Modesto Junior College
Course Outline of Record
BIO 116

I. OVERVIEW
The following information will appear in the 2010 - 2011 catalog

BIO 116  Biology: A Human Perspective  4 Units

Recommended for Success: Before enrolling in this course, students are strongly advised to satisfactorily complete ENGL 50 and satisfactorily complete MATH 70.

An introduction to the principles of biology with an emphasis on humans. Topics covered include scientific method, cell structure and function, biochemistry, metabolism, heredity, biotechnology, evolution, anatomy and physiology of the human body, development of aging, disease, and ecology. BIO 116 is recommended for allied health students.

Field trips might be required.  (A-F or P/NP - Student choice) Lecture /Lab

Transfer: (CSU, UC) General Education: (MJC-GE: A ) (CSU-GE: B2, B3 ) (IGETC: 5B )

II. LEARNING CONTEXT
Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:

A. COURSE CONTENT

1. Required Content:

   a. Exploring life and science
      i. organization and classification
      ii. scientific method

   b. Chemistry of life
      i. organization of atoms
      ii. radioactive isotopes
      iii. ionic and covalent bonding
      iv. properties of water
      v. acids and bases
      vi. four classes of organic molecules and their subunits
         a. carbohydrates
         b. lipids
         c. proteins
         d. nucleic acids

   c. Cell structure and function
i. cell theory

ii. three types of microscopes

iii. cellular organization

iv. organelles

v. plasma membrane

vi. nucleus

vii. cilia and flagella

viii. cellular metabolism/respiration

d. Organization of body systems

i. four types of tissue

ii. integumentary system

iii. organs systems
   a. body cavities
   b. four types of membranes

e. Cardiovascular system

i. parts and functions

ii. lymphatic system

iii. blood vessels

iv. heart
   a. double pump
   b. regulation of heartbeat
   c. ECG

v. cardiovascular pathways

vi. cardiovascular disorders

f. Blood

i. functions and parts

ii. composition

iii. clotting

iv. blood typing
v. capillary exchange

g. Digestive system
   i. general structure and function
   ii. path of food/waste
   iii. absorption and secretion
   iv. accessory organs
   v. digestive enzymes
   vi. nutrition
   vii. eating disorders

h. Respiratory system
   i. pathway of air
   ii. mechanism of breathing
   iii. gas exchange
   iv. respiration and health

i. Urinary system
   i. kidney structure
   ii. urine formation
   iii. regulatory functions of the kidney
   iv. problems with kidney function

j. Skeletal system
   i. tissues of skeletal system
   ii. bone growth and remodeling
   iii. bones of the skeleton
   iv. articulations

k. Muscular system
   i. types and functions of muscles
   ii. mechanism of skeletal muscle contraction
   iii. whole muscle contraction
   iv. energy for muscle contraction
v. muscular disorders

l. Nervous system
   i. nervous tissue
   ii. central nervous system
   iii. limbic system and higher mental functions
   iv. peripheral nervous system
   v. drug abuse

m. Sensory system
   i. sensory receptors and sensations
   ii. proprioceptors and cutaneous receptors
   iii. senses of taste and smell
   iv. sense of vision
   v. sense of hearing
   vi. sense of equilibrium

n. Endocrine system
   i. endocrine glands
   ii. hypothalamus and pituitary gland
   iii. thyroid and parathyroid gland
   iv. adrenal glands
   v. pancreas
   vi. other endocrine glands

o. Reproductive system
   i. male reproductive system
   ii. female reproductive system
   iii. female hormone levels
   iv. control of reproduction

p. Development and aging
   i. fertilization
   ii. development before birth
   iii. pregnancy and birth
iv. development after birth

q. Cell division
   i. cell increase and decrease
   ii. mitosis
   iii. meiosis
   iv. human life cycle

r. Inheritance
   i. genotype and phenotype
   ii. one and two trait inheritance
   iii. beyond simple inheritance patterns
   iv. sex-linked inheritance

s. Biotechnology and the human genome
   i. DNA, RNA; structure and function
   ii. gene expression
   iii. genomics
   iv. DNA technology

t. Immune system and disease
   i. organs, tissues and cells of immune system
   ii. nonspecific and specific defense
   iii. acquired immunity

u. Parasites and pathogens
   i. virulent and beneficial microbes
   ii. viral infections
   iii. bacterial infections
   iv. other infectious agents

v. STDs
   i. viral and bacterial STDs
   ii. other infections
   iii. AIDS
w. Cancer
   i. causes
   ii. treatment

x. Human Evolution

y. Ecology
   i. Human impact on the environment
   ii. energy flow
   iii. biogeochemical cycles
   iv. global ecosystems

a`. Human population, planetary resources and conservation

2. **Required Lab Content:**

   a. Scientific Method
   b. Microscope
   c. Anatomy and diversity of cells
   d. Tissues
   e. Skeletal system
   f. Muscular system
   g. Nervous system I; organization, neurons, nervous tissues and spinal reflexes
   h. Nervous system II; spinal cord, brain and autonomic nervous system
   i. Senses
   j. Cardiovascular system I; blood
   k. Cardiovascular system II; heart and blood vessels
   l. Respiratory system
   m. Digestive system
   n. Urinary system
   o. Reproductive system
   p. Genetics
   q. Biotechnology
   r. Evolution
   s. Ecology
B. **ENROLLMENT RESTRICTIONS**

1. **Advisories**
   
   Before enrolling in this course, students are strongly advised to satisfactorily complete ENGL 50 and satisfactorily complete MATH 70.

2. **Requisite Skills**
   
   *Before entering the course, the student will be able to:*
   
   a. Effectively read and learn from academic texts.
   
   b. Write effectively at the college level for lab write-ups, examinations, and research assignments.
   
   c. Perform algebraic and arithmetic operations involved in biological concepts and explorations.

C. **HOURS AND UNITS**

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<thead>
<tr>
<th>INST METHOD</th>
<th>TERM HOURS</th>
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D. **METHODS OF INSTRUCTION (TYPICAL)**

Instructors of the course might conduct the course using the following method:

1. Lecture and discussion with power point/overheads
2. Microscope use: hands on laboratory activities
3. Tissue identification
4. Anatomical model identification

E. **ASSIGNMENTS (TYPICAL)**

1. **EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS**

   *Time spent on coursework in addition to hours of instruction (lecture hours)*

   a. Preparation for weekly quizzes covering lecture and lab content
   
   b. Preparation for one exam every 3 weeks for a total of 5 exams covering lecture and lab content; lab practica included in the 5 exams
   
   c. Preparation for Final Comprehensive Exam

2. **EVIDENCE OF CRITICAL THINKING**

   *Assignments require the appropriate level of critical thinking*

   a. Students will be able to distinguish, interpret, and name bones and muscles of the human body. One example question would be to have students assemble the information about glycolysis and compose a sequence of events in this reaction.
   
   b. Students will be able to inspect and diagram the sliding filament model of muscle contraction.
   
   c. Students will be able to categorize and assess various tissue types under the microscope.
d. Students will be able to inspect (through microscopy) and interpret the cell cycle.

e. Students will be able to assemble, formulate, and assess the processes of DNA replication, transcription and translation.

F. TEXTS AND OTHER READINGS (TYPICAL)


III. DESIRED LEARNING

A. COURSE GOAL

As a result of satisfactory completion of this course, the student should be prepared to:

apply the scientific method to the analysis of experiments and observations, evaluate and describe how the human body responds to various pathogens and toxins, evaluate how biochemical processes in the internal and external environment impact human beings, and evaluate the structure and function of various aspects of each major organ system in the human body. The student should be prepared to succeed in anatomy, physiology and microbiology.

B. STUDENT LEARNING GOALS

Mastery of the following learning goals will enable the student to achieve the overall course goal.

1. Required Learning Goals

Upon satisfactory completion of this course, the student will be able to:

   a. Explain how the scientific method works and its importance in biology.

   b. Explain why cells exhibit both diversity and unity in organisms.

   c. Explain enzyme activity in terms of normal cell activity.

   d. Demonstrate and apply commonly used terms in life science.

   e. Identify the main organ systems and parts.

   f. Compare and contrast the structural and functional characteristics of carbohydrates, lipid, proteins, and nucleic acids.

   g. Compare and contrast the structure and function of cells and organelles.

   h. Compare and contrast the processes of mitosis and meiosis.

   i. Describe the structure and function of DNA.

   j. Explain the theory of evolution and analyze its application to the diversity of life.

   k. Appraise the observations and ideas that led to the development of the theory of evolution.

   l. Explain the position of ecology within the framework of the science of biology.

   m. Utilize the premises of ecology as well as the total of all concepts studied throughout the course to understand population ecology and in particular human population ecology and our relationship with the environment.

2. Lab Learning Goals

Upon satisfactory completion of the lab portion of this course, the student will be able to:
a. Identify muscles and bones of the human body.

b. Identify tissue samples from under the microscope.

c. Use a light microscope with high proficiency.
   Resolve basic problems with operating a light microscope.
   Produce accurate laboratory reports.
   Analyze data resulting from laboratory experiments.
   Identify items such as body parts, and cell and tissue sections.
   Identify structure and function at the cellular, tissue, and gross anatomical level.

d. Use a light microscope with high proficiency, resolve basic problems with operating a light microscope, and produce accurate laboratory reports from this work.

IV. METHODS OF ASSESSMENT (TYPICAL)

A. FORMATIVE ASSESSMENT
   1. Homework assignments
   2. Quizzes
   3. Lab Assignments and Lab write-ups
   4. Exams
   5. Lab Practica

B. SUMMATIVE ASSESSMENT
   1. Final Exam