

**BIOLOGY 206
GENETICS AND SOCIETY**

BULLETIN INFORMATION

BIOL 206 - Genetics and Society (3 credit hours)

Course Description:

(Designed for non-major students.) Genetic principles, emphasizing human heredity. Relevance of recent advances in genetics

SAMPLE COURSE OVERVIEW

So many topics in biology and genetics have rapidly gained public attention and sometimes stimulated enormous controversy. Issues such as genetic screening, reproductive rights, stem cells, cloning, drug development, AIDS, Bird Flu, Swine Flu and other infectious diseases, antibiotic resistance, genetically modified organisms (particularly foods), bioterrorism and discussions surrounding science education all require that we have at least some minimal level of understanding in order to make informed decisions. Decisions made regarding these and other similar topics will have a major impact on our lives and society over the coming decades.

ITEMIZED LEARNING OUTCOMES

Upon successful completion of Biology 206, students will be able to:

1. Demonstrate an understanding of the relevance of the field of genetics to human society
2. Demonstrate an understanding of cellular structures and their functions
3. Explain the basis of inheritance of traits in living organisms
4. Discuss the structure of the human genome and how genes operate
5. Demonstrate an understanding of the patterns of inheritance
6. Evaluate certain genetic information such as frequencies of inherited traits and pedigree patterns
7. Discuss the contribution of genes to traits: ranging from hair color to diseases such as cancer as well as to some behaviors
8. Demonstrate an understanding of and discuss current genetic technologies, e.g., animal and human cloning, crop improvements, stem cell research, human genome project, cancer therapeutics.
9. Demonstrate an understanding of and discuss applications of genetic technologies and their impact on the society in the past, current and future.
10. Discuss some bioethical issues and current ethical and political debates regarding the use of the state-of-the art technologies as applied to (but not limited to) human cloning, stem cells, and genetically modified crops.

11. Evaluate the scientific methodology used to arrive at conclusions regarding the use of genetic technologies for (but not limited to) crop improvement, safety of genetically engineered crops, bioterrorism, cancer treatments, use and application of stem cells.

SAMPLE REQUIRED TEXTS/SUGGESTED READINGS/MATERIALS

1. *Human Heredity* by Cummings. 7th or 8th edition
2. *The Double Helix* by James Watson
3. Essays/Handouts (3-4 over the semester)

SAMPLE ASSIGNMENTS AND/OR EXAMS

1. **Student Evaluation:** The assignments and the exams throughout the class will incorporate how we use observations in order to formulate testable hypotheses, and how we can test such hypotheses using well-designed scientific experiments. Only well executed experiments with proper controls can lead to meaningful data and results. Students will learn during the semester as to how certain scientific data/results can be applied to understand cloning, stem cells, crop improvements, designer babies, etc., and make informed decisions about issues that are important for society at present and in near future.
2. Students will apply and demonstrate their understanding of genetics the scientific method through various means, including **assigned homework** that will involve problem solving, **writing essays and summaries** of assigned topics and readings including pertinent news stories. In addition, they will demonstrate their understanding of the scientific method and concepts through scheduled **exams**.
3. Students will evaluate the relationships between science, technology, genetics, and biology through issues as diverse as (but not limited to) controversies surrounding stem cells, cloning, reproductive rights, genetics screening, and inherited and infectious diseases. Concepts in biology and genetics are also applied to understanding contemporary issues such as genetically modified foods, and bioterrorism. The homework assignments, news stories, and assigned readings will be selected accordingly and the students will analyze and comment on these using the skills and material learned in the lectures.
4. **Questions and problems from text:** I will assign questions and problems from the text on Tuesdays and they will be handed in to me the following Tuesday. Credit will be given for doing the problems and handing them in on time. These problems will focus on scientific problem solving and key concepts in genetics.
5. **Summary of news story:** Find a current news article dealing with some aspect of genetics and write a short summary (1 page.) This assignment will draw attention to the relevance of genetics to current issues.
6. **Summaries of assigned readings:** During the semester I will hand out a few (hopefully 3-4) relevant essays. You will need to write a short (2 page) summary and turn it in – I will tell you when I hand it out when the summary will be due. These assignments will focus on the relevance of genetics, ethical issues and the biological sciences to current issues and cultural trends in our society.

7. **Summary report on *The Double Helix*:** We'll be reading an account of the discovery of the structure of DNA by James Watson. You will need to write a 3-4 page summary or overview. Also, a brief description of the role of certain individuals will be on exam 3. This assignment is to give students insight into an aspect of the history of genetics and the process of scientific discovery
8. **Exams:** There will be three exams (*no final exam.*) Exams will cover material from the lectures and material covered by assigned problems from the text. These exams will evaluate student comprehension of important concepts in genetics, cell biology, and their relationship to societal issues. They will also evaluate the student's ability to use scientific methodologies to solve problems using knowledge of genetics.

SAMPLE COURSE OUTLINE WITH TIMELINE OF TOPICS, READINGS/ASSIGNMENTS, EXAMS/PROJECTS

Week 1: Introduction: Why is this subject important?
Chapt 1

Week 2: Cell Structure/Cell Division
Chapt 2

Week 3: Principles of Mendelian Inheritance
Chapt 3

Week 4: Human Pedigrees
Chapt 4, 6

Week 5: DNA Structure
Chapt 8

Week 6: What are chromosomes?
Chapt 6,
EXAM 1

Week 7: What is a gene? Gene expression
Chapt 9

Week 8: How genes control protein production.
Chapt 10, 11
Summary of news article due

Week 9: Manipulating genetic information
Chapt 13

Week 10: EXAM 2

Video (After Darwin: genetics, eugenics & the human genome)

Week 11: Video: part 2
Genetics of Cancer
Chapt 12

Week 12: Cancer Can't
Stem cells & animal cloning
Summary of Double Helix due

Week 13: Gene therapy
Chapt 14, 16
EXAM 3

Week 14: Genetically modified crops
The Human Genome project
Chapt 15