

ME571/Geol571 Advanced Topics—Geology and Economics of Strategic and Critical Minerals (3 credits) Spring 2013

INSTRUCTOR—Dr. Virginia T. McLemore

Strategic minerals are commodities that are essential to the national defense, but are subject to potential supply disruptions. Critical minerals are commodities that perform an essential function for which few or no satisfactory substitutes exist. The list of critical and strategic minerals consists of, but is not limited to: rare earth elements (REE), lithium, platinum group elements (PGM), antimony, rhenium, beryllium, tantalum, cobalt, chromium, tin, tantalum, tellurium, niobium, tungsten, gallium, yttrium, bauxite, and germanium. These elements have captured international attention due to their application in a range of developing markets such as consumer electronic devices, electric and hybrid vehicles, wind turbines, solar panels, energy efficient lighting and medical diagnostic equipment. In this course, we will examine the economics, occurrence, geology, uses, and politics of some of these commodities. Field trips will examine deposits in New Mexico and adjacent states.

The class will meet one day TBD, 4-7 PM, B127 for ~120 minutes with the remaining time spent on field trips or in occasional extra discussion sessions with visiting scientists. The first class will be Tuesday Jan 22, 2013, 4PM, B127 (Bureau conference room).

WEEK OF:

January	21—Introduction: Strategic and critical minerals definition and overview 28—Basic concepts: Geology, types of deposits, mining, and processing
February	04— Commodities: Introduction 11— Rare earth elements 18— Rare earth elements—cont 25— Midterm exam (Take Home), Annual SME meeting in Denver (24-27), no class
March	04— Commodities--beryllium 11— Spring break 18— Platinum group metals, cobalt 25— Sustainable development
April	01—Commodities 08—Commodities 12—New Mexico Geological Society Spring meeting, Socorro 15—Commodities 22—Commodities 29— Present research results in class (15 mins); Final exam given out (Take Home)
May	06— Final Exam, research report due by noon on May 8 th

Textbooks

Kogel, J.E, Trivedi, N.C., Barker, J.M., and Krukowski, S.T., 2006, ed., Industrial Minerals and Rocks, 7th edition: Society for Mining, Metallurgy, and Exploration, Littleton, Colorado—available online from SME at student price \$193 if you become a member online (use McLemore member #2142500 as recommendation) to get this price (save more \$ than membership costs plus you should all be members of SME anyway) NOTE: I also have this on CD for anyone not wanting to buy it.

Committee on Critical Mineral Impacts of the U.S. Economy, 2008, Minerals, Critical Minerals, and the U.S. Economy: Committee on Earth Resources, National Research Council, ISBN: 0-309-11283-4, 264 p., download from http://www.nap.edu/catalog.php?record_id=12034#toc

Papers as assigned

Class Details

Exams: Midterm and Final—both are take home exams that will emphasize short answer and essay questions.

Term project—you are required to do a research project that will involve some original work. You can work on this as a team.

Discussion—we will assign papers to be read prior to class to be discussed by the class with one of you leading us. Each class member will be responsible for researching and leading the discussion (15 min) on one commodity.

Field trips—there will be 2 or more field trips and a field report on each trip will be required.

Basis for final grade	Midterm	25%
	Final (comprehensive)	30%
	Lab exercise	5%
	Term project	25%
	Class Participation, field trips	15%