BIO 20 Course Outline as of Spring 2005

CATALOG INFORMATION

Dept and Nbr: BIO 20 Full Title: Human Genetics Last Reviewed: 10/22/2018 **Title: HUMAN GENETICS**

| | Course Hours per Week | K] | Nbr of Weeks | Course Hours Total | |
|------|------------------------------|--|--|--|---|
| 3.00 | Lecture Scheduled | 3.00 | 17.5 | Lecture Scheduled | 52.50 |
| 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 |
| | 3.00 3.00 | Course Hours per Weel3.00Lecture Scheduled3.00Lab ScheduledContact DHRContact TOTAlNon-contact DHR | Course Hours per Week13.00Lecture Scheduled3.003.00Lab Scheduled0Contact DHR0Contact Total3.00Non-contact DHR0 | Course Hours per WeekNbr of Weeks3.00Lecture Scheduled3.0017.53.00Lab Scheduled017.5Contact DHR00Contact Total3.00Non-contact DHR0 | Course Hours per WeekNbr of WeeksCourse Hours Total3.00Lecture Scheduled3.0017.5Lecture Scheduled3.00Lab Scheduled017.5Lab ScheduledContact DHR0Contact DHRContact DHRContact Total3.00Contact TotalNon-contact DHR0Non-contact DHR |

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:

| AS Degree: | Area | | | Effective: | Inactive: | |
|---------------|---------------|-------------------------|-----------|------------|-------------|--|
| | С | Natural Science | es | Fall 2020 | | |
| | С | Natural Sciences | | Fall 1981 | Summer 2011 | |
| CSU GE: | Transfer Area | | | Effective: | Inactive: | |
| | B2 | Life Science | | Fall 2020 | | |
| | B2 | Life Science | | Fall 1981 | Summer 2011 | |
| IGETC: | Transfer Area | | | Effective: | Inactive: | |
| | 5B | Biological Scien | nces | Fall 2020 | | |
| | 5B | Biological Scien | nces | Fall 1981 | Summer 2011 | |
| CSU Transfer: | Transferable | Effective: | Fall 1981 | Inactive: | Summer 2011 | |
| UC Transfer: | Transferable | Effective: | Fall 1981 | Inactive: | 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. allelesb. 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

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

Homework problems

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

In class oral reports

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

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

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

Attendance, participation in group work

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.

| Writing 10 - 20% |
|----------------------------------|
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| |
| Problem solving 10 - 20% |
| |
| |
| Skill Demonstrations 10 - 20% |
| |
| Evame |
| 40 - 70% |

| Other Category | |
|----------------|--|
| 0 - 10% | |