

PALOMAR COLLEGE
COURSE OUTLINE OF RECORD FOR
DEGREE CREDIT COURSE

Transfer course A.A. degree applicable course

(check all that apply)

COURSE NUMBER AND TITLE: Biology 110 - Human Genetics

UNIT VALUE: 3 **MINIMUM NUMBER OF SEMESTER HOURS:** 48

BASIC SKILLS REQUIREMENTS: Appropriate Language and computational skills.

ENTRANCE REQUIREMENTS: None

PREREQUISITE:

COREQUISITE:

RECOMMENDED PREPARATION:

SCOPE OF COURSE:

Principles of human inheritance including gene transmission, genetic diseases, pedigree analysis, molecular genetics, immunogenetics, and population genetics; relationships to other fields of study will be emphasized.

SPECIFIC COURSE OBJECTIVES:

Upon completion of this course, successful students will be able to:

1. compare and contrast mitosis and meiosis in the transmission of chromosomes and genes through cell division and human reproduction;
2. analyze and predict outcomes for patterns of eukaryotic inheritance, variations in gene expression, and autosomal and sex-linked genetic diseases;
3. describe the molecular basis of heredity including DNA replication, transcription, translation, gene mutations and DNA repair, gene regulation;
4. apply the concepts of molecular genetics to cancer and oncogenes, recombinant DNA technology, polymerase chain reaction and DNA fingerprinting;
5. describe chromosomal abnormalities and associated human diseases;

6. integrate the concepts of genetics with immunology and apply this information to human immunogenetics; and,
7. apply the Hardy-Weinberg Principle to human population genetics.

CONTENT IN TERMS OF SPECIFIC BODY OF KNOWLEDGE:

- I. Introduction
 - A. Course Overview
 - B. Scientific Method
- II. Overview of Principles of Chemistry and Macromolecules
 - A. Structure of Atom: Subatomic Particles, Electron Shells
 - B. Chemical Bonding: Covalent, Ionic, Hydrogen Bonds
 - C. Macromolecule Structure and Function: Carbohydrates, Lipids, Proteins, Nucleic Acids
- III. The Cellular Basis of Heredity and Human Reproduction
 - A. Overview of Cell Structure and Function
 1. Ribosome
 2. Endoplasmic Reticulum
 3. Golgi Apparatus
 4. Mitochondria
 5. Centriole
 6. Microtubules
 7. Nucleus
 - B. Chromosomes
 - C. Mitosis
 - D. Comparison of Mitosis and Meiosis
 - E. Gametogenesis
 - F. Fertilization
 - G. Sex Determination and Differentiation
 - H. Twins and Heredity
 - I. Technology of Reproduction
- IV. Patterns of Inheritance and Variations in Gene Expression
 - A. Mendel and His Laws
 - B. Patterns of Inheritance
 - C. Probability and Genetics
 - D. Variations in Gene Expression
 - E. Autosomal Dominant Diseases
 - F. Autosomal Recessive Diseases
 - G. X-Linked Diseases
- V. The Molecular Basis of Heredity
 - A. The Search For the Genetic Material
 - B. Structure of DNA and RNA
 - C. DNA Replication
 - D. Gene Expression: Transcription and Translation
 - E. The Structure and Function of Protein
 - F. Enzymes and Inborn Errors of Metabolism
 - G. Gene Mutations and DNA Repair
 - H. Gene Regulation
 - I. Cancer and Oncogenes
 - J. Recombinant DNA Technology
 - K. PCR and DNA Fingerprinting

- VI. Chromosome Abnormalities and Associated Human Diseases
 - A. The Human Karyotype
 - B. Abnormalities in Chromosome Number and Associated Diseases
 - C. Abnormalities in Chromosome Structure and Associated Diseases
 - D. The Human Chromosome Map
- VII. Immunogenetics
 - A. The Immune System
 - B. Antibodies
 - C. Histocompatibility and Transplantation
 - D. Hereditary Defects in the Immune System
 - E. Blood Typing and Transfusions
- VIII. Population Genetics
 - A. How to Determine the Genetic Makeup of a Population
 - B. Factors That Change the Genetic Makeup of a Population
 - C. Manipulating the Human Gene Pool
- IX. Genetic Services
 - A. Human Pedigree Construction
 - B. Genetic Screening
 - C. Genetic Counseling
 - D. Genetic Therapy

REQUIRED READING:

Lewis, R. Human Genetics, Concepts and Applications. Dubuque, IA: William C. Brown Publishing Company, 1994.

Or similar texts.

SUGGESTED READING:

Selected current research papers and other instructor generated course materials available for student use. Current research articles in journals such as Science, Journal of American Medical Association, Comparative Biochemistry and Physiology, Scientific American, Microbiology, Annual Reviews in Biochemistry, Journal of Cell Biology, and Annual Reviews in Genetics.

REQUIRED WRITING:

Exams typically require the student to answer one or more essay questions that may run one to several paragraphs in length. Students may also be required to complete short papers on specific topics, or a term paper. Student will write a minimum of ten pages per semester. During each unit of study, each student may answer questions designed to promote critical thinking and to integrate concepts. Each student also completes genetics problems designed to use principles of genetics and problem solving skills.

OUTSIDE ASSIGNMENTS:

Students are expected to spend a minimum of three hours per unit per week in class and on outside assignments, prorated for short term classes.

Outside assignments may include the following activities; reading chapters from the text or other assigned readings, answering genetics questions, preparing a research paper, using learning center modules, preparing oral presentations, and/or preparing for examinations.

INSTRUCTIONAL METHODOLOGY:

A variety of instructional techniques will be used at different times such as: lecture and guest lectures; demonstrations; computer assisted instruction; films; video cassettes; 35mm slides; overhead transparencies; models; films.

Check all that apply:

- lecture
- laboratory
- lecture-laboratory combination
- directed study

This course may be offered as a distance education course and meets Title 5 regulations 55370, 55372, 55374, 55376, 55378, and 55380.

Yes No

If yes, check all that apply. (See guidelines for preparation for definitions.)

- telecourse
- mediated instruction
- computer assisted instruction

GRADING POLICY AND STANDARDS (include methods for determining whether the stated objectives have been met by students):

Evaluation of students may include quizzes, examinations, research paper(s), genetic problems and other assignments. In a typical class, at least 70% of the points come from exams, and up to 30% come from other assignments, which may include quizzes, research paper(s), genetic problems or other assignments.

IS COURSE REPEATABLE FOR REASON(S) OTHER THAN DEFICIENT GRADE?

YES NO Number of times course may be taken for credit 1

If yes, identify specific provisions of Title 5 Division 2 section(s) 55761-55763 and 58161 which qualifies course as repeatable.

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SIGNATURES ON FILE