

Course Title: THE GEOLOGY AND EVOLUTION OF CAVES

Instructor: Ronal Kerbo

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Description:

This course is an introduction to speleology the science and study of caves. Topics include cave development and evolution (speleogenesis), cave decorations (speleothems) and the adaptations of living organisms to life below ground.

Pre-requisite: None

Competencies:

1. Explain the origin of caves and cave speleothems in terms of basic hydrologic and geochemical processes. (I, II, III, IV, V)
2. Relate principles of adaptation and evolution to cave flora and fauna (VI)
3. Apply classroom information to the analysis and interpretation of actual cave features in a field setting Recognize and classify the corrosive, collapse and depositional features in a particular cave setting. (VII, VIII)

Topical Outline

I. INTRODUCTION:

Caves as dwelling places, burial sites, storehouses, and places of worship. Caves as objects of scientific investigations. This course concentrates on the science of cave evolution, cave speleothems, and cave life.

II. GEOLOGIC AND GEOGRAPHIC LOCATION OF CAVES:

Effects of rock types, geologic setting and climate, soils and vegetation, and water and rock chemistry on the formation of caves.

- A. Caves in Lava
- B. Evaporites: Gypsum, anhydrite, rock salt
- C. Carbonate Rocks: Limestone and dolomite.

III. HYDROLOGY AND CHEMISTRY OF CAVE SYSTEMS:

- A. Porosity and permeability of the rock; regional water catchment area
- B. Groundwater zones: Vadose (Zone of Aeration, above water table) and Phreatic (Zone of Saturation, below water table).
- C. Hydrology: water velocity and pressure, cave wall roughness, change in passage cross-section (wide and narrow), change in direction (vertical and horizontal), and passage curvature.
- D. Cave chemistry, atmosphere and environment: Loss of CO<sub>2</sub> from water, evaporation, chemical reaction (Lechuguilla Cave, N.M.); temperature, humidity, air pressure, air currents, and light.

IV. STAGES OF LIMESTONE CAVE EVOLUTION: MOST COMMON CAVE SYSTEMS ARE BOTH PHREATIC AND VADOSE IN ORIGIN.

V. DEPOSITIONAL FEATURES IN CAVES:

- A. Collapse types and causes of collapse: Block, Slab, and chip
- B. Speleothems

Cave Flora and Fauna:

VI. CAVE LIFE:

- A. Types of Microscopic Cave flora and Fauna and their characteristics
- B. Cave Animals, adaptations and evolution

VII. SPECIAL TOPICS OF CAVES

- A. Calcite-Aragonite Problem
- B. Speleothem dating, indicators of paleoclimate, growth rates, and old age.
- C. Protection of Caves and Cave Speleothems

VIII. FIELD TRIP TO A COLORADO CAVE SYSTEM

Existing Deliveries for this Course:

T: Traditional Classrooms;

WW: Internet;

TL: Passive Video (one way video with 2-way audio, TV transmission, satellite, and videotapes.);

Other (PowerPoint Presentations and Slide lectures)

GEY 143 Geology and Evolution of Caves

2 Credits

This course is an introduction to the science of caves. Topics include cave formation and evolution, cave decorations (speleothems) and the adaptations of living organisms to life below ground. A one-day field trip to a nearby cave system is included.

### Assignments and grading

Assignment	Percentage of grade
Class participation, attendance, and knowledge quizzes	80%
Cave field trip	20%
	100%
A =	90 to 100%
B =	80 to 89%
C =	70 to 79%
D+ =	60 to 69%
F =	59% and lower