Course Outline

COURSE:  BIO 10  DIVISION:  10  ALSO LISTED AS:  

TERM EFFECTIVE:  Fall 2017  CURRICULUM APPROVAL DATE: 11/28/2016

SHORT TITLE: PRIN BIOLOGY L/L

LONG TITLE: Principles of Biology

<table>
<thead>
<tr>
<th>Units</th>
<th>Number of Weeks</th>
<th>Type</th>
<th>Contact Hours/Week</th>
<th>Total Contact Hours</th>
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<td>4</td>
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<td>Lecture: 3</td>
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<td>Lab: 3</td>
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COURSE DESCRIPTION:

An introductory biology course covering functions at the cellular and organismal levels. Includes study of the basic principles of metabolism, heredity, evolution and ecology. Primarily for non-biological science majors. ADVISORY: Eligible for English 250, English 260 and Mathematics 430.

PREREQUISITES:

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion
03 - Lecture/Laboratory
04 - Laboratory/Studio/Activity
05 - Hybrid
72 - Dist. Ed Internet Delayed
73 - Dist. Ed Internet Delayed LAB

12/2/2016
STUDENT LEARNING OUTCOMES:
1. Describe and explain the processes and structures common to all living things.
   Measure of assessment: written exam, homework, lab report
   Year assessed, or planned year of assessment: 2017
   Semester: Spring
2. Explain how evolution drives and shapes an ecosystem, and has resulted in both the similarities and differences between all living things.
   Measure of assessment: written exam, homework, lab report
   Year assessed, or planned year of assessment: 2017
   Semester: Spring
3. Explain the process of how traits are inherited, and how genes are responsible for those traits.
   Measure of assessment: written exam, homework, lab report
   Year assessed, or planned year of assessment: 2017
   Semester: Spring
4. Demonstrate the use of a compound light microscope and other laboratory equipment.
   Measure of assessment: demonstration
   Year assessed, or planned year of assessment: 2017
   Semester: Spring

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS
Curriculum Approval Date: 11/28/2016
This course is a Lecture/Lab
3 lec, 3 lab Hours  Topic: Introduction to Biology;
Objectives: 1. Define biology. 2. Describe the characteristics of living things. 3. Describe the levels of biological organization and define emergent properties. 4. Explain the Theory of Evolution by Natural Selection. 5. Describe the basic system of taxonomy used in biology. Describe ecological interactions. 7. Effectively organize and present information to a group.
Assignments: read text, answer homework questions.
Lab topic: Laboratory Rules and Safety; Objectives: 1. List the norms for behavior in the laboratory. 2. Explain why these norms are important.
Assignments: Complete lab report.
3 lec, 3 lab Hours  Topic: Basic Chemistry; Objectives: Define and explain the differences between the following: atom, molecule, compound, ion, isotope. 2. Diagram the structure of an atom including the placement of electrons in the appropriate energy levels. 3. Explain and compare the different types of chemical bonding. 4. Explain how the structure of water gives it its unique properties. 5. Explain the Ph scale.
Assignments: read text, answer homework questions.
Lab Topic: Use of the Microscope (Part 1):
Objectives: 1. Name the parts of the microscope and describe their functions. 2. Properly adjust the microscope for viewing slides with the scanning, medium, and hi-dry objective lenses. 3. Properly store the microscope.
Assignments: complete lab report, demonstrate skills to the instructor.
3 lec, 3 lab Hours  Topic: Organic Chemistry; Objectives: 1. Explain what macromolecules are and how they are assembled and disassembled. 2. Describe the basic forms and functions
of the four classes of biologically important molecules.
Assignments: read text, answer homework questions.
Lab topic: Learning the Microscope (Part 2);
Objectives: 1. Prepare microscope slides using dry mounts, wet mounts, and simple staining procedures. 2. Locate and observe living specimens in wet mounts. 3. Demonstrate proper techniques for drawing objects observed through the microscope and proper labeling of the drawings.
Assignments: complete lab report, including drawings of several microscopic organisms.

3 lec, 3 lab Hours  Basic Metabolism:
Objectives: 1. Define energy and explain its states. 2. State and explain the First and Second Laws of Thermodynamics. 3. Explain how energy can be transferred from an exergonic reaction to an endergonic reaction. 4. Describe the role of ATP in living systems. 5. Explain the function of an electron transport system. 6. Explain the function of enzymes in living systems. 7. Explain how enzymes function.
Assignments: read text, answer homework questions.
Lab Topic: Enzymes; Objectives: 1. Explain what a catalyst is. 2. Describe the difference between an inorganic catalyst and an organic enzyme. 3. Describe how changes in temperature and pH affect enzyme activity. 4. Explain why changes in temperature and pH affect enzyme activity. 5. Explain the significance for living organisms of the effect of temperature and pH on enzyme activity.
Assignments: complete lab report.

3 lec, 3 lab Hours  Topic: Cell Structure and Function;
Objectives: 1. Describe and explain the General Cell Theory. 2. Describe surface area : volume ratio and explain its impact on cell size. 3. Describe the differences between prokaryotic and eukaryotic cells. 4. Describe and define the functions of cell organelles and other subcellular structures. 5. Describe the functions of the cell membrane. 6. Describe the structure of the cell membrane and explain how the parts perform the membrane's functions. 7. Explain the processes of diffusion, facilitated diffusion, osmosis, and active transport and explain how these processes affect the movement of materials across a cell membrane.
Assignments: read text, answer homework questions.
Lab topic: Cell Structure and Membrane Transport;
Objectives: 1. Explain how materials move across the cell membrane using diffusion and osmosis. 2. Define and explain tonicity. 3. Predict and verify through observation the effects on living cells of solutions of varying salt concentration. 4. Observe cells under the microscope and identify basic cell structures.
Assignments: complete lab report.
Assignments: read text, answer homework questions.

3 lec, 3 lab Hours  Topic: Photosynthesis; Objectives: 1. Explain the function of photosynthesis and chemosynthesis in a community. 2. Describe the reactants and products of the light dependent and light independent reactions and compare and contrast the functions of both. 3. Describe the role of pigments in photosynthesis. 4. Describe leaf structure and its importance in
photosynthesis.

Assignments: read text, answer homework questions.

Lab topic: Surface Area : Volume Ratio; Cell Structures;
Objectives: 1. Explain how surface area : volume ratio affects the rate at which materials are absorbed by a cell. 2. Describe how surface area may be increased without affecting volume. 3. Describe the structure and function of the common cell organelles.

Assignments: complete lab report.

3 lec, 3 lab Hours  Topic: Respiration; Objectives: 1. Explain the function of cellular respiration. 2. Describe the differences between aerobic and anaerobic respiration, both in the processes and in their relative efficiency. 3. Describe the reactants and products of the three major steps of aerobic respiration. 4. Explain the complementarity of photosynthesis and aerobic respiration.

Assignments: read text, answer homework questions.

Lab topic: Photosynthesis; Objectives: 1. Use paper chromatography to separate the different plant leaf pigments. 2. Explain why plants have different pigments. 3. Use a spectrometer to observe how different pigments selectively absorb different wavelengths of light.

Assignments: complete lab report.

3 lec, 3 lab Hours  Topic: DNA Structure; Objectives: 1. Describe the structure of DNA. 2. Explain complementary base pairing and its function in DNA replication. 3. Explain why DNA replication is necessary. 4. Describe the process of DNA replication. 5. Explain the difference between DNA and chromosomes.

Assignments: read text, answer homework questions.

Lab topic: Respiration; Objectives: 1. Explain the role of enzymes in cellular respiration. 2. Explain how the process of evolution determines what enzymes are present in an organism.

Assignments: complete lab report

3 lec, 3 lab Hours  Topic: Gene Expression and Regulation; Objectives: 1. Define a gene. 2. Explain the relationship between a gene and the protein coded for by a gene. 3. Explain the 3 types of RNA and describe their roles in the process of translation. 4. Describe the processes of transcription and translation. 5. Explain how the genetic code works. 6. Explain how genetic mutations occur. 7. Explain the importance of mutations in the evolutionary process.

Assignments: read text, answer homework questions.

Lab topic: DNA Structure;
Objectives: 1. Describe the structure of the DNA molecule. 2. Explain the role of base pairing in DNA replication. 3. Translate a gene into a protein using a mRNA codon/amino acid dictionary.

Assignments: complete lab report.

3 lec, 3 lab Hours  Topic: Cellular Reproduction;
Objectives: 1. Describe the cell cycle and explain how it differs from a life cycle. 2. Compare and contrast sexual and asexual reproduction. 3. Describe the steps of mitotic cell division and explain the function of mitosis. 4. Describe the steps of meiotic cell division and explain the function of meiosis. 5. Describe crossing-over and independent assortment and explain their roles in increasing genetic variability. 6. Describe what abnormalities may occur during cell division and
explain the consequences of these abnormalities.
Assignments: read text, answer homework questions.
Lab Topic: Mitosis; Objectives: Identify the stages of mitosis in plant and animal cells in prepared microscope slides.
Assignment: complete lab report.

3 lec, 3 lab Hours

Topic: Genetics; Objectives: 1. Describe the Principle of Segregation and the Principle of Independent Assortment and explain how they affect the inheritance of specific genes. 2. Explain the difference between a gene and an allele. 3. Define genotype and phenotype. 4. Define complete dominance, incomplete dominance, and codominance. 5. Define pleiotropy and give examples. 6. Define ploidy and give examples. 7. Explain linkage. 8. Describe the four types of changes in chromosome structure and their effects. 9. Define polyploidy and aneuploidy, describe how they can occur, and give examples of their effects.

Assignments: read text, answer homework questions.
Lab Topic: Genetics (Part 1);
Objectives: 1. Define monohybrid cross and test cross. 2. Use the Punnett Square to predict the inheritance of single traits showing complete, incomplete, and codominance.
Assignment: complete lab report.

3 lec, 3 lab Hours

Topic: Biotechnology; Objectives: 1. Define the terms biotechnology, genetic recombination, and genetic engineering. 2. Describe some of the uses of genetic engineering. 3. Explain the function of restriction enzymes in biotechnology. 4. Describe some of the social, ethical, and moral dilemmas presented by some areas of biotechnology research.

Assignments: read text, answer lecture quizzes and homework questions.
Lab Topic: Genetics (Part 2); Objectives: 1. Define dihybrid cross. 2. Use the Punnett Square to predict the inheritance of 2 traits. 3. Use the Punnett Square to predict the inheritance of sex-linked traits.
Assignments: complete lab report.

3 lec, 3 lab Hours

Topic: Principles of Evolution;
Objectives: 1. Describe the history of evolutionary thought from Aristotle to Darwin and Wallace. 2. Explain Darwin's Theory of Evolution by Natural Selection. 3. Describe the forms of evidence used to demonstrate that evolution has occurred. 4. Describe present-day examples of evolution.
Assignments: read text, answer homework questions.
Lab Topic: Homologous Structures;
Objectives: 1. Identify homologous bones on different vertebrate skeletons. 2. Describe how adaptation has affected the shape of the clavicles, scapula, and pelvises of three different vertebrates.
Assignments: complete lab report

3 lec, 3 lab Hours

Topic: Mechanisms of Evolution;
Objectives: 1. Define evolution, species, and population. 2. Describe mutation, gene flow, genetic drift, and natural selection and explain how each affects the genetic variability within a single population and between two populations of the same species. 3. Describe the modes of natural selection and give examples of each. 4. Describe sexual
selection and explain how it can lead to sexual dimorphism.
Assignments: read text, answer homework questions.
Lab Topic: Agents of Evolution;
Objectives: 1. Use the Hardy-Weinberg Equilibrium to demonstrate the effects of natural selection, gene flow and genetic drift on a population. 2. Explain how gene flow can prevent natural selection from causing a population to change.
Assignments: complete lab report.
3 lec, 3 lab Hours Topic: Macroevolution; Objectives: 1. Define speciation. 2. Explain the different types of genetic isolation and its importance in speciation. 3. Describe allopatric and sympatric speciation and give examples of both. 4. Describe the major patterns of macroevolution. 5. Explain the importance of extinction in macroevolution.
Assignments: read text, answer homework questions.
Lab Topic: Energy Flow in a Community;
Objectives: 1. Assign trophic levels to members of an ecological community based on how they obtain energy. 2. Inventory a natural community and develop a list of species for that community. 3. Construct a food web for that community.
Assignments: complete lab report.
3 lec, 3 lab Hours Topic: Ecology;
Objectives: 1. Define ecology. 2. Identify biotic and abiotic components of the environment and explain how they interact. 3. Explain the difference between an ecosystem and a community. 4. Define ecological niche and explain the niche's role in determining what organisms will be found in a community. 5. Describe the roles of competition, predation, and symbiosis in shaping a community. 6. Describe the process of succession and compare and contrast primary and secondary succession. 7. Explain the how climate and geography determines the climax community. 8. Explain how energy flows through a community and how this flow results in the pyramid of biomass. 9. Describe the process of biological magnification and explain its importance to populations of top consumers. 10. Define and give examples of biogeochemical cycles. 11. Explain how acid deposition occurs.
Assignments: read text, answer lecture quiz and homework questions.
Lab Topic: Review
2 Hours: Final

METHODS OF INSTRUCTION:
Instructional Methods include lecture and lab with use of audio/visual aids, group discussions, and hands-on laboratory exercises.

METHODS OF EVALUATION:
Writing assignments
Percent of total grade: 40.00 %
Written Homework Lab Reports Free Response Exam Questions
Problem-solving assignments
Percent of total grade: 10.00 %
Homework Problems Lab Reports Quizzes Exams
Skill demonstrations
Percent of total grade: 5.00 %
Class Performance/s
Objective examinations
Percent of total grade: 45.00 %

REPRESENTATIVE TEXTBOOKS:
Required Representative Textbooks
ISBN: 978-0133923001
Reading Level of Text, Grade: 13 Verified by: Publisher
Required Other Texts and Materials
Keys and Laage, Laboratory Manual for Biology 10

ARTICULATION and CERTIFICATE INFORMATION
Associate Degree:
  GAV B2, effective 201230
  GAV B3, effective 201230
CSU GE:
  CSU B2, effective 201230
  CSU B3, effective 201230
IGETC:
  IGETC 5B, effective 201230
  IGETC 5C, effective 201230
CSU TRANSFER:
  Transferable CSU, effective 201230
UC TRANSFER:
  Transferable UC, effective 201230

SUPPLEMENTAL DATA:
Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education:
  Program Status: 1 Program Applicable
Special Class Status: N
CAN:
  CAN Sequence:
  CSU Crosswalk Course Department: BIO
  CSU Crosswalk Course Number: 10
Prior to College Level: Y
Non Credit Enhanced Funding: N
Funding Agency Code: Y
In-Service: N

12/2/2016 7
Occupational Course: E
Maximum Hours:
Minimum Hours:
Course Control Number: CCC000310399
Sports/Physical Education Course: N
Taxonomy of Program: 040100