I. CATALOG DESCRIPTION:

A. Division: Science
Department: Geology
Course ID: GEOL 170x4
Course Title: Geological History of Great Basin
Units: 1
Lecture: .5 hours
Laboratory: 24 hours during a four-day field trip.
Prerequisite: GEOL 100 0r 101.

B. Course Description:
Discussion and observation of the physical and historical geology of the Great Basin Province of the United States with special emphasis on the geology of Death Valley National Monument. Course work will involve a series of 1-hour lectures preparatory to a 4-day field trip through the Great Basin in and around Death Valley. Student must attend the field trip for the successful completion of the course. Each repetition of the course will visit different areas emphasizing the variety of the geology of the Great Basin.

Schedule Description:
Discussion and observation of the physical and historical geology of the Great Basin which includes a four-day field trip through parts of the Great Basin in and around Death Valley.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: Four (4)

III. EXPECTED OUTCOMES FOR STUDENTS

Upon completion of the first repetition of the course, the student will be able to:
A. Identify the major geomorphic features typical of desert landscapes, including certain types of volcanic features.
B. Gain a general appreciation and understanding of the scale of geologic processes responsible for the formation of desert landforms.
C. Be aware of the geologic conditions responsible for the formation of the rocks exposed in the field, to the point that the student will be able to analyze typical visible rock formations to ascertain the general processes from which they arose.

Upon completion of the second repetition of the course, the student will be able to:
A. Identify the full range of geomorphic features typical of desert landscapes as well as specific characteristics of features derived from both volcanic and sedimentary processes.
B. Demonstrate specific knowledge of large-scale geologic processes responsible for the formation of desert landforms.
C. Demonstrate knowledge of the geologic conditions responsible for development of rock formations, both surface and underlying, to the point that the student will be able to analyze the full range of visible and subterranean rock formations to ascertain the specific processes from which they arose.

Upon completion of the third repetition of the course, the student will be able to:
A. Based on observations of any geologic formation characteristic of the Great Basin, analyze the processes that lead to this formation, with enough detail to “tell the story” of the geologic micro-zone.
B. Explain how geologic factors combine, rather than acting in isolation, to produce the “transition” zones characteristic of the Great Basin, to the point that the student can make reasonable projections about the geologic future of the zone.
C. Perform field analyses to identify rocks and minerals characteristic of the Great Basin.

Upon completion of the fourth repetition of the course, the student will be able to:

A. Work independently in the field to make scientific observations, form and test hypotheses, make judgments to achieve a stated goal, research information as needed to effectively utilize field time, and write thorough, cogent, and persuasive journal entries and summative reports of the independent work.

B. Research information as needed to effectively utilize field time, and write thorough, cogent, and persuasive journal entries and summative reports of the independent work.

IV. CONTENT

Specific examples used to illustrate the following content areas vary from year to year according to which areas are to be examined on the field trip.

A. Death Valley
   1. Landscape
   2. Salt
   3. Water
   4. Sand Dunes
   5. Gravel Fans
   6. Mountains
   7. Climate
   8. Plant and Animal Geography
   9. People

B. Water
   1. Lakes, Wet and Dry
   2. Quantity and Quality of Death Valley Water
   3. Sources
   4. Streams
   5. Springs
   6. Estimating Discharge

C. The Salt Pan: Orderliness in the Natural Environment
   1. Salt Minerals—Their Zoning and Geologic History
   2. Patterned Ground
   3. The Salt Pan—An Outdoor Museum

D. Gravel Fans
   1. Differences in Fans
   2. Fan Patterns
   3. Ages of Gravel
   4. Kinds and Sizes of Stones
   5. Faulting Across the Mouth of Furnace Creek Wash
   6. Desert Pavement
   7. Desert Varnish—the Black Stain
   8. Wind Effects
   9. Mudflows

E. Rocks: A Billion Years of Death Valley History
   1. Time Sequence
   2. Kinds of Rocks and Their Locations

F. How the Rocks Broke
   1. Present-Day Earth Movements
   2. Death Valley’s Last Major Earthquake
   3. Earlier Earthquakes
   4. Valleys Before Death Valley
   5. Faults, Granite Intrusions, and Volcanism

G. Mines and Mining
   1. Present Problem in Death Valley
   2. Mining History

H. Archaeology of Indian Occupation
   1. Chronology
   2. Death Valley I Indians
   3. Death Valley II Indians
   4. Third Stage—Arrival of the Bow and Arrow
   5. Death Valley IV Indians—Arrival of Pottery

I. Archaeology Since 1849
   1. Old Trails
   2. Archaeology of Litter

J. Plant and Animal Geography
   1. Climatic Zoning of Plants
   2. Water Supply of Plants
   3. Changes in Plant Stands
   4. Burros and Bighorns
   5. Other Big Game
   6. Small Game
   7. Reptiles
   8. Fish
   9. Birds and Pests

V. METHODS OF INSTRUCTION:
   A. Lecture, including directed discussion, instructor-guided investigations, instructor-moderated problem solving sessions, and audio-visual aids—including computer-generated lecture outlines, supervised illustration of major features.
   B. On the field trip, students will be shown geologic features first hand, collect representative samples, perform field identifications, and assess the results of a variety of geologic processes.

VI. TYPICAL ASSIGNMENTS:
   A. Reading Assignments
      1. Selected assignments from the textbook.
      2. Articles and background material related to the geology of Death Valley and the particular site to be visited.
   B. Writing Assignments
      1. Selected chapter exercises from the textbook.
      2. Instructor-prepared exercises, especially those involving illustrations (maps, charts, diagrams, cross-sections) and their analysis.
      3. A journal to be kept when in the field.
   C. Example
      1. Using the reference books on reserve in the library, define an alluvial plain, sketch a typical example, describe geologic processes that may lead to alluvial plains in the Great Basin Desert, and identify a specific site in the area that exemplifies this feature.
      2. Upon entering your assigned field area, make a thorough assay of the morphologies of visible rocks and geologic features in the area. Include complete sketches and paragraph level journal entries.

VII. EVALUATION:
   A. Methods of evaluation:
      1. Written quizzes and/or tests of a variety of types of questions from among true-false, multiple choice, fill-in, sentence completion, and short essay.
      2. Written exercises.
      3. Written summaries of magazine or newspaper articles.
      4. Laboratory assignments.
      5. Performance in the field, including the journal.
      6. Performance on the term project.

B. Frequency of evaluation:
   1. Quizzes are given in lecture and/or lab, at weekly or monthly intervals.
   2. Exams are given on a monthly basis, including a comprehensive final exam.
   3. Exercises are assigned on a frequency to support comprehension of material, as deemed appropriate by the instructor.
   4. Laboratory assignments are given weekly.
   5. Typically, the class will take two field trips each semester.

C. Levels of Evaluation Upon Repetition
   1. First Enrollment
      Students are expected to draw conclusions from some of the more obvious geologic relationships that are immediately apparent.
   2. Second Enrollment
      Students are expected to demonstrate greater insight into geologic processes and be able to explain more complex geologic relationships.
   3. Third Enrollment
      Students are expected to work with little supervision to analyze and master the geomorphism of the field area visited. Third enrollment students will typically be assigned as group leaders to assist first and second enrollment students.
   4. Fourth Enrollment
      Students will be given an individual assignment commensurate with their interests and career goals that will require challenging and in-depth analysis of field observations.

D. Typical exam questions
   1. Explain why mesas are not a common geologic feature in Death Valley.
   2. What hydrologic features are evident in the lower Owens Valley? What geologic path lead to these currently visible characteristics?

VIII. TYPICAL TEXTS

Sharp, Robert P. and Allen F. Glazner, *Geology Underfoot in Death Valley and Owens Valley*, Mountain Press Publishing Co., Missoula, Montana,1997.

Sharp, Robert P., *A Field Guide to Southern California*, 3rd ed., Kendall/Hunt, Dubuque, Iowa, 1994.

Hunt, C. B., *Death Valley*, University of California Press, Los Angeles 1975.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

A. Field supplies depending on the particular trip.