CIC Approval: 05/10/2012
BOT APPROVAL:
STATE APPROVAL:
EFFECTIVE TERM: Fall 2012

SAN DIEGO COMMUNITY COLLEGE DISTRICT
CITY, MESA, AND MIRAMAR COLLEGES
ASSOCIATE DEGREE COURSE OUTLINE

SECTION I

SUBJECT AREA AND COURSE NUMBER: Biology 107

COURSE TITLE: General Biology-Lecture and Laboratory

Units: 4
Grade Only

CATALOG COURSE DESCRIPTION:

This course is an examination of living organisms and their environment. The lecture and laboratory are intended for students planning on taking more advanced courses in the Life Sciences, or students majoring in Education, Child Development, Physiological Psychology or related areas. Topics include the fundamental chemical and physical processes common to all living organisms, the interactions between organisms and their environment, classical and molecular genetics, metabolism, plant and animal anatomy and physiology, animal behavior, evolution, cellular and molecular biology, and the experimental and cognitive processes used to examine these fields.

REQUISITES:

Advisory:
ENGL 101 with a grade of "C" or better, or equivalent or Assessment Skill Level R6/W6
or
ENGL 105 with a grade of "C" or better, or equivalent or Assessment Skill Level W6/R6
&
MATH 046 with a grade of "C" or better, or equivalent or Assessment Skill Level M40

Limitation on Enrollment:

This course is not open to students with previous credit for BIOL 105 & 106, 210A, or 210B

FIELD TRIP REQUIREMENTS:
May be required

TRANSFER APPLICABILITY:
Associate Degree Credit & transfer to CSU CSU General Education IGETC UC Transfer Course List
Limitation: No credit for BIOL 105, 106 or 107 if taken after 210A, 210B.

CID:

TOTAL LECTURE HOURS:
48 - 54

TOTAL LAB HOURS:
48 - 54

STUDENT LEARNING OBJECTIVES:
Upon successful completion of the course the student will be able to:

1. Apply the process of science to problem solving situations and formulate procedural steps necessary for a scientific investigation.
2. Explain, employ, and evaluate basic ecological concepts.
3. Describe the process of evolution and speciation by employing the concepts upon which modern evolutionary theory is based and recognize examples of each.
4. Define and distinguish atoms, molecules, compounds, chemical bonds, mechanisms of chemical bond formation, and name and recognize the components of biological molecules.
5. State the cell theory and describe the structure and function of prokaryotes and the organelles in a eukaryotic cell.
6. Interpret and compare processes of cellular metabolism including enzymes, cellular respiration and photosynthesis.
7. Compare and contrast mechanisms of reproduction, growth, and development in the natural world.
8. Describe, apply, and distinguish Mendel's principles of genetics and their exceptions.
9. Describe the process of DNA replication, protein synthesis, mutation, and methods used in DNA technology, and demonstrate an ability to predict outcomes when given a particular nucleotide or amino acid sequence.

SECTION II

1. COURSE OUTLINE AND SCOPE:

A. **Outline Of Topics:**
The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

I. Scientific Methods and Investigation
- A. Introduction to terminology
- B. Five part analysis
- C. Analysis of newspaper articles

II. Ecological concepts: the bioshpere, populations, and communities
- A. Biomes
- B. Basic components of an ecosystem
- C. Population growth
- D. Competitive exclusion
- E. Ecological succession
- F. Food webs, food chains and the transfer of energy and nutrients between trophic levels

III. The theory of Natural Selection, evolution, phylogeny, and diversity of life
- A. Darwin's theory of evolution by natural selection
- B. Common misconceptions about evolution
- C. The Hardy Weinberg equilibrium
- D. Speciation
- E. Stratigraphy
- F. Phylogenetic trees
- G. The origins of life

IV. The Chemical Basis of Life
- A. Structure of an atom
- B. Isotopes and radioactivity
- C. Ionic, covalent (polar and non-polar), and hydrogen bonds
- D. Solute, solvent, and solution
- E. Acid, base, buffers, and pH
- F. Carbohydrates, proteins, lipids and nucleic acids
- G. Anabolism, catabolism, hydrolysis, and dehydration
- H. Properties of the water molecule

V. The Cell theory, cell structures and functions
- A. Structure and function of prokaryotic cells
- B. Cell theory
- C. Surface to volume ratios and cell size
- D. Distinguish prokaryotic and eukaryotic cells
- E. Organelles of the eukaryotic cell

F. The fluid mosaic model of cell membranes
G. Osmosis and diffusion
H. Isotonic, hypotonic, and hypertonic solutions
I. Simple diffusion, facilitated diffusion, and active transport

VI. Cellular activities, including metabolism, enzymes, cellular respiration and photosynthesis
A. First and second laws of thermodynamics
B. Endergonic, exergonic, catabolic and anabolic reactions
C. Energy of activation and the role of enzymes
D. Enzyme structure and activity
E. Oxidation and reduction
F. Cellular respiration
G. Fermentation
H. Photosynthesis

VII. Mechanisms of reproduction, growth, and development in the natural world
A. Cell cycle
B. Asexual reporduction and its advantages and disadvantages
C. Sexual reproduction and its advantages and disadvantages
D. Function of mitosis and meiosos
E. Hormonal control of sperm and egg production in humans
F. Species specific recognition of egg and sperm
G. Prevention of polyspermy during fertilization
H. Three embryonic germ layers
I. The genetic potential of a differentiated nucleus
J. The role of egg and embryo RNA in early development
K. The role of the placenta in pregnancy
L. Hormonal control of child birth
M. Plant life cycle and alternation of generation
N. Asexual and sexual reproduction in plants
O. The role of hormones in plant development
P. The role of phytochromes and light in plant flowering

VIII. Genetics
A. Mendel's principles of dominance, independent assortment, and segregation
B. Incomplete dominance and codominance
C. Gene linkage, polygenic inheritance, and sex linkage
D. Continuous and discrete traits
E. Chromosomal theory of inheritance

IX. DNA structure, replication, and protein synthesis
A. DNA structure
B. DNA replication
C. Protein synthesis
D. Recombinant DNA techniques
E. Biotechnology applications

Outline of topics to be addressed in the laboratory portion of the course

I. Scientific methods and investigation
A. Design and complete a scientific experiment
B. Graph and interpret biological data

II. Ecological concepts: the biosphere, populations, and communities
A. Study of ecological concepts that may use a field trip to a local habitat
B. Use of dichotomous key for classificaiton
C. Characteristics of the Chaparral or any other local biome

III. The theory of Natural Selection, evolution, phylogeny, and diversity of life
A. Simulation or an experiment of natural selection
B. Study of animal or plant diversity and evolution
C. Plant anatomy, physiology, and evolution

IV. The chemical basis of life
A. Experimenting with organic molecules
B. Experimenting with the concepts of pH and pH measurement

V. The cell theory, cell structures and functions

A. Observation of cells of different domains and kingdoms with the microscope
B. Calculations of magnification and size of cells using the microscope
C. Calculation and discussion of surface area to volume ratio using simulated cells
D. Factors that affect osmosis and diffusion which may include solutions of different tonicity

VI. Cellular activities
A. Factors that affect enzyme activity
B. Cellular respiration
C. Photosynthesis

VII. Mechanisms of reproduction, growth, and development in the natural world
A. The cell cycle, including mitosis
B. Meiosis

VIII. Genetics
A. Mendel's principles of dominance, independent assortment, and segregation
B. Incomplete dominance and codominance
C. Gene linkage, polygenic inheritance, and sex linkage
D. Genetic experiments or simulations

IX. DNA structure, replication, and protein synthesis
A. DNA structure and replication
B. Protein synthesis
C. Recombination and biotechnology applications

B. **Reading Assignments:**
Reading assignments are required and may include but, are not limited to, the following:
Students will be expected to understand and critique college level texts or the equivalent.

I. Assigned textbook.
II. Science pages of daily newspapers such as The San Diego Union Tribune.
III. Popular journals such as Scientific American and Discover Magazine.
IV. Weekly current magazines such as Time and Newsweek.
V. Reports by government agencies such as National Science Foundation.
VI. Internet reports such as Biological Issues.

C. **Writing Assignments:**
Writing assignments are required and may include, but are not limited to, the following:
All written work will require application of critical, analytical skills. Standard paper formats and structures will be applied. Students should be able to understand and apply graphic analysis to biological problems, both theoretical and applied. The results of this analysis will be communicated by written assignment.

I. Essay examinations.
II. Analytical semester projects.
III. Short essays.
IV. Reviews of current periodicals.
V. Opinion papers.
VI. Research papers.

D. **Appropriate Outside Assignments:**
Outside assignments may include, but are not limited to, the following:

I. Apply graphic analysis to biological problems, both in theory and in real world applications.
II. Reading and writing assignments as specified in the course syllabus.
III. Library, electronic and other archival research.
IV. Viewing of assigned/recommended media materials.
V. Observations, e.g. field trips, lectures, or conferences.
VI. Analytical semester project.

E. **Appropriate Assignments that Demonstrate Critical Thinking:**
Critical thinking assignments are required and may include, but are not limited to, the following:

I. Analyze and compare various biological models in different contemporary situations.

II. Apply various biological models to the analysis of alternative outcomes to contemporary events.
III. Review and critique current periodicals.

2. METHODS OF EVALUATION:

A student's grade will be based on multiple measures of performance unless the course requires no grade. Multiple measures may include, but are not limited to, the following:

I. In class objective examinations that test for definitions and major biological concepts.
II. Out of class writing assignments that test the application of biological concepts to contemporary government, business, and consumer decisions.
III. Take home essay examinations.
IV. Analytical semester projects.
V. Position papers.
VI. Participation in classroom simulations that apply theory to current biological and scientific issues.
VII. Participation in field trips.
VIII. Participation in-group activities.
IX. Class participation.
X. Oral presentations on a variety of biological subjects.

3. METHODS OF INSTRUCTION:

Methods of instruction may include, but are not limited to, the following:

* Lecture-Lab Combination
* Distance Education
* Lecture Discussion
* Audio-Visual
* Collaborative Learning
* Distance Education (Partially online only)
* Other (Specify)
* Field observation and field trip.
* Guest speakers.

4. REQUIRED TEXTS AND SUPPLIES:
Textbooks may include, but are not limited to:

TEXTBOOKS:
1. Cecie Starr, Christine Evers, and Lisa Starr. Biology: Concepts and Applications, 8 ed. Brooks Cole, 2010, ISBN: 9781439046739
2. Eldon D. Enger, Frederick C.Ross, and David B. Bailey. Concepts in Biology, 14 ed. McGraw-Hill, 2012, ISBN: 0073403466
3. Jane B. Reece; Martha R. Taylor; Eric J. Simon; Jean L. Dickey. Campbell Biology: Concepts & Connection, 7 ed. Benjamin Cummings, 2009, ISBN: 9780321696816
4. Jay Phelan. What is Life, A Guide to Biology, W.H. Freeman, 2009, ISBN: 9781429223188
5. Sylvia Mader. Inquiry into Life, 13 ed. McGraw-Hill , 2010, ISBN: 9780077280109
6. Teresa Audesirk, Gerald Audesirk, and Bruce E. Byers. Biology: Life on Earth, 0 ed. Benjamin Cummings, 2010, ISBN: 9780321598479

MANUALS:
1. San Diego City College Biology Department. Biology 107 Lecture and Laboratory Manual 10/11, San Diego City College Bookstore, 06-01-2010
2. San Diego Mesa College Biology Department. Laboratory Activities for General Biology, RandomNPC LLC, 06-01-2011

PERIODICALS:

SOFTWARE:

SUPPLIES:

ORIGINATOR: Janice Clymer

CO-CONTRIBUTOR(S)
DATE: 11/28/2011