

Learning Objectives:

After studying this unit, you will be able to:

- Describe the modern industrial uses for enzymes.
- Recognize the role of genetics in modern industrial biotechnology.
- Explain how and why biofuels are important.
- List the environmental benefits of industrial biotechnology.

UNIT 10 Assignments

Assignment	Type	Score
Modern Industrial Biotechnology: Unit Text Questions	Homework	10 points
Modern Industrial Biotechnology: Online Biotechnology Lab Questions	Homework	10 points
Biotechnology Unit 10 Activity 1	Activity	15 points
Unit 10 Discussion Assignment 1	Discussion	5 points
Unit 10 Discussion Assignment 2	Discussion	5 points
Unit 10 Quiz – Modern Industrial Biotechnology	Quiz	15 points

Unit 11: Modern Agricultural Biotechnology

Learning Objectives:

After studying this unit, you will be able to:

- Describe how organisms are genetically modified.
- Report on the prevalence of GMOs.
- Summarize the risks and benefits of GMOs.

- Develop an educated opinion about the role of GMOs in our food supply.

UNIT 11 Assignments

Assignment	Type	Score
Modern Agricultural Biotechnology: Unit Text Questions	Homework	10 points
Modern Agricultural Biotechnology: Online Biotechnology Lab Questions	Homework	10 points
Unit 11 Discussion Assignment 1	Discussion	5 points
Unit 11 Discussion Assignment 2	Discussion	5 points
Unit 11 Quiz – Modern Agricultural Biotechnology	Quiz	15 points

Unit 12: Modern Pharmaceutical Biotechnology

Learning Objectives:

After studying this unit, you will be able to:

- Explain innovations in pharmaceutical biotechnology.
- Define the importance of genetically modified hormones, insulin, and other compounds typically produced in the body.
- Recognize the potential for new treatments for cancer and other illnesses.
- Describe the importance of vaccines.

UNIT 12 Assignments

Assignment	Type	Score
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Modern Pharmaceutical Biotechnology: Unit Text Questions	Homework	10 points
Modern Pharmaceutical Biotechnology: Online Biotechnology Lab Questions	Homework	10 points
Unit 12 Discussion Assignment 1	Discussion	5 points
Unit 12 Discussion Assignment 2	Discussion	5 points
Unit 12 Quiz – Modern Pharmaceutical Biotechnology	Quiz	15 points

Biotechnology Final Exam

Learning Objectives:

- Review information acquired and mastered from this course up to this point.
- Take a course exam based on material from units seven to twelve in this course – the last six units. (Note: You will be able to open this exam only one time.)

FINAL Assignments

Assignment	Type	Score
Biotechnology Final Exam	Exam	50 points
Class Reflection Discussion Assignment	Discussion	10 points