College of San Mateo
Official Course Outline

1. **COURSE ID:** PALN 110 **TITLE:** General Paleontology **C-ID:** GEOL 110
   Units: 3.0 units **Hours/Semester:** 48.0-54.0 Lecture hours; 96.0-108.0 Homework hours; 144.0-162.0 Total Student Learning hours
   Method of Grading: Letter Grade Only

2. **COURSE DESIGNATION:**
   Degree Credit
   Transfer credit: CSU; UC
   AA/AS Degree Requirements:
   CSM - GENERAL EDUCATION REQUIREMENTS: E5a. Natural Science
   CSU GE:
   CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B1 - Physical Science
   CSU GE Area B: SCIENTIFIC INQUIRY AND QUANTITATIVE REASONING: B2 - Life Science
   IGETC:
   IGETC Area 5: PHYSICAL AND BIOLOGICAL SCIENCES: A: Physical Science
   IGETC Area 5: PHYSICAL AND BIOLOGICAL SCIENCES: B: Biological Science

3. **COURSE DESCRIPTIONS:**
   Catalog Description:
   The origin and evolution of the planet and life on earth through the past 4.6 billion years. Includes the study of fossils, rocks, geologic time, dating methods, evolution by natural selection, modern and ancient ecosystems, plate tectonics, speciation and mass extinction.

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**
   Upon successful completion of this course, a student will meet the following outcomes:
   1. Apply scientific inquiry and investigation of evidence to critically evaluate paleontological and historic geological principles.
   2. Communicate paleontological and historic geological principles and theories effectively.
   3. Apply scientific principles, theories, or models to explain the behavior of paleontological and historic geological phenomena on both a human and geologic timescale.
   4. Evaluate the impacts of life on Earth's history and the impacts of Earth's history and evolution on life and society today.

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**
   Upon successful completion of this course, a student will be able to:
   1. Evaluate multiple lines of evidence that support the theory of evolution by natural selection, plate tectonics theory, and the immensity of geologic time
   2. Evaluate how evolution, speciation, and extinction have impacted Earth's history.
   3. Evaluate the fossilization process and how it has contributed to our understand of Earth history.
   4. Solve quantitative problems associated with geologic, biologic, and paleontologic concepts, including applying absolute and relative dating methods to minerals, rocks, and fossils.
   5. Interpret graphical representations associated with geologic, biologic or paleontologic concepts, including an evaluation of paleogeography and paleoclimate.
   6. Explain the tectonic processes that shape the Earth and their influence on the environment, ecosystems and evolution
   7. Interpret the formation histories of rocks and fossils as expressed in stratigraphic sections, and apply that information to producing geologic histories of a region.

6. **COURSE CONTENT:**
   Lecture Content:
   1. Principles of scientific inquiry
      A. History of Paleontology
      B. Reading graphs
      C. Making observations
      D. Finding patterns
      E. Testing hypotheses

F. Making predictions
2. Geologic time and dating
    A. Geologic time scale
    B. Relative dating
    C. Absolute dating
    D. Fossil succession
3. Minerals, igneous, and metamorphic rocks
    A. Formation
    B. Interpretation
    C. Rock cycle
4. Sedimentary Rocks
    A. Formation
    B. Interpretation of depositional environments
    C. Sedimentary structures
    D. Sedimentary facies
5. Stratigraphy
    A. Correlation
    B. Interpretation
    C. Sea level changes
6. Fossils
    A. Preservation
    B. Fossils as clues to environments
    C. Dating with fossils
7. Evolution
    A. Lamarck, Darwin and Wallace
    B. Natural selection and genetics
    C. Evidence
    D. Speciation
    E. Extinction
    F. Mechanisms, patterns and rates of evolution
8. Organization of life
    A. Taxonomy
    B. Phylogeny
    C. Cladistics And Cladogram Construction
9. Ecosystems and paleoclimate
    A. Terminology
    B. Ecosystem interactions
    C. Paleoclimate indicators
10. Plate tectonics
    A. Earth layers and structure
    B. Evidence for continental drift
    C. Plate boundaries and associated features
    D. Earth's magnetic field and paleomagnetism
    E. Seafloor spreading
    F. Crustal origins
    G. Plates: past, present, and future
    H. Pangaea
    I. Effects on paleoclimate
11. Origin of the Earth and its life
    A. Nebular theory
    B. Early atmosphere
    C. Early oceans
    D. Amino acids
12. Precambrian geology and life
    A. Archean terranes
    B. Proterozoic supercontinents
    C. Great oxygenation event
    D. Prokaryote to eukaryotes to multicellular life
    E. Ediacaran fauna
13. Paleozoic geology and life

A. Orogenies and paleogeography
B. Cambrian explosion
C. Great Ordovician biodiversification event (GOBE)
D. End-Ordovician extinction event
E. Late Devonian extinction event
F. Marine invertebrates
G. Fish, amphibians and reptiles
H. Land plants: psilophytes, gymnosperms
I. End-Permian extinction

14. Mesozoic geology and life
    A. Orogenies and paleogeography
    B. End-Triassic extinction
    C. Dinosaurs
    D. Marine reptiles
    E. Flying reptiles
    F. Early mammals
    G. Birds
    H. Flowering plants
    I. End-Cretaceous extinction
15. Cenozoic geology and life
    A. Orogenies and paleogeography
    B. Mammal radiation
    C. Primates and hominids
    D. Ice ages
    E. Pleistocene extinction

7. **REPRESENTATIVE METHODS OF INSTRUCTION:**

Typical methods of instruction may include:

A. Lecture
B. Activity
C. Discussion
D. Field Trips
E. Observation and Demonstration
F. Other (Specify): The following methodologies are appropriate. Individual faculty will use whatever mix of these they find most effective in the presentation of each topic. Lecture presentations can happen inside or outside the classroom and are supplemented by additional resources such as videos, animations, maps, models; in-class demonstrations; in-class hands-on exercises and small-group discussions; critical thinking activities; classroom response system questions; instructor-led class discussions; hands-on experience with mineral and rock identification, in-class review games; required reading of text; required assignments on key terms and concepts, required application of relative dating principles, optional homework reviewing terms & concepts and optional field trips.

8. **REPRESENTATIVE ASSIGNMENTS**

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

Writing assignment example:

Give a brief description of Paleozoic fish evolution that includes at least 5 of the key adaptations and the advantages gained from those adaptations. Be careful to avoid Lamarckian phrasing that implies goal-oriented evolution (fish evolved jaws so that they could bite).

Reading Assignments:

Reading assignments from the textbook, video tutorials, and relevant articles and websites such as produced by the United States Geological Survey (USGS).

Other Outside Assignments:

Critical thinking questions and analysis of data and maps, rock and fossil identification, and dating of geologic events.

9. **REPRESENTATIVE METHODS OF EVALUATION**

Representative methods of evaluation may include:

A. Class Work
B. Exams/Tests

C. Homework
D. Projects
E. Quizzes
F. Instructors have considerable discretion in determining course grades, as long as final grades reflect the student's mastery of the course's student learning outcomes. Methods of evaluation include written assignments and quizzes and tests with at least some graphic-based questions, quantitative problem-solving questions, critical thinking questions, and topic-exploration projects.

10. **REPRESENTATIVE TEXT(S):**
Possible textbooks include:
A. Harold Levin. *The Earth Through Time*, 11th ed. John Wiley & Sons, 2016
B. Callan, B., Layou, K., Kohrs, R., Jaye, S., Affolter, M., Ricketts, B.. *Historical Geology*, 1 ed. Online: opengeology.org/historicalgeology, 2020

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Course Originator: Katryn Wiese