GEOL A285: PETROLOGY

Item	Value
Curriculum Committee Approval Date	10/21/2015
Top Code	191400 - Geology
Units	4 Total Units
Hours	108 Total Hours (Lecture Hours 54; Lab Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	Yes
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)

Course Description

Origin, occurrence, identification, and classification of rocks and rock-forming minerals. Emphasis on hand lens/microscopic identification and field occurrences. PREREQUISITE: GEOL A280. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Distinguish the crystal chemistry principles as applied to rock-forming minerals.
2. Classify rocks by hand specimens in the lab and in the field.
3. Quantify and analyze rock data using petrographic techniques.
4. Interpret rocks to determine genesis and geologic environments
5. Differentiate the different rock-forming minerals.

Course Objectives

- 1. Explain the origin of igneous, sedimentary and metamorphic rocks.
- 2. Classify and identify igneous rocks.
- 3. Describe the formation and evolution of magmas.
- 4. Utilize phase diagrams to describe the formation of rocks.
- 5. Identify sedimentary rocks based upon their physical characteristics.
- 6. Describe the depositional environment of a sedimentary rock based upon the physical and mineralogical characteristics of the rock.
- 7. Describe metamorphic facies.
- 8. Explain metamorphic processes and identify the metamorphic rocks that result from these processes.
- 9. Explain the affect of pressures and temperature on the metamorphism of various types of rocks.
- 10. Explain the relationship between tectonics and rock types.

Lecture Content

I. Introductiona. Petrology as a scienceb. Petrologic cycleII. Igneous rocksa. Field occurrencesb. Plate tectonic settingsc. Petrogensisd. Theoretical petrology and phase diagramse. Examination and IUGS classificationf. Optical mineralogy of igneous rock-forming mineralsIII. Metamorphic rocksa. Types of metamorphismb. Metamorphic faciesc. Metomorphic reactionsd. Petrogenetic gridse. Metamorphism related to plate tectonicsf. Field occurancesg. Examination and classificationh. Optical mineralogy of meto morphic rock-forming mineralsIV. Sedimentary rocksa. Sedimentary environmentsb. Lithification and diagenesisc. Recognition and interpretation of textures and structuresd. Field occurrencese. Examination and classificationf. Sedimentary rocks in thin section

Lab Content

Laboratory- Petrography Examination of the Igneous Rocks and IUGS classification Optical mineralogy of igneous rock-forming minerals Basalts Ultramafics Calc-alkaline rocks Granites and alkaline rocks CIPW norms Phase diagrams Examination and classification of the Sedimentary RocksSedimentary rocks in thin section Clastic sedimentary rocks Evaporite sedimentary rocks Examination and classification of the Metamorphic Rocks Optical mineralogy of metamorphic rock-forming minerals Identification of metamorphic minerals Pressure-Temperature determinations

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- Lab (04)
- DE Live Online Lab (04S)

Instructional Techniques

Activity Cooperative Learning Directed Study Discussion Experiments Field Experience Field Trips Guest Lecturers Guided Inquiry Handouts Instructor-Prepared Materials Lab Lecture Mediated Learning Multimedia Presentations Observation and Demonstration Projects Students who wish to go into greater subject depth are referred to specific outside resources and where to find them, e.g. journals, books, maps, charts, models, Internet sites, geological locales, parks, and museums.

Reading Assignments

Students will spend approximately two hours per week on readings assigned from textbook(s, the introduction to each laboratory exercise, and handouts given in class

Writing Assignments

Students will spend approximately two hours per week on the following: Written assignments that analyze and critically evaluate the formation of different rocks (rock reports) Write brief answers to questions in the lab exercises Write answers to questions at the end of chapters from the text Use deductive reasoning along with measured properties to identify minerals and rocks

Out-of-class Assignments

Students will spend approximately two hours per week on homework including textbook exercises and shall attend field trips to various locations of geologic interest

Demonstration of Critical Thinking

Rock reports - laboratory assignments where student writes a 2-3 page paper for each sample examined The students shall identify unknown rocks by using the texture and observed mineralogy

Required Writing, Problem Solving, Skills Demonstration

Each week the student shall do one or more of the following: 1.Write brief answers to questions in the lab exercises 2.Write answers to questions at the end of chapters from the text 3.Use deductive reasoning along with measured properties to identify minerals and rocks

Eligible Disciplines

Earth science: Masters degree in geology, geophysics, earth sciences, meteorology, oceanography, or paleontology OR bachelors degree in geology AND masters degree in geography, physics, or geochemistry OR the equivalent. Masters degree required.

Textbooks Resources

1. Required Blatt, Tracy and Owens . Petrology: Igneous, Sedimentary, and Metamorphic, 3rd ed. New York: W.H. Freeman and Co., 2006 Rationale: latest 2. Required Raymond, L.. Petrology The Study of Igneous, Sedimentary, and Metamorphic Rocks, 2nd ed. Long Grove, IL: Waveland Press, 2002 Rationale: . 3. Required Raymond, L.. Petrography Laboratory Manual Handspecimen and Thin Section Petrography, 3rd ed. Long Grove, IL: Waveland Press, 2010 Rationale: .