

**BIO 20 Course Outline as of Summer 2021****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    | 6            | 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 current genetic technologies and their ethical and societal consequences.

**Prerequisites/Corequisites:****Recommended Preparation:****Limits on Enrollment:****Schedule of Classes Information:**

Description: Mechanisms of heredity with specific reference to humans. Course includes current genetic technologies and their ethical and societal consequences. (Grade or P/NP)

Prerequisites/Corequisites:

Recommended:

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 2020         | <b>Inactive:</b> |
| <b>UC Transfer:</b>  | Transferable         | <b>Effective:</b>   | Fall 2020         | <b>Inactive:</b> |

### **CID:**

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

Major Applicable Course

## **COURSE CONTENT**

### **Student Learning Outcomes:**

At the conclusion of this course, the student should be able to:

1. Explain the roles of DNA in the transmission of genetic characteristics between generations.
2. Predict the outcome of genetic crosses using Mendelian and other principles.
3. Critically analyze the impact of recent technological advances in genetics.

### **Objectives:**

At the conclusion of this course, the student should be able to:

1. Describe cellular organization and structure.
2. Explain the role of chromosomes, DNA, and RNA in cell function and information transfer.
3. Describe the roles of DNA and genes in reproduction, development, and disease.
4. Solve problems based on Mendelian inheritance.
5. Describe extensions and exceptions to Mendel's laws.
6. Explain the role of genetic changes in evolution.
7. 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.
8. Evaluate how new technologies impact the individual, family and society.
9. Examine the history of eugenics and its current manifestations.

### **Topics and Scope:**

- I. Scientific Method
- II. Cell Structure and Function
- III. Gene Expression
  - A. Structure and function of DNA and RNA
  - B. Protein synthesis

- C. Regulation of gene expression
- IV. Reproduction
  - A. Mitosis
  - B. Meiosis
  - C. Human reproduction and development
- V. Mendelian Inheritance
- VI. Beyond Mendelian Inheritance
  - A. Sex-linkage
  - B. Epigenetics
  - C. Environmental impacts
  - D. Other topics
- VII. Mutation and Genetic Disease
- VIII. Evolution
  - A. Theory of natural selection
  - B. Role of mutation
- IX. Race and Eugenics
  - A. Historical perspective
  - B. Reproductive choice and the new eugenics
- X. The Human Microbiome
- XI. Recent Developments in Genetics and Genetic Technology (at least five topics selected from the following)
  - A. Recombinant DNA
  - B. Genetic engineering
  - C. Genome sequencing
  - D. Gene therapy
  - E. Preimplantation genetic diagnosis
  - F. Genetic testing
  - G. Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)/Cas9
  - H. Polymerase chain reaction (PCR)
  - I. Gene chips
  - J. Ancient DNA
  - K. Other recent developments
- XII. Bioethics - Societal Impacts of the Science and Technology of Genetics

### **Assignment:**

1. Readings: 15-35 pages/week may include textbooks, scientific journals, and articles from newspapers, magazines, and the Internet
2. Homework: 2-4 assignments; may include problem sets, case studies, and/or written descriptions or discussions of lecture topics in short essay format
3. Oral reports: 1-2; research an approved topic and present a 5-10 minute report to the class
4. Formal assessment: 2-3 midterms and 1 final exam, including objective type questions, genetics problems, and essay questions
5. Research papers: 2-3 research papers of 3-5 pages in length on current topics
6. Participation: regularly participate in class discussions on current topics

### **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.

Research papers, homework (short essays)

Writing  
20 - 40%

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

Homework problems, case studies

Problem solving  
10 - 20%

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

None

Skill Demonstrations  
0 - 0%

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

Midterms and final exam; may include multiple choice, true/false, matching items, completion, genetics problems, and/or essays

Exams  
40 - 60%

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

Attendance, participation in group work, oral reports

Other Category  
10 - 20%

### **Representative Textbooks and Materials:**

Human Genetics: Concepts And Applications. 11th ed. Lewis, Ricki. McGraw-Hill. 2015 (classic)

### **Recommended Books:**

Human Heredity: Principles & Issues. 11th ed. Cummings, Michael. Cengage Learning. 2015 (classic)

Cartoon Guide To Genetics. Updated edition. Gonick, Larry and Wheelis, Mark. Harper Collins. 1991 (classic)