COURSE OUTLINE OF RECORD

Number: BIOL G186  TITLE: Diversity of Organisms

ORIGINATOR: Travis Vail  EFF TERM: Fall 2017
FORMERLY KNOWN AS:  DATE OF
OUTLINE/REVIEW: 05-04-2017
CROSS LISTED COURSE:  TOP NO: 0408.00
CID: BIOL 140

SEMESTER UNITS: 5.0  HRS LEC: 54.0  HRS LAB: 108.0  HRS OTHER: 0.0
CONTACT HRS TOTAL: 162.0
STUDY NON-CONTACT HRS RECOMMENDED: 108.0

CATALOG DESCRIPTION:
A survey of extant living organisms including physiological and anatomical adaptations of organisms in response to their environment. Each kingdom is examined, with an emphasis on evolution and ecology of organisms found in kingdoms Plantae and Animalia. Included in this survey is an introduction to scientific methodology including student-centered experimental design, execution, and subsequent analysis of data.

JUSTIFICATION FOR COURSE:

PREREQUISITES:
- BIOL G180: Cell and Molecular Biology with a minimum grade of C or better
- MATH G030: Intermediate Algebra with a minimum grade of C or better
- MATH G040: Accelerated Elementary and Intermediate Algebra with a minimum grade of C or better
- MATH G115: College Algebra with a minimum grade of C or better
- MATH G120: Trigonometry with a minimum grade of C or better
- MATH G170: Precalculus with a minimum grade of C or better
- MATH G180: Calculus 1 with a minimum grade of C or better

COREQUISITES:

ADVISORIES:

ASSIGNED DISCIPLINES:
Biological sciences

MATERIAL FEE: Yes [ ] No [X] Amount: $0.00

CREDIT STATUS: Noncredit [ ] Credit - Degree Applicable [X] Credit - Not Degree Applicable [ ]

GRADING POLICY: Pass/No Pass [ ] Standard Letter [X] Not Graded [ ] Satisfactory Progress [ ]

OPEN ENTRY/OPEN EXIT: Yes [ ] No [X]

TRANSFER STATUS: CSU Transferable[ ] UC/CSU Transferable[ ] Not Transferable[ ]

BASIC SKILLS STATUS: Yes [ ] No [X]  LEVELS BELOW TRANSFER: Not Applicable

CALIFORNIA CLASSIFICATION CODES: Y - Not Applicable

NON CREDIT COURSE CATEGORY: Y - Not applicable, Credit Course
OCCUPATIONAL (SAM) CODE: E
REPEATABLE ACCORDING TO STATE GUIDELINES: No [X] Yes [ ] NUMBER REPEATS:
REQUIRED FOR DEGREE OR CERTIFICATE: No [X] Yes [ ]
GE AND TRANSFER REQUIREMENTS MET:
IGETC Area 5: Physical and Biological Sciences
  5B: Biological Science
  5C: Laboratory Activity
CSU GE Area B: Scientific Inquiry and Quantitative Reasoning
  B2 - Life Science
  B3 - Laboratory Sciences
Degree Applicable
  AA Degree Applicable
  AS Degree Applicable
  AS-T Degree Applicable

COURSE LEVEL STUDENT LEARNING OUTCOME(S) Supported by this course:

1. Differentiate among organisms of different taxonomic levels (and therefore phylogeny) using specific symplesiomorphies and synaopmorphies.
2. Demonstrate comprehension of how environmental pressures spurred evolutionary adaptations which ultimately gave rise to the apomorphies among major taxa.
3. Explain the major physiological mechanisms of each of the kingdoms.
4. Analyze and understand the link between form and function or anatomical structures as exemplified by members of each of the kingdoms.
5. Create and execute a simple experiment demonstrating thorough understanding of the scientific method.
6. Compose a report that clearly communicates complex ideas using proper scientific format as is used by the scientific community to publish in science-based peer-reviewed journals.

COURSE OBJECTIVES:
1. Differentiate among organisms of different taxonomic levels (and therefore phylogeny) using specific symplesiomorphies and synaopmorphies.
2. Demonstrate comprehension of how environmental pressures spurred evolutionary adaptations which ultimately gave rise to the apomorphies among major taxa.
3. Compare on contrast the development, life cycles, and anatomical and physiological characteristics of major organismal taxa.
4. Analyze and understand the link between form and function or anatomical structures as exemplified by members of each of the kingdoms.
5. Create and execute a simple experiment demonstrating thorough understanding of the scientific method.
6. Compose an essay that clearly communicates complex ideas in a scientific format.
7. Define what it means to be "alive" including essential elements and hypotheses of life's history.

COURSE CONTENT:
LECTURE CONTENT:

1) Defining life
   a) Differentiating life from not-life
   b) Theories of the origin of life

2) Evolution
   a) Definition
   b) Multi-discipline support
   c) People that influenced the origin of the theory of evolution
   d) Causes of evolution
      i) Natural selection
      ii) Directional, Disruptive, and Stabilizing
      iii) Genetic Drift
      iv) Gene Flow
      v) Mutation
   e) Species
      i) Morphological, Biological, Phylogenetic species concepts
      ii) Speciation
      iii) Modes of speciation: allopatric, sympatric, parapatric
      iv) Isolation mechanisms
      v) Premating
      vi) Postmating

3) Phylogenetics and Cladistics
   a) Reading cladograms
   b) Appropriate definitions such as “monophyletic” and the like
   c) Defining appropriate terms; Apomorphies, synapomorphies, etc.

4) Organization of life
   a) Karl VonLinne’s taxonomic system
   b) Major taxonomic levels
   c) Appropriate grammar
   d) Binomial nomenclature

5) Viruses
   a) Structure
   b) Life cycle

6) Prokaryote kingdoms
   a) Archaebacteria
      i) Anatomical and physiological adaptations for homeostasis and metabolism
      ii) Life cycle
   b) Eubacteria
      i) Anatomical and physiological adaptations for homeostasis and metabolism
      ii) Life cycle

7) Protista
a) Major taxonomic groups  
b) Life cycles  
c) Ecology  
d) General characteristics  
e) Anatomical and physiological adaptations for homeostasis and metabolism  
f) Survey of organelles and protist-centric structures

8) Plantae  
a) Kingdom-wide general characteristics  
b) Organs  
c) Tissues  
d) Organelles  
e) Anatomical and physiological adaptations for homeostasis and metabolism  
f) Mosses, liverworts  
   i) Adaptations to land life  
   ii) Life cycle  
   iii) Relationships among and identification of major taxonomic groups  
g) Ferns  
   i) Adaptations for land life  
   ii) Life cycle  
h) Gymnosperms  
   i) Adaptations for land life  
   ii) Life cycle  
   iii) Relationships among and identification of major taxonomic groups  
i) Angiosperms  
   i) Adaptations for land life  
   ii) Life cycle  
   iii) Relationships among and identification of major taxonomic groups

9) Fungi  
a) Kingdom-wide general characteristics  
b) Relationships among and identification of major taxonomic groups  
c) Life cycles within each of the groups  
d) Anatomical and physiological adaptations for homeostasis and metabolism

10) Animalia  
a) Kingdom-wide general characteristics  
b) Relationships among and identification of major taxonomic groups  
c) Note: “general characteristics” below indicates blastopore condition, embryonic germ layer condition, coelom condition (as appropriate), body symmetry, level of body organization (cellular, tissue, organ or organ system), proposed superphylum membership, feeding mechanisms, and anatomy and physiology of digestive, excretory, nervous, circulatory, and respiratory structures  
d) Porifera  
   i) Phylogenetic position within the kingdom  
   ii) General characteristics  
   iii) Anatomical and physiological adaptations for homeostasis and metabolism  
   iv) Life cycles
e) Cnidaria
   i) Phylogenetic position within the kingdom
   ii) General characteristics
   iii) Anatomical and physiological adaptations for homeostasis and metabolism
   iv) Life cycles

f) Platyhelminthes
   i) Phylogenetic position within the kingdom
   ii) General characteristics
   iii) Anatomical and physiological adaptations for homeostasis and metabolism
   iv) Life cycles

g) Mollusca
   i) Phylogenetic position within the kingdom
   ii) General characteristics
   iii) Anatomical and physiological adaptations for homeostasis and metabolism
   iv) Life cycles

h) Annelida
   i) Phylogenetic position within the kingdom
   ii) General characteristics
   iii) Anatomical and physiological adaptations for homeostasis and metabolism
   iv) Life cycles

i) Nematoda
   i) Phylogenetic position within the kingdom
   ii) General characteristics
   iii) Anatomical and physiological adaptations for homeostasis and metabolism
   iv) Life cycles

j) Arthropoda
   i) Phylogenetic position within the kingdom
   ii) Relationships among and identification of major taxa
   iii) General characteristics
   iv) Anatomical and physiological adaptations for homeostasis and metabolism
   v) Life cycles

k) Echinodermata
   i) Phylogenetic position within the kingdom
   ii) General characteristics
   iii) Anatomical and physiological adaptations for homeostasis and metabolism
   iv) Life cycles
   v) Chordata
   vi) Primitive subphyla: Cephalochordata and Urochordata
       (1) Phylogenetic position within the kingdom
       (2) General characteristics
       (3) Anatomical/physiological adaptations for homeostasis and metabolism
vii) Vertebrata

(1) Note: “General characteristics” below indicates specific skeletal, circulatory, thermoregulatory, respiratory, integumentary, and reproductive anatomy and physiology

(2) 3 classes of fishes

(3) Phylogenetic position within the kingdom

(4) General characteristics

(5) Homeostasis and metabolism

(6) Amphibians

(7) Phylogenetic position within the kingdom

(8) General characteristics

(9) Adaptations for land life

(10) Homeostasis and metabolism

(11) Reptiles

(12) Phylogenetic position within the kingdom

(13) General characteristics

(14) Adaptations for land life

(15) Homeostasis and metabolism

(16) Aves

(17) Phylogenetic position within the kingdom

(18) General characteristics

(19) Adaptations for land life

(20) Homeostasis and metabolism

(21) Mammalia

(22) Phylogenetic position within the kingdom

(23) General characteristics

(24) Adaptations for land life

(25) Homeostasis and metabolism

11) Ecology

a) Population ecology

i) Growth

ii) Interactions

iii) Symbiosis

iv) Predator/prey

v) Competition
b) Community ecology
   i) Succession

c) Ecosystem ecology
   i) Flow of energy through an ecosystem

LABORATORY CONTENT:
I. Scientific method
II. Evolution
   Convergent evolution vs. adaptive radiation
   Natural selection and genetic drift
III. Phylogenetics and cladistics
   Organization of specimens into taxonomic groups
   Identification of synapomorphies and symplesiomorphies
IV. Microscopy
   Compound light microscope function and use
   Dissecting microscope function and use
V. Bacteriology
   Staining techniques (pending availability of Bunsen burners)
   Investigation of bacterial resistance to antiseptics
VI. Protista
   Survey of the kingdom
   Focus of symplesiomorphies within taxa
VII. Plantae
   Anatomical study or organs and tissues of major taxa
   Life cycle investigation of major taxa
VIII. Experimental design
   Proposing of a student research project
IX. Fungi
Anatomical study of organs and tissues

X. Invertebrate zoology

Survey of major invertebrate phyla including:

Anatomical study may include dissection

Taxonomic survey includes investigation of various specimens within specific taxonomic units

XI. Vertebrate zoology

Survey of major vertebrate phyla including:

Anatomical study may include dissection

Taxonomic survey includes investigation of various specimens within specific taxonomic units

XII. Presentation of student-created research project

Student projects shall be presented to class using either a PowerPoint supported conference style format, or a poster presentation session, or both

XIII. Field trip to Bolsa Chica Ecological Reserve

Investigation of how energy flows through an ecosystem

Investigation of how competition may result in resource partitioning.

METHODS OF INSTRUCTION:

A. Lecture:
B. Lab:

INSTRUCTIONAL TECHNIQUES:

1. Instructor-led lectures during each lecture section that include use of PowerPoint visuals.

2. Instructor-led lectures introducing each laboratory activity that include, but are not limited to, demonstration of use of specialized equipment, introduction to safety hazards associated with that particular lab, outline of what is expected of students during lab, and indication of how student learning will be monitored.

3. Laboratory activities that use, among other techniques, inquiry-based student learning that includes hands-on interaction with appropriate taxa.

4. One-on-one instructor/student interaction in lab.

COURSE ASSIGNMENTS:

Reading Assignments

1. Assigned reading in textbook to accompany learning acquired during lecture.

2. Assigned reading of laboratory manual prior to student's arrival in lab.

Out-of-class Assignments

1. Design and execution of an experiment that accurately employs the scientific method.

Writing Assignments

1. Writing of a scientific paper demonstrating the student's ability to construct and execute an experiment.
METHODS OF STUDENT EVALUATION:
Midterm Exam
Final Exam
Written Assignments
Objective Examinations
Report
Projects (ind/group)
Oral Presentations

Demonstration of Critical Thinking:
1. Lecture examinations.
2. Scientific method project.

Required Writing, Problem Solving, Skills Demonstration:
1. Scientific report covering the student's designed an executed experiment.

TEXTS, READINGS, AND RESOURCES:

TextBooks:

Manuals:

LIBRARY:

Adequate library resources include: Print Materials
Non-Print Materials
Online Materials
Services

Comments:
To optimize student research prior to their scientific method projects, students should have access to as many peer-reviewed scientific journals as is affordable by the campus.

Attachments:

Attached Files