GEOL4315/5315/6315 **COURSE SYLLABUS** **SPRING 2020**
CRN26613/29174/29189

INTRODUCTION TO ECONOMIC GEOLOGY: PRINCIPLES AND PRACTICE

Instructor(s) Dr. Phil Goodell, Dr. Antonio Arribas
Lecture T & Th, 3:00-4:20 in GEOL Room 320

Course Description and Objectives

This course will introduce the student to the principles and practice of one of the main entrepreneurial activities in the geosciences: *economic geology*. The course aims to provide an overview and practical analysis of the economic geology profession, including its societal context, the relevant geologic and metallogenic science, and the fundamentals of mineral exploration. The objective is to help understand mineral exploration and how its practice reflects the evolution of scientific thinking (i.e., geological studies), technological/engineering developments, and the all-important environmental and socio-economic issues.

Summary of topic contents and learning objectives

Mineral resources are crucial to every person's way of life in our modern society, both to maintain the standard of living in the developed world, and for the growth that is essential in the developing world. Contrary to some widely-held views, all past evidence clearly indicates that we are not going to run out of mineral resources any time soon. Thus, the expected continual increase in the consumption of metals must be met with attention to the numerous challenges facing the sensible development of mineral resources and exploration for new ore deposits. This course will review these issues and examine modern exploration for a range of commodities based on ore deposit models, strategies, methods and discovery case studies.

In addition to readings concerning the material at hand, each student will be involved in an exercise on mineral exploration in a selected area, with all areas in a region along the southern Arizona-New Mexico border. Student projects will compile relevant exploration data, develop an exploration plan and budget, and report their results. A field trip will include some of these areas.

Subjects Covered

- Mineral resources and society: past, present and future (necessity of metal production and thus exploration).
- The geological science behind mineral exploration: base- and precious-metal deposits, including porphyry, epithermal, skarn and carbonate replacement, among others.
- Ore deposit characteristics targeted during exploration: geology, geochemistry, geophysics, other.

- The business and practice of mineral exploration: strategies and the exploration sequence; discovering, defining and assessing ore deposits
- Introduction to engineering, economic, environmental and societal issues associated with mineral resources and mineral resource development
- Case studies of mineral exploration: conceptual and practical lessons

Course Requirements: Prerequisite
Background in general geology, mineralogy, basic chemistry; knowledge of ore deposits useful.

Textbook/required reading
Several key research articles will be distributed for reading and discussion. In addition, a copy of *"Mineral Exploration and Mining Essentials"*, by Robert Stevens, will be made available to each student in the class.

Course content

Week	Month/Day	Discussion topic
1	Jan. 21/23	Introduction. Mineral deposits/commodities and Society
2	Jan. 28/30	Regional and metallogeny of the exploration exercise
3	Feb. 4/6	Magmatic-hydrothermal deposits I: porphyry, HS/IS epithermal deposits
4	Feb. 11/13	Magmatic-hydrothermal deposits II: porph./epith. (cont.), LS epithermal
5	Feb. 18/20	Mineral exploration: strategies and the exploration sequence Entrepreneurial Geosciences I.
6	Feb. 25/27	Magmatic-hydrothermal deposits III: carbonate replacement & skarns
7	Mar. 3/5	Prospectors and Developers Association of Canada Annual Meeting
8	Mar. 10/12	Field Trip (tentative)
9	Mar. 24/26	Economic, environmental and societal issues associated with mineral resource discovery and development (ESG/CSR)
10	Mar31-Apr1	Geochemical exploration
11	Apr. 7/9	Geophysical exploration
12	Apr. 14/16	Professional tools applicable to academia and industry
13	Apr. 21/23	Student presentations I
14	Apr. 28/30	Student presentations II
15	May 5/7	Open topic. Entrepreneurial Geosciences II
16	May 12/14	Final exam

Grading policy
Course grade will be based on the score of a final exam, student presentation(s), and class assignments or quizzes