

CATALOG INFORMATION

Dept and Nbr: BIO 20

Title: HUMAN GENETICS

Full Title: Human Genetics

Last Reviewed: 10/22/2018

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	3.00	Lab Scheduled	0	17.5	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	3.00		Contact Total	52.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade or P/NP

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

**Catalog Description:**  
Mechanisms of heredity with specific reference to humans. Course includes new genetic technologies, and their ethical and societal consequences.

**Prerequisites/Corequisites:**

**Recommended Preparation:**  
Eligibility for ENGL 100 or ESL 100

**Limits on Enrollment:**

**Schedule of Classes Information:**  
Description: Mechanisms of heredity with specific reference to humans. Course includes new genetic technologies, and their ethical and societal consequences. (Grade or P/NP)  
Prerequisites/Corequisites:  
Recommended: Eligibility for ENGL 100 or ESL 100  
Limits on Enrollment:  
Transfer Credit: CSU;UC.  
Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

<b>AS Degree:</b>	<b>Area</b>			<b>Effective:</b>	<b>Inactive:</b>	
	C	Natural Sciences		Fall 2020		
	C	Natural Sciences		Fall 1981	Summer 2011	
<b>CSU GE:</b>	<b>Transfer Area</b>			<b>Effective:</b>	<b>Inactive:</b>	
	B2	Life Science		Fall 2020		
	B2	Life Science		Fall 1981	Summer 2011	
<b>IGETC:</b>	<b>Transfer Area</b>			<b>Effective:</b>	<b>Inactive:</b>	
	5B	Biological Sciences		Fall 2020		
	5B	Biological Sciences		Fall 1981	Summer 2011	
<b>CSU Transfer:</b>	Transferable		<b>Effective:</b>	Fall 1981	<b>Inactive:</b>	Summer 2011
<b>UC Transfer:</b>	Transferable		<b>Effective:</b>	Fall 1981	<b>Inactive:</b>	Summer 2011

### **CID:**

#### **Certificate/Major Applicable:**

Not Certificate/Major Applicable

## **COURSE CONTENT**

### **Outcomes and Objectives:**

Upon completion of the course, student will be able to:

1. Identify the structure and functions of major biological molecules.
2. Describe cellular organization and structure.
3. Explain the role and chemistry of chromosomes, DNA, and RNA in cell function and information transfer.
4. Compare and contrast cellular replication/duplication by means of meiosis vs. mitosis.
5. Differentiate sperm and oocyte formation, describe fertilization and human development.
6. Differentiate genotype and phenotype genetic expression.
7. Explain basic Mendelian inheritance and patterns of Mendelian pedigrees.
8. Describe extensions and exceptions to Mendel's laws, including the inheritance of complex traits.
9. Explain mutation and its relationship to genetic disease.
10. Describe recent advances in genetics such as recombinant DNA, genetic engineering, and the human genome project and how they are applied in gene therapy, genetic testing, and the creation of genetically-modified organisms.
11. Evaluate how new technologies impact us at the individual, family and socio-cultural levels.
12. Examine the history of eugenics and its current manifestations.

### **Topics and Scope:**

1. History of genetics "Mendel's laws"

2. Cell structure
3. Cell function as applied to genetics
4. Information machinery of the cell
  - a. the nucleus: structure, DNA, RNA
  - b. the chromosomes: structure and function
  - c. protein synthesis
5. Communication between generations
  - a. mitosis
  - b. meiosis
  - c. formation of sperm and oocytes
  - d. development of zygote: differentiation
6. Genotype vs. Phenotype
  - a. loci vs. alleles
  - b. biochemical basis of phenotype
7. Sex chromosomes
  - a. sex determination
  - b. human sex ratios
  - c. sex linkage
  - d. abnormalities of sex chromosomes
8. Gene Interaction
  - a. genetic ratios
  - b. crossing over
  - c. linkage
  - d. dominance relationships
  - e. cytoplasmic inheritance
  - f. epistasis
  - g. penetrance and expressivity
9. Polygenic systems
  - a. the normal distribution
  - b. role of environment
10. Mutation - genetic disease
  - a. types
  - b. rates
  - c. macro vs. micro mutation
  - d. causes
  - e. human examples - case studies
11. Recent developments in genetics
  - a. recombinant DNA
  - b. genetic engineering
  - c. the human genome project
  - d. gene therapy
  - e. preimplantation genetic diagnosis
  - f. genetic testing
  - g. genetically-modified organisms
  - h. stem cells
  - i. assisted reproduction techniques
12. Eugenics
  - a. historical perspective
  - b. reproductive choice and the new eugenics

**Assignment:**

1. Reading in textbooks, scientific journals, and articles from newspaper, magazines and the internet; approximately 15-35 pages/week.
2. Homework: may include problem sets, and written descriptions or discussions of lecture topics in short essay format.
3. Oral reports: students will work in small groups, research an approved topic, and present a 10-15 minute report to the class.
4. Formal assessment: midterm and final examinations, including objective type questions, genetics problems, and essay questions.

### Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Written homework

Writing  
10 - 20%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Homework problems

Problem solving  
10 - 20%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

In class oral reports

Skill Demonstrations  
10 - 20%

**Exams:** All forms of formal testing, other than skill performance exams.

Multiple choice, True/false, Matching items, Completion, Objective style questions (problems, essays)

Exams  
40 - 70%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

Attendance, participation in group work

Other Category  
0 - 10%

### Representative Textbooks and Materials:

HUMAN GENETICS: CONCEPTS AND APPLICATIONS, by R. Lewis, McGraw-Hill Publishers, Fourth Edition, 2001

Recommended Books:

CARTOON GUIDE TO GENETICS: (updated edition), by L. Gonick and M. Wheelis, 1991, Harper Collins

GENOME: by Matt Ridley, 1999, Harper Collins

HUMAN HEREDITY: PRINCIPLES & ISSUES, by Michael R. Cummings, 6th Edition, Thomson Learning, 2003.