

**I. COURSE INFORMATION:**

A. Division: Science and Math  
Department: Biology  
Course ID: BIOL 109  
Course Title: History of Life  
Units: 4  
Lecture: 3 Hours  
Laboratory: 3 Hours  
Prerequisite: None  
Departmental Advisory: None

B. Catalog and Schedule Descriptions: An Introductory course exploring the history of life on Earth. The role of natural selection and evidence from geology, biogeography, and paleontology will be combined with fossils and recent organisms to interpret the clues of life's history on Earth.

**II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One**

**III. EXPECTED OUTCOMES FOR STUDENTS:**

Upon successful completion of this course, students should be able to:

- A. Read, critically evaluate, and discuss scientific and popular literature on topics relating to the history of life on Earth.
- B. Describe and evaluate the scientific evidence for the evolution of life.
- C. Interpret biological phylogenies.
- D. Recognize the factors that can influence life on Earth and explain how they have affected life in the past.
- E. Identify the major geological time periods of Earth.
- F. Describe the major trends in the history of life on Earth.
- G. Explain and apply evolutionary theory to life history events.
- H. Discuss the importance of knowledge about the past on modern human society.
- I. Identify the major groups of invertebrate organisms found in the fossil record
- J. Utilize knowledge of recent organisms to interpret the past.

**IV. CONTENT:**

Lecture Topics: The overall instructional goal is to present a broad perspective that will provide students with key evidence, concepts, and analytical skills essential to critically evaluate information and scientific ideas about the history of life on Earth.

- A. How scientists understand the history of life
  1. Scientific methods
  2. Evolution
  3. Phylogenies
  4. Paleoclimate & geology
- B. The early Earth
  1. Early Earth conditions
  2. Origin of life
  3. Origin of eukaryotes
  4. Origin of multicellularity

- C. The early Paleozoic
  - 1. The Cambrian revolution
  - 2. The first vertebrates
  - 3. Plants invade the land
  - 4. The radiation of fish
  - 5. Evolution of amphibians
- D. The late Paleozoic
  - 1. Evolution of seed plants
  - 2. Evolution of reptiles
  - 3. Reptiles & thermoregulation
- E. The Mesozoic
  - 1. Triassic reptiles
  - 2. Evolution of mammals
  - 3. Dinosaur ecology
  - 4. Evolution of flight
  - 5. Marine reptiles
  - 6. Flowers & insects
  - 7. Extinction
- F. The Cenozoic
  - 1. Mammalian radiations
  - 2. Mammals & geography
  - 3. Whale evolution
  - 4. Primate evolution
  - 5. Early man
  - 6. Man and the past

Laboratory Topics: Labs are designed to introduce students to the fossil record and the techniques used to interpret fossils and construct an understanding of the history of life on Earth.

- A. How scientists understand the history of life
  - 1. Cladistics & phylogenies
  - 2. Sedimentary geology
  - 3. Fossils & ecology
- B. The earliest life - cells
- C. The Invertebrate fossil record
  - 1. Sponges & corals
  - 2. Bryozoans & brachiopods
  - 3. Mollusks
  - 4. Arthropods
  - 5. Echinoderms & Primitive chordates
- D. Plants
- E. The vertebrates
  - 1. The skeleton
  - 2. Skeletal adaptations
  - 3. Skull adaptations

**V. METHODS OF INSTRUCTION:**

- A. Lectures supported by audio-visual aids and demonstration material.
- B. Readings and visual material from textbook and supplementary handouts.
- C. Directed discussion and cooperative-learning group activities.
- D. Essay homework assignments
- E. Hands-on laboratory activities emphasizing partnerships and teamwork.
- F. Field trips to museums and/or the field

**VI. TYPICAL ASSIGNMENTS:**

- A. Directed discussion and cooperative-learning group activities:
  - 1. Discuss the possible function of the spines on the back of *Dimetrodon*. What evidence in the fossil record might you look for to test your hypothesis?
  - 2. In the laboratory, participate in teams to construct a cladogram and phylogeny and then discuss as a class the results.
- B. Essay homework assignments: Using an article from the scientific literature, write an essay discussing how a new paleontological discovery has changed our understanding of the past.
- C. Hands-on laboratory activities:
  - 1. Identify and compare fossil and living invertebrates in relationship to their anatomy and ecology.
  - 2. Identify the bones of the vertebrate skeleton and then use this information to compare and interpret skeletal adaptations in living and fossil organisms.

**VII. EVALUATION:**

- A. Methods of Evaluation
  - 1. Lecture:
    - a) Participation.
    - b) Graded short answer and essay exams.
    - c) Sample 1: Discuss how the seed and the amniotic egg are comparable structures. What was the importance of these to the future history of plants and vertebrates?
    - d) Sample 2: Cyanobacteria have played a major role in the evolution of life on Earth. Explain how they have affected life and continue to affect you even today.
    - e) Student papers and/or fossil preparation projects. Each project will be evaluated based on the following:
      - i. The clarity of the presentation
      - ii. Creative analysis of the topic and the scientific methodology involved
      - iii. The impact of the topic on the students life
  - 2. Laboratory:
    - a) Participation
    - b) Graded worksheets done in class that typically include single-sentence or paragraph answers. Some worksheets include student sketches.
      - i. Sample 1: What key characteristics could you use to separate ammonites from nautiloids?
      - ii. Sample 2: For the following fossil skeletons; (Utilizing your knowledge of skeletal adaptations from the recent specimens you have studied) describe what mode of locomotion/way of life you would predict based on the structure of their skeletons. Explain your reasoning.
- B. Frequency of Evaluation
  - 1. Lecture: Evaluative assignments or exams will be given no less than 4 times during the semester. While a variety of formats may be used to evaluate student acquisition of course concepts, a target of 2,500 words of critically-evaluated student writing is expected in the lecture section.
  - 2. Laboratory:
    - a) Participation
    - b) 15 weekly graded assignments from the departmentally-published biology lab book or substitute activities that meet the course goals.

**VIII. TYPICAL TEXTS:**

- A. Cowen, R. 2000. History of Life. 3<sup>rd</sup> ed. Blackwell Scientific Publications.
- B. Levin, H.L. 2003. The Earth Through Time. 7<sup>th</sup> ed. Wiley Text Books.
- C. Wicander, R & J. Monroe. 2004. Historical Geology. 4<sup>th</sup> ed. Brooks/Cole-Thompson.

- IX. OTHER SUPPLIES REQUIRED OF STUDENTS:** Lecture: Individualized instructor supplementary handout packet (\$2-\$5). Laboratory: Departmentally-produced laboratory manual (\$2-\$5).