

**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:** BIOL 105 – Biology with a Human Emphasis

**UNIT VALUE:** 4 units

**MINIMUM NUMBER OF SEMESTER HOURS:** 96

**BASIC SKILLS REQUIREMENTS:** Appropriate language and computational skills

**ENTRANCE REQUIREMENTS:**

**PREREQUISITE:** none

**COREQUISITE:** none

**RECOMMENDED PREPARATION:** none

**SCOPE OF COURSE:**

Principles of cellular, organismal and population biology as exemplified by, and relating to, the human organism. Laboratory includes study of cells, tissues, and mammalian organ systems. *Not open to students with prior credit in BIOL 106 or 106L.* CSU; UC\*

**SPECIFIC COURSE OBJECTIVES:**

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

1. Identify the structural and functional components of a eukaryotic cell;
2. Explain cellular metabolism as it relates to the human system;
3. Compare and contrast mitosis and meiosis;
4. Explain genetic principles as they relate to the human system;
5. Identify tissues, organs and organ systems associated with the human system;
6. Compare and contrast the major organ systems in the human system;
7. Explain evolution as it relates to human systems;

8. Explain the impact of human systems on ecosystems.
9. Demonstrate the scientific process through experimental design, basic laboratory work, and data analyses of laboratory exercises;
10. Demonstrate the care and proper usage of laboratory equipment such as light microscopes and calibrated measuring devices such as pipettes and graduated cylinders, among others;
11. Use the Metric System of measurement for linear, mass, and volume measurements.

**CONTENT IN TERMS OF SPECIFIC BODY OF KNOWLEDGE:**

- I. Introduction
  - A. Characteristics of Living Things
  - B. Homeostasis and Feedback Mechanisms
- II. Chemistry
  - A. Atomic Structure: subatomic particles, electron shells
  - B. Chemical Bonding: covalent, ionic, hydrogen bonds
  - C. Biologically Important Compounds and Molecules
    1. Properties of Water
    2. Acids, Bases, Buffers
    3. Macromolecule Structure and Function: Carbohydrates, Lipids, Proteins, Nucleic Acids
- III. Cell Biology
  - A. Comparison of Prokaryotic and Eukaryotic Cell Structures
  - B. Eukaryotic Cell Structure
    1. Functions of Organelles
      - a. Nucleus
      - b. Lysosome
      - c. Cytoskeleton
      - d. Ribosome
      - e. Golgi Complex
      - f. Endoplasmic Reticulum
      - g. Peroxisome
      - h. Mitochondrion
      - i. Centriole
      - j. Chloroplast
      - k. Cilium/Flagellum
    2. Membrane Structure and Function
    3. Movement Across Membranes
      - a. Diffusion/Osmosis
      - b. Facilitated Diffusion
      - c. Active Transport
      - d. Endocytosis and Exocytosis
  - C. Energy Conversion in Eukaryotic Cells
    1. Laws of Thermodynamics
    2. Energy Flow
      - a. Photosynthesis: Overview of Reactants, Products, Structures
      - b. Cell Respiration: Structures, Reactants and Products
        1. Anaerobic Respiration
        2. Aerobic Respiration

- IV. Genetics: Heredity
  - A. Mendel's Laws and Modern Genetic Terminology
  - B. Monohybrid Crosses and Dihybrid Crosses
  - C. Patterns of Inheritance
    - 1. Dominant/Recessive
    - 2. Sex-linked
    - 3. Incomplete Dominance
    - 4. Co-dominance
    - 5. Polygenic Inheritance
    - 6. Multiple Alleles
  - D. The genetics of ABO and Rh Blood Groups

- V. Genetics: Molecular
  - A. Structure and Replication of DNA
  - B. Structure of RNA
  - C. Protein Synthesis: Transcription and Translation

VI. Major Organ Systems.

Instructors will discuss *three major organs systems*. One of the three will be the cardiovascular system. The other two will be chosen from the following list: nervous system; muscle; respiratory system; endocrine system; excretory system; and immune system. Below is the scope of the material to be covered for a given system.

- A. Cardiovascular System
  - 1. Components of Blood
  - 2. Structure of Heart
  - 3. Characteristics of Circulatory Vessels
  - 4. Cardiac Cycle: systole and diastole; electrical events
  - 5. Cardiac Output: heart rate and stroke volume
- B. Nervous System
  - 1. Divisions of Nervous System
  - 2. Structure of Neuron
  - 3. Nerve Impulse: action potentials, synaptic events
- C. Muscles
  - 1. Types of Muscle: skeletal, smooth, cardiac
  - 2. Gross and Microscopic Skeletal Muscle Anatomy
  - 3. Sliding Filament Theory of Muscle Contraction
  - 4. Gross Muscle Contraction
- D. Respiratory System
  - 1. Anatomy of Respiratory Tract
  - 2. Muscle Contraction/Relaxation Events of Ventilation
  - 3. Pressure Changes During Ventilation
  - 4. Gas Exchange
  - 5. Oxygen and Carbon Dioxide Transport in Blood
- E. Endocrine System
  - 1. Basic Endocrine System: Glands, Hormones, Hormone Action
  - 2. Hypothalamic and Pituitary Actions - Feedback Mechanisms
  - 3. Effect of Hormones on Cell Activity
- F. Excretory System
  - 1. Structures of Urinary Tract
  - 2. Functions of Nephron
    - Blood Filtration; Blood Volume: Blood pH
- G. Immune System
  - 1. Nonspecific Immune Responses

- 2. Specific Immune Response: T-lymphocytes; B-lymphocytes
- 3. Microorganisms and Disease
- VII. Evolution
  - A. Principles of Natural Selection
  - B. Evidence for Evolution
- VIII. Ecology and Human Populations
  - A. Population Dynamics
  - B. Human Population Growth
  - C. Effects of Human Population on Ecosystems

**LABORATORY CONTENT.**

The laboratory section will include the topics I - XIV as described below. Additional laboratory exercises will be chosen by the instructor. These additional laboratory sessions can include: homeostasis; analysis of biological molecules; presentation & discussion of sexually-transmitted diseases; nutritional analysis of student diets; blood-typing exercises with simulated blood products; sensory organ dissection and examination; additional genetic laboratory exercises.

- I. Introduction
  - A. Laboratory Safety Procedures (as described in Life Science Department's Laboratory Safety Procedures Handout)
  - B. Library Research Techniques
  - C. Metric Measurements and Conversions
- II. Scientific Process
  - A. Process of Investigation
  - B. Data Analysis/Graphing
- III. Light Microscopy
  - A. Microscope Handling and Operation
  - B. Investigating Cell Structure
- IV. Enzymes
  - A. Nature of Enzymatic Reactions
  - B. Influences on Enzymatic Activity
- V. Diffusion/Osmosis
  - A. Solutions: Solutes, Solvents, Tonicity
  - B. Factors influencing Diffusion
- VI. Energy
  - A. Anaerobic and Aerobic Respiration
- VII. DNA
  - A. Structure of DNA
  - B. DNA, RNA, and Protein Synthesis
  - C. DNA Extraction
- VIII. Cell Division
  - A. Chromosomes, Ploidy
  - B. Cell Division Involving Mitosis
    - 1. Mitosis in Growth and in Reproduction
    - 2. Phases of Mitosis
    - 3. Cell Cycle
  - C. Cell Division Involving Meiosis
    - 1. Phases of Meiosis
    - 2. Cell Cycle
- IX. Human Genetics

- A. Monohybrid, Dihybrid Crosses
- B. Pedigrees
- X. Sensory Laboratory
  - A. Sensory Receptors
  - B. Reflexes
- XI. Cardiovascular Laboratory
  - A. Heart Sounds
  - B. Heart Rate
  - C. Blood Pressure Measurement
  - D. The Electrocardiogram
- XII. Respiratory Laboratory
  - A. Respiratory Rate
  - B. Diagnostic Lung Volumes
- XIII. Principles of Natural Selection
- XIV. Ecology. One of the following:
  - A. Population Dynamics
  - B. Statistical Methods

**REQUIRED READING:**

Instructor choice of:

Campbell, Neil A., Lawrence G. Mitchell, and Jane B. Reece. Biology: Concepts and Connections, latest edition. Redwood City, CA: Benjamin Cummings.

*Or*

Campbell, Neil A., and Jane B. Reece. Essential Biology. San Francisco, CA: Benjamin Cummings, latest edition,.

*Or*

Krogh, David. Biology: A Guide to the Natural World. Upper Saddle River, NJ: Prentice Hall, latest edition.

*Or*

Starr, Cecie. Biology: A Human Emphasis. Belmont, CA: Wadsworth Publishing Co., latest edition.

**And**

Sourbeer, Dan, et al. General Biology Laboratory Manual. Self-published, latest edition.

**SUGGESTED READING:** none

**REQUIRED WRITING:**

Exams in the lecture component include some essay questions with each answer requiring one-half to one full page of writing. Other writing assignments may include short essays on specific topics, journal article reviews, and/or a term paper. These assignments will total a minimum of ten pages of writing.

**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.**

**INSTRUCTIONAL METHODOLOGY:**

**Check all that apply:**

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

**DISTANCE LEARNING:**

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

Yes  No

**If yes, check all that apply:**

- Television Course (Video one-way, e.g. ITV, video cassette, etc.)
- Online Course (Text one-way, e.g. newspaper, correspondence, electronic file, etc.)
- Two-Way Video Conferencing (Two-way interactive video and audio)
- One-Way Video Conferencing (One-way interactive video and two-way interactive audio)
- Computer Assisted Instruction (A specialized form of mediated instruction relying primarily on student access to information and prepared lessons or teaching materials through a computer terminal, but not under immediate supervision of a qualified instructor.)

**GRADING POLICY AND STANDARDS:**

The students will be evaluated on both lecture and laboratory content. At least 70% of the course grade is determined by exams and quizzes with the remainder from other assignments. Evaluation relating to lecture content should constitute about 3/4 of the grade. Evaluations relating to laboratory content should constitute the remaining 1/4 of the grade. Such evaluations should include laboratory quizzes and laboratory reports or journals.

**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 provision of Title 5 Division 2 section(s), 55761-55763 and 58161 which qualifies course as repeatable:

**CONTACT PERSON: Sara Thompson, x2533**

SIGNATURES ON FILE