BIOL 1620

Division: Natural Science and Mathematics
Department: Biology
Course: BIOL 1620
Title: Biology II
Catalog Description:

This course introduces major phyla and classes of the Chromista, red algae, green algae, plants, and animals through the study of structure/function relationships, reproductive mechanisms, adaptations, and evolutionary development, physiology, ecology, and human importance. This is the second semester course of a year long sequence that is required for most biology majors, many preprofessional majors, Natural Resource majors, and some Agriculture majors.

General Education Requirements: Life Science
Semesters Offered: Spring
Credit/Time Requirement: Credit: 4; Lecture: 4; Lab: 0
Clock/Hour Requirements: 0
Offered for Non-Credit: No
Prerequisites: BIOL 1610 and 1615, or instructor's permission

Corequisites: BIOL 1625

Justification:

The Biology II lecture course (BIO 1620) and Biology II laboratory (BIO 1625) have been designed as the second semester courses in a year long exposure to biology as recommended by the State Biology Group. Biology I lecture (BIO 1610) and Biology I laboratory (BIO 1615) will constitute the first semester courses for the majors biology sequence. This year long sequence of biology is required for most biology majors, many preprofessional majors, natural resource majors, and some agriculture majors.

Student Learning Outcomes:

Upon successful completion of this course, students will:

- know the essential qualities and key processes commonly found in life forms
- have begun to understand the diversity of living organisms and their myriad interrelationships in the biological world
- know how to apply systematic methods to understand the complexities of an individual organism or to distinguish among diverse species.
- be able to use microscopes, computers, and other commonly available lab equipment and supplies
- be able to read the literature of the biological sciences flexibly, analytically, and imaginatively
- be able to appreciate that they have been exposed to an unfortunately small number of the myriad beauties and marvels of the living world, extant or extinct
- have some understanding of the role that biology plays in modern life as well as past history.

Content:

This course will include:

- multicellularity
- chloroplast endosymbiosis in
    - Chromista
    - brown algae (Phaeophyta)
    - red algae (Rhodophyta)
    - green algae (Chlorophyta)
- cell specializations, tissues, and organ-like structures
- representative reproductive strategies and cycles
    - isogamy
    - anisogamy
    - oogamy
    - monoecy
    - dioecy
- comparisons of Chromista, rhodophyte, and chlorophyte evolution from ultrastructural, morphological, physiological, and environmental perspectives
- possible evolutionary paths in development of land plants from green algae
- Bryophyte phyla
    - liverworts (Hepatophyta)
    - hornworts (Anthocerophyta)
    - mosses (Bryophyta)
    - comparison of structures, adaptive and reproductive strategies
        - develop key terminology and concepts
            - leptoids
            - hydroids
            - stomates
            - caulids/phyllids/rhizoids
            - dermal/vascular/ground tissue systems
            - stele development
            - stems/roots/microphylls
            - primary structure and development of stems, leaves, and roots
            - alteration of generations
    - fossil phyla of seedless vascular plants
    - Lycophyta group compared to the Sphenophyta, Psilophyta, and Pterophyta groups
        - comparison of structures, adaptive and reproductive strategies
            - develop key terminology and concepts
                - homospory
                - heterospory/exosporic
                - endosporic/gametophyte or haploid dominance versus sporophyte or diploid dominance/ megaphylls and leaf gaps/sporophylls
                - micro- or megasporophylls
    - adaptive advantages between seeds and spores
        - pollen versus free swimming gametes
        - Gymnosperms
            - Cycadophyta

        - Ginkgophyta
        - Gnetophyta
        - Coniferophyta
        - Comparison of structures, adaptive and reproductive strategies
- Angiosperms or Anthophyta -- Monocots and dicots
    - evolution of flowers and pollination mechanisms
    - fruits and seed dispersal strategies
    - embryo development
    - primary meristems, tissues and growth
    - secondary meristems, tissues and growth
    - wood products
    - plant hormones, tropisms, nastic responses
    - photoperiodism
    - dormancy
    - plant nutrition
- multicellularity and symmetry in animals
- acoelomate, pseudocoelomate, coelomate/deuterostome or protostome development/sac-like or complete gut
- introduction of the following animal phyla via comparative anatomy (tissues, organs, organ systems) and in terms of evolutionary developments
    - Porifera (sponges)
    - Cnidaria (jellyfish, corals, Hydra)
    - Platyhelminthes (flat worms)
    - Nematoda (nematodes)
    - miscellaneous acoelomate, pseudocoelomate, and coelomate phyla including:
        - Gastrotricha (gastrotrichs)
        - Rotifera (rotifers)
        - Kinorhyncha (kinorhynchs)
        - Nematomorpha (horsehair worms)
        - Acanthocephala (acanthocephalans)
        - Loricifera (loriciferans)
        - Priapulida (priapulids)
        - Entoprocta (entoprocts)
        - Branchiopoda (branchiopods)
        - Nemertea (nemerteans)
        - Sipuncula (sipunculans)
        - Echiura (spoon worms)
        - Tardigrada (water bears)
        - Pogonophora (beard worms)
            - Mollusca (clams, squid, snails)
            - Annelida (segmented worms)
            - Arthropoda (insects, spiders, crustaceans)
            - Echinodermata (sea stars, sea cucumbers, sea urchins)
            - Chordata with emphasis on the following Subphyla:
                - Urochordata (tunicates)
                - Cephalochordata (amphioxus)

        - Vertebrata with emphasis on the following classes:
            - Cephalaspidomorphi (lampreys)
            - Myxini (hagfishes)
            - Chondrichthyes (rays, sharks)
            - Osteichthyes (bony fishes)
            - Amphibia (frogs, salamanders, caecilians)
            - Reptilia (snakes, lizards, turtles, alligators)
            - Aves (birds)
            - Mammalia (mammals)
    - comparative physiology for the above animal groups as follows:
        - neurons and the nervous system
        - muscle physiology
        - reproductive strategies
        - gas exchange
        - circulatory systems
        - digestive systems
        - osmoregulation
- concepts and terminology of ecology
    - niche
    - habitat
    - community
    - ecosystem
    - biomes
    - competitive exclusion principle
    - resource partitioning
    - trophic levels and food webs
    - energy transfer
    - predation
    - commensal
    - parasitic and symbiotic relationships, etc.

General Education Outcomes:

1) Read effectively, constructively, and critically.
   Students read the text throughout the course to give them a basis for understanding current scientific literature and research. There will be at least one library research project in which students read scientific literature. Project (s), test essay questions, discussions, etc. are evaluated on synthesis and critical thinking processes.

2) Write clearly, informatively, and persuasively.
   Students will complete at least one library project and several test essay questions over the course of the semester that will be evaluated for skills in clarity of writing as well as in the areas of synthesis and critical thinking.

4) Retrieve, evaluate, interpret, and deliver information through a variety of traditional and electronic media.
   Students will complete at least one library project which will require the use of traditional and electronic media.

7) Apply scientific reasoning to a variety of contexts.
Students will demonstrate scientific reasoning throughout the various topics considered in course content in their responses to tests, quizzes, projects, discussions, etc.

Key Performance Indicators:

Since different faculty teach the lecture course, teaching styles will vary as will evaluation methods. The biology department allows a variable number of quizzes and test, projects, etc. in the evaluation process. The department encourages that essay questions be given. Each instructor will administer their own comprehensive final which should count at least 20% of the course grade.

Representative Text and/or Supplies:

- Raven, Evert, and Eichhorn, *Biology of Plants,* current edition, Worth Publishers, W.H. Freeman and Company.
- Miller and Harley, *Zoology,* current edition, McGraw-Hill Companies, Inc.

Optimum Class Size: 24
Maximum Class Size: 48

Signatures:

I hereby submit this course syllabus:

Allan Stevens, , Professor

I hereby find this course consistent with the goals and resources of the Biology Department:

Allan Stevens, , Professor, Chair

I hereby find this course consistent with the goals and resources of the Natural Science and Mathematics Division:

Dan Black, EdD, Associate Professor, Dean

I have discussed the need for library resources related to this class with the person submitting the syllabus:

Lynn Anderson, MLIS, Technical Services Librarian (Main Campus)

Michelle Olsen, MLS, Campus Librarian (Richfield Campus)