

Mt. San Jacinto College
Integrated Course Outline of Record

Form B

Submitted by:	Sujatha Pamula	Date:	06/25/2020
---------------	----------------	-------	------------

Department	Subject	Course Number	Title
Biology	Biology BIOL	100	Human Biology

Units/Hours

- Each lecture unit requires 1 hour per week of class time, and 2 hours per week of study outside of class.
- Each laboratory unit requires 3 hours per week of class time.
- Each activity unit requires 2 hours per week of class time and 1 hour per week of study outside of class.

Lecture Units	Lab Units	Total Units
3.00	1.00	4.00
Lecture Contact Hours	Lab Contact Hours	Total Contact Hours
48.00 - 54.00	48.00 - 54.00	96.00 - 108.00
Lecture Homework Hours	Lab Homework Hours	
96.00 - 108.00	0	

Stand Alone:

Program Applicable

AA/AS Degree General Ed Breadth Area(s):

A NATURAL AND PHYSICAL SCIENCES

General Education Justification:

BIOL-100 is a natural science biology course for non majors that satisfies the General Education Learning Outcomes for Option A, Area A - Natural and Physical Sciences. In BIOL-100 students investigate how human life on earth that has evolved over time. Living systems are interconnected and interacting with each other and with the abiotic environment (GELO1). In this course students will apply the scientific process that is evidence based to test hypotheses about life (GELO2). Students will learn to generate knowledge in a scientific way they must accept uncertainty because all scientific claims are falsifiable and a negative case disproves a claim (GELO3). Biology focuses on the study of complex living systems that require students to interpret and create graphics, models and simulations (GELO3). Quantitative analysis and mathematical reasoning will be applied to better evaluate data produced through experimentation, modeling, and simulation (GELO4). Integration among subfields in biology, as well as integration between biology and other disciplines, will be used to develop a fundamental understanding of living systems and to investigate new questions at the intersection between biology and society (GELO1, GELO2, GELO3, and GELO5). Biology is a collaborative enterprise. Critical skills in writing and presenting scientific observations and results to other scientists and other disciplines will be developed (GELO3). The laboratory portion of the class will develop technical laboratory skills with a variety of tools used in all subfields of biology.

Students will learn to apply the appropriate tools to investigate questions about life (GELO6).

Maximum Enrollment: 32

Maximum Enrollment Justification: Justification:

Grading Method: Letter Grade or P/NP

TOP code: 0401.00

Can be Taken 1

time(s) for credit (max 4)

- Visual or Performing Arts course that is required to meet major requirements for UC/CSU
- Intercollegiate athletics course
- Academic/vocational competition course

Catalog Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course). (75 words or less in gray box below).

This course is an introduction to scientific and biological principles presented in a human context. Topics covered include the scientific method, cell structure and function, biochemistry, metabolism, genetics, human anatomy and physiology with a review of organ systems and the application of biotechnology.

Schedule Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course). (25 words or less in gray box below).

This introductory course studies biological concepts in a human context. Topics include biochemistry, cell structure & function, genetics and the anatomy and physiology of organ systems.

Need for the course:

This course is consistent with the intent of Area A, Natural and Physical Sciences. It meets the needs of Non-Biology majors in their acquisition of a science with laboratory requirement for the Associate's degree. In addition, it is a major prep course for transfer level programs Kinesiology at CSUSM and serves as one of a prerequisite courses for Microbiology (BIOL125) course at MSJC. It fulfills the requirement of a science course with a lab general education requirement under IGETC Area 5, CSU GE area B requirement. It satisfies the UC/CSU science with laboratory requirement for life sciences. This course counts towards awarding Liberal Arts: Mathematics & Science Emphasis - Associate in Arts A.A.-T in Psychology for Transfer - Associate in Arts A.A.-T in Kinesiology for Transfer - Associate in Science A.A.-T in Child and Adolescent Development for Transfer - It has been included in the following proposed awards Associate Degree in Biology - Associate in Science A.S.-T in Public Health Science for Transfer A.S.-T. in Nutrition and Dietetics for Transfer A.S. in Medical Assisting Administrative and Clinical - Medical Assisting Administrative - Certificate and Medical Assisting Clinical - Certificate

Prerequisite(s):

Prerequisites go through a separate approval process. See Forms E1-E6 for details. (For further clarification, contact the Prerequisite Subcommittee)

-none-

Corequisite(s):

Corequisites go through a separate approval process. See Forms E1-E6 for details.

-none-

Recommend Preparation:

Recommended Preparation goes through a separate approval process. See Forms E1-E6 for details.

-none-

Other Enrollment Criteria:

-none-

Learning Objectives:

(please number each objective and express in behavioral terms)

Upon the completion of the course the student will be able to do the following:

1. Classify and describe characteristics that define life, using the human species as the example.

2. Discuss the homeostatic mechanisms and pathologies for each of the 11 body systems with regard to causes, signs and symptoms, and possible treatments.

3. Evaluate the principles of molecular biology and the significance of DNA technology in genetics.

4. Study the language of Human biology and correctly use terms in written and oral communication.

5. Demonstrate proper use and function of various scientific and medical instruments such as the dissection instruments, compound microscope, Stethoscope, spirometer and sphygmomanometer.

6. Design, perform, and evaluate experimental investigations in biology through the application of the scientific method.

7. Critically evaluate the results of a controlled experiment to test a specific hypothesis and write a report for an experiment in standard scientific writing format.

8. Relate the chemical properties of the essential elements of life and biological molecules to their cellular functions.

9. Analyze the enzymatic processes underlying the essential metabolic pathways of cellular respiration and fermentation, that transform energy and matter to sustain life.

10. Compare the processes of mitosis and meiosis and relate these processes to asexual and sexual modes of reproduction both at the cellular level and in the life cycles of animals and plants.

11. Analyze the inheritance patterns of traits within individuals using Mendelian principles to solve problems in classical genetics.

12. Relate the anatomical structures of humans to their respective physiological functions with emphasis on organ systems involved in exchanges with the environment, homeostasis, and behaviors.

Course Content:

(please number the outline of main topics and subtopics)

1. Human Organization

1. Chemistry of life

1. Elements and atoms

2. Molecules and compounds

3. Macromolecules

1. Carbohydrates

2. Lipids

3. Proteins

4. Nucleic acids

4. Water, buffers, and pH balance

2. Cellular respiration and metabolism

1. Enzymes

2. Metabolic pathways

1. Glycolysis

2. Krebs cycle

- 3. Electron transport system
 - 4. Fermentation
- 2. Cellular Basis of Life
 - 1. Cellular organization
 - 1. Cell theory
 - 2. Cell size and microscopy
 - 3. Organelles
 - 2. Cell and organelle structure and function
 - 1. Plasma membrane
 - 1. Active transport
 - 2. Passive transport
 - 3. Tonicity
 - 4. Endocytosis and exocytosis
 - 5. Phagocytosis
 - 2. Nucleus and nuclear envelope
 - 3. Nucleolus
 - 4. Ribosomes
 - 5. Endoplasmic reticulum
 - 1. Rough ER
 - 2. Smooth ER
 - 6. Golgi apparatus
 - 7. Vacuoles and vesicles
 - 8. Lysosomes
 - 9. Mitochondria
 - 10. Cytoskeleton
 - 11. Cilia and flagella
 - 12. Centrioles
 - 3. Cell cycle
 - 1. Cell death
 - 2. Mitosis
 - 3. Hypertrophy and hyperplasia
 - 4. Cancer
 - 1. Cyclins
 - 2. Oncogenes
 - 3. Tumor suppressor genes
 - 5. Aging
- 3. Organization and Regulation of Body Systems
 - 1. Tissues
 - 1. Epithelial
 - 2. Nervous
 - 3. Muscular
 - 4. Connective
 - 2. Body cavities
 - 1. Ventral
 - 2. Dorsal
 - 3. Thoracic
 - 4. Abdominal
 - 5. Cranial
 - 3. Body Membranes
 - 1. Mucous
 - 2. Serous
 - 3. Pleural
 - 4. Synovial
 - 4. Integumentary system

- 1. Regions of the skin
 - 2. Function of the Integumentary system
 - 3. Accessory organs of the skin
 - 4. Skin cancer
- 5. Homeostasis
 - 1. Body fluid composition
 - 2. Negative feedback mechanisms
 - 3. Positive feedback mechanisms
- 4. Anatomy and Physiology
 - 1. Digestive system
 - 1. Nutrition
 - 1. Eating disorders
 - 2. Nutrient and macronutrient deficiencies
 - 3. Basal metabolism and daily energy requirement
 - 4. Ideal weight based on bone mass and body composition
 - 2. Upper
 - 1. Oral diseases
 - 2. Oral and esophageal cancer
 - 3. Middle
 - 1. Stomach cancer
 - 2. Ulcers
 - 4. Lower
 - 1. Colon polyps and cancer
 - 2. Diarrhea and Constipation
 - 3. Pancreatic pathologies
 - 4. Gall bladder pathologies
 - 5. Liver disorders
 - 2. Blood
 - 1. Red blood cells
 - 2. White blood cells
 - 3. Blood clotting
 - 4. Plasma
 - 5. Capillary exchange
 - 6. Blood typing
 - 3. Lymphatic system and immunity
 - 1. Nonspecific defenses
 - 2. Specific defenses
 - 3. Induced immunity
 - 4. Lymphatic organs and vessels
 - 5. Allergic responses
 - 4. Respiration
 - 1. Respiratory system anatomy
 - 2. Mechanism of breathing
 - 3. Gas exchange
 - 4. Respiratory pathology
 - 1. Lung cancer
 - 2. Tobacco smoking
 - 3. Infectious and noninfectious respiratory diseases
 - 5. Excretion
 - 1. Urinary system anatomy
 - 2. Urine formation
 - 3. Maintenance of water-salt balance
 - 4. Maintenance of acid-base balance
 - 5. Kidney and urinary tract infections and dysfunctions

- 6. Influence on red blood cell formation
- 7. Influence on blood pressure regulation
- 6. Movement and support
 - 1. Skeletal system
 - 1. Bone growth
 - 2. Bone repair
 - 3. Articulations
 - 4. Bones of the skeleton
 - 5. Skeletal prosthesis
 - 2. Muscular system
 - 1. Skeletal muscles
 - 2. Muscle contraction
 - 3. Muscle energy systems
- 7. Integration and coordination in humans
 - 1. Nervous system
 - 1. Central nervous system
 - 2. Peripheral nervous system
 - 3. Higher mental functions
 - 4. Synapses and neurotransmitters
 - 5. Drug abuse
 - 6. Degenerative nervous system diseases
 - 2. Sensory system
 - 1. Sensory receptors and sensations
 - 2. Proprioceptors and cutaneous receptors
 - 3. Equilibrium and balance
 - 3. Endocrine system
 - 1. Endocrine glands
 - 2. Hormones
 - 3. Specific endocrine gland hyper- and hypo-function
- 8. Cardiovascular system
 - 1. Blood vessels
 - 1. Arteries and arterioles
 - 2. Veins and venules
 - 3. Capillaries
 - 2. Heart
 - 1. Anatomy
 - 2. Blood flow
 - 3. Heartbeat
 - 4. Intrinsic control
 - 5. Extrinsic control
 - 6. Heart electrophysiology
 - 3. Cardiovascular function
 - 1. Pulse and pulse-rate
 - 2. The electrocardiogram
 - 3. Blood pressure
 - 4. Arterial blood flow
 - 5. Capillary blood flow
 - 6. Venous blood flow
 - 4. Vascular pathways
 - 1. Pulmonary circuit
 - 2. Systemic circuit
 - 3. Cardiac circuit
 - 5. Cardiovascular disease and disorders
 - 1. Cardiovascular disease risk factors

- 2. Cardiovascular disease prevention
 - 3. Hypertension
 - 4. Atherosclerosis
 - 5. Stroke
 - 6. Heart attack
 - 7. Aneurysms
- 5. Human Reproduction
 - 1. Reproductive system
 - 1. Male reproductive system
 - 1. Anatomy
 - 2. Hormonal regulation
 - 3. Pathology and dysfunctions
 - 2. Female reproductive system
 - 1. Anatomy
 - 2. Hormonal regulation
 - 3. Ovarian cycle
 - 4. Uterine cycle
 - 5. Pathology and dysfunctions
 - 2. Human sexual response
 - 1. Orgasm in the male
 - 2. Orgasm in the female
 - 3. Contraception
 - 1. Methods
 - 2. Infertility
 - 3. Abortion
 - 4. Sexually transmitted disease
 - 1. Viral infectious diseases
 - 2. Bacterial infectious diseases
 - 3. Protozoan and fungal infectious diseases
 - 4. Microscopic animal infectious diseases
 - 5. Human development and aging
 - 1. Fertilization and pregnancy
 - 2. Development before birth
 - 1. Embryonic development
 - 2. Extra-embryonic membranes
 - 3. Fetal circulation
 - 4. Birth defects
 - 3. Birth
 - 1. Birthing process
 - 2. Female breast and lactation
 - 4. Development after birth
 - 1. Life span aging
 - 2. Gerontology
 - 3. Effects of age on body systems
 - 4. Menopause
- 6. Human Genetics
 - 1. Chromosomal inheritance
 - 1. Meiosis
 - 2. Spermatogenesis
 - 3. Oogenesis
 - 4. Linkage and cross-over
 - 5. Nondisjunction
 - 6. Abnormal chromosomal inheritance
 - 2. Genes and medical genetics

- 1. Genotype and phenotype
- 2. Dominant and recessive traits
 - 1. Punnett Square
 - 2. Recessive trait disorders
 - 3. Dominant trait disorders
 - 4. Pedigree charts
- 3. Polygenic inheritance
- 4. Multiple alleles and blood typing
- 5. Incompletely dominant traits
- 6. Sex-linked traits
- 3. DNA and Biotechnology
 - 1. DNA and RNA structure and function
 - 1. DNA replication
 - 2. Ribosomal RNA
 - 3. Messenger RNA
 - 4. Transfer RNA
 - 2. Gene expression
 - 1. Transcription
 - 2. Translation
 - 3. Protein synthesis
 - 3. Biotechnology
 - 1. Genetic engineering
 - 2. Cloning
 - 3. Recombinant DNA technology
 - 4. Polymerase chain reaction technology
 - 5. Human genome
 - 6. Gene therapy and genetic disorders
- 4. Cancer
 - 1. Characteristics of cancer cells
 - 2. Origins of cancer
 - 1. Oncogenes
 - 2. Tumor-Suppressor genes
 - 3. p53 and the RB gene
 - 4. Mutation
 - 5. Carcinogenesis
 - 3. Causes of cancer
 - 1. Heredity
 - 2. Environmental carcinogens
 - 3. Viral carcinogens
 - 4. Diagnosis and treatment of cancers
 - 1. Routine screening tests
 - 2. Tumor marker tests
 - 3. Genetic tests
 - 4. Prevention
 - 5. Radiation and chemotherapies
 - 6. Bone marrow transplants
 - 7. Gene therapy

Lab Content:

(please number the outline of main topics and subtopics)

- 1. Measurements and the scientific method
- 2. Basic chemistry and molecules of life
- 3. Use of compound microscope to study cells (physical microscopes and/or digital images/programs/videos)

- 4. The four major types of tissues (epithelial, muscular, connective and nervous tissue) using prepared slides or digital images/programs/videos
- 5. Define and apply anatomical terminology using human models (physical models and/or digital images/programs/videos)
- 6. The skeletal system using models of human bones (physical models and/or digital images/programs/videos)
- 7. The muscular system using human models (physical models and/or digital images/programs/videos) or preserved animal muscle dissection
- 8. Human brain model (physical models and/or digital images/programs/videos) or dissection of preserved animal brain
- 9. Models of human sensory organs (physical models and/or digital images/programs/videos) or dissection of preserved animal eye
- 10. Physiology of sensations (skin, sight, taste, hearing, smell) using experimental investigation
- 11. Blood groups analysis by blood typing
- 12. Osmosis and diffusion
- 13. Human heart model (physical models and/or digital images/programs/videos) or dissection of the preserved animal cardiovascular system
- 14. Heart rate and blood pressure physiology (physical models and/or digital images/programs/videos)
- 15. The model of human respiratory system (physical models and/or digital images/programs/videos) or dissection of the preserved animal respiratory system
- 16. Pulmonary function
- 17. Disease transmission
- 18. The model of the human digestive system (physical models and/or digital images/programs/videos) or dissection of the preserved animal digestive system
- 19. Energy balance/metabolism
- 20. The model of human urinary system (physical models and/or digital images/programs/videos) or dissection of the preserved animal urinary system
- 21. Urine analysis
- 22. The model of the human reproductive system (physical models and/or digital images/programs/videos) or dissection of the preserved animal reproductive system
- 23. The cell division using prepared slides of mitosis and meiosis and/or digital images/programs/videos
- 24. Mendel's laws
- 25. Variations from Mendel's laws
- 26. Pedigree analysis
- 27. Biotechnology

Methods of Instruction:

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

- **Method:** Lab Activities
Integration: Observation of cells and tissues using prepared slides and microscopes to assist in understanding tissues found in the human body. Hands on study of major organ systems using human models, dissection of preserved animals or preserved animal organs such as cows'eye, sheep brain to help understand human anatomy
- **Method:** Projects
Integration: Conduct research on case studies in the current scientific literature and to apply their newly acquired knowledge to predict outcomes and treatments appropriate for specific scenario. Students conduct oral presentations on these projects. Students conduct these oral presentations asynchronously using PowerPoint narrations i.e. students will record audio inside of PowerPoint while creating the slideshow. These files will be uploaded to LMS (Canvas) by each student on their own time.
- **Method:** Experiments
Integration: Conduct experiments using the instruments spirometer, stethoscope, and sphygmomanometer to illustrate human physiological processes.
- **Method:** Lecture
Integration: Lecture will be delivered in the class room using PowerPoint presentations and computer generated animations to assist students in understanding complex principles of human biology.
- **Method:** Activity

Integration: Large and small group cooperative learning activities, which involve students in critical thinking interactions about physiological processes.

Methods of Evaluation:

A student's grade shall be determined by the instructor using multiple measures of performance related to the course objectives. Methods of evaluation may include but are not limited to the following:

- **Method:** Quizzes
Integration: Weekly quizzes assess the critical analysis, synthesis of information and problem solving skills. These quizzes are conducted in class during lecture time or Canvas(MSJC course management system). Students receive immediate feed back.
- **Method:** Exams/Tests
Integration: Exams will assess critical analysis and synthesis of information presented in the lectures on various human biology topics. Students receive feedback and grades on these exams either in the class or immediately if given in Canvas.
- **Method:** Laboratory reports
Integration: Laboratory reports demonstrate cognitive processes such as developing a testable hypothesis and following an experimental protocol. Feed back and grades are given to these weekly reports based on critical analysis, scientific writing and accuracy.
- **Method:** Laboratory practical exams
Integration: These exams demonstrate competence in laboratory methods and content areas. These are conducted three times at various points during lab time. These are evaluated immediately and given appropriate feedback.
- **Method:** Oral Presentation
Integration: Students conduct research on case studies in the current scientific literature and apply their newly acquired knowledge to predict outcomes and treatments appropriate for specific scenarios. Students choose this topic during 10th week and spend six weeks on the topic by conducting research. Students present the topic in the classroom during the last week of the semester. These presentations are graded by the instructor and feed back given.

Examples of Assignments:

Students will be expected to understand and critique college level texts or the equivalent. Reading and writing, as well as out of class assignments are required. These assignments may include but are not limited to the following:

1. **Group Discussion:** Discuss why pediatricians become concerned about the potential for brain damage when an infant's temperature approaches 105°C. Identify the group of organic molecules that are most likely damaged by high temperature.
2. **Short paragraph answer Question:** Identify the structures that protect the brain and the spinal cord. Discuss specifically the specific bones, membranes, fluid and blood vessels.
3. **Essay Question:** Describe anatomy and physiology of human digestive system. Identify the organs that do not function in patients who suffer from diabetes, colic disease and constipation.
4. **Urine Analysis Lab:** Urine analysis is a method to determine physiological changes taking place in an individual under abnormal conditions.
 - I. Using your own urine sample, test the following characteristics of the urine.
 - II. Collect urine sample in the cup provided to you. Note down the physical characteristics such as odor, color, and transparency. Dip the urine analysis strip in the urine for one minute. Deposit the urine in the toilet. And compare the results to the chart given to you.
 - III. Record your results in the below given table. Discuss the Importance of the following any abnormal values:

#	Characteristic of the test	Result	Normal value
1	turbidity		Transparent
2	Color		Yellow-amber
3	Odor		ammonia like smell
4	pH		4.6-8

5	Specific gravity	1.001-1.035
6	Glucose	None
8	Nitrate	None
9	Urobilinogen	0.2-1mg/dl
10	Protein	None
11	ketone	None
12	bilirubin	None
13	blood	None

Urine is generally made up of water and dissolved components such as electrolytes (Na⁺ and K⁺), metabolites, hormones such as estrogen, nitrogenous wastes such as urea, uric acid, creatinine, ammonia and cells such as epithelial cells, leukocytes etc. Urine can be a general indicator of an individual's health. An adult excretes an average of 1.5 l of urine per day. A person with illness can have: bacteria, blood, glucose and/or protein in their urine.

1. Transparency: clear and cloudiness may indicate the presence of plasma proteins.
2. Color: pale or deep yellow. Yellow is the result of urochrome a by-product of bile metabolism.
3. Odor: ammonia smell. Sweet smell may indicate diabetes mellitus.
4. pH: normal is about 6, vegetarian diet would have alkaline pH, a diet high in proteins would be acidic.
5. Specific gravity . 1.001-1.035 . Higher would indicate chronic nephritis.
6. Glucose: normally none should be found. Positive indicates diabetes mellitus.
7. Protein: normally none. Presence of protein is indication of kidney infection.
8. Bilirubin: normally none. Presence of the bilirubin is an indication of liver damage.
9. Ketone: Presence of ketones is an indication of diabetes mellitus.
10. Nitrate: high protein diet or burning of muscle or urinary tract infection(UTL).

Textbooks:

- Mader, S., Windelspecht, M. (2020). *Human Biology* McGraw Hill. ISBN: 1260233030
- Michael D. Johnson. (2017). *Human Biology Concepts and Current Issues* Pearson. ISBN: 9780134042435

Other Resources:

- Instructor prepared lab manual SJC. It will be available through MSJC course management system and SJC book store. Students will have to purchase it from SJC book store.
- Instructor prepared lab manual MVC. It will be available through the Menifee Bookstore. Students will have to purchase it from the Menifee Bookstore.

Minimum Qualification

- Biological Sciences (Masters Required)