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Received(time)	11:49 AM
Date	7/11/2006

Ohio Articulation Number (OAN)
Course Submission Form
2005-2006

College/University Bowling Green State University

Course(s) Submitted(Title & Course #) **GEOL 302.** *Earth Materials I*

Ohio Articulation Number for OSC 013

Date April 6, 2006 Course _____ of a _____ Course OAN mapping.

Name and title of individual submitting on behalf of the college/university

Name Mark Gromko Title Vice Provost for Academic Programs

Address Provost's Office, BGSU, BG, OH 43403

E-mail mgromko@bgnet.bgsu.edu

Phone 419 372 7794

Fax 419 372 8446

Credit Hours 4 qtr _____ sem x

Lecture Hours 3

Laboratory Hours 2 (if applicable)

Pre-Requisites(s) Course work (if applicable)

Prerequisites or corequisites: GEOL 104; GEOL 315; and CHEM 125 or CHEM 135 .

Placement Score (if applicable)
(Name of test)
(Domain) (Score)

Catalog/Course Description (Includes Course Title and Course #)

GEOL 302. *Earth Materials I (4).* Fall. Classification, identification, chemistry, association, economics and genesis of crystals, minerals and rocks. Three lectures and one two-hour laboratory. Prerequisites or corequisites: GEOL 104 ,GEOL 315 , and CHEM 125 or CHEM 135 .

Texts/Outside Readings/Ancillary Materials

Course Textbook: *Introduction to Mineralogy*, W. D. Nesse (2000).
Most lecture topics and laboratory exercises will come with supplemental notes that will be handed out in class.

Course Objectives and/or Plan of Work

Course Goals: Simply stated, the earth is made of rocks, and rocks are groups of minerals. Hence, in order to understand those processes that have, and continue to mold and shape our home planet, we must learn to extract and employ the wealth of information contained in minerals and rocks. The major goal of this course is to guide you to achieve a basic understanding of minerals and the information they provide about earth processes and earth history.

This general goal can be elaborated in terms of more specific objectives. At the completion of this course each of you should:

i. have an appreciation and working knowledge of the relationships among the crystal structure of a mineral, its chemical composition, and physical properties;
ii. have a general understanding of the factors that affect the stability and occurrence of minerals and assemblages of minerals;
iii. be able to identify common rock forming minerals in hand samples and thin sections; and
iv. be familiar with the equipment and resources available at BGSU and elsewhere to characterize minerals.

Learning Outcomes: In addition to the specified course goals, through this course you will work toward achieving the overall learning outcomes set forth for students in the Geology program at BGSU, these include:

1. Identify, describe, and classify earth materials, formations, and structures and interpret them in the context of geologic processes. (Investigate, Connect)
2. Analyze and report quantitative geologic data collected in the field and laboratory. (Investigate, Write)
3. Read, write, present and critically evaluate geologic reports, professional papers and maps. (Investigate, Write, Present)
4. Synthesize information from a variety of disciplines to

solve geological problems. (Connect)

5. Define and conduct original research in the geological sciences. (Investigate, Connect)

Description of Assessment and/or Evaluation of Student Learning

Evaluation/grading - Student evaluation/grading for this course consists of four components: laboratory reports (40%), in-class hourly exams (30%), problem sets and in-class assignments (20%) and laboratory practical exams (10%). These evaluation techniques are designed to provide you with ample opportunities to demonstrate progress toward achieving the course goals outlined above. Details of how to compose your laboratory reports will be provide at the first laboratory meeting. The exams are designed to assess not only the body of facts that you have acquired, but also the other five cognitive levels of Bloom's taxonomy (comprehension, application, analysis, synthesis and evaluation). It is important at this point in your educational development that you "think" and "act" as a geoscientist.

Master Syllabi and Working Syllabi (if both are used)

LECTURE AND LABORATORY SCHEDULE

	Date	Lecture/Lab Topics	Readings
M	Aug 22	Introduction	Chpt 1
Lab		*Review of Physical Properties of Minerals and Classification systems*	Chpt 6
W	Aug 24	Geochemistry I – element distribution	handout
F	Aug 26	Geochemistry II – isotopes	
M	Aug 29	Crystallography I – symmetry	Chpt 2
Lab		*Symmetry elements*	
W	Aug 31	Crystallography II – symmetry operations, crystal systems	
F	Sep 2	Crystallography III - coordinate systems, Miller indices	
M	Sep 5	**Labor Day Holiday**	
Lab			
W	Sep 7	Crystallography IV – crystal forms	
F	Sep 9	Crystal chemistry I – ions, bonding, coordination	Chpt 3
M	Sep 12	Crystal chemistry II - Pauling's Rules	Chpt 4
Lab		*Crystal forms*	
W	Sep 14	Crystal chemistry III - common structure types	
F	Sep 16	Diffraction I - the diffraction phenomena, X-ray diffraction	Chpt 8
M	Sep 19	Diffraction II - X-ray diffraction and crystal refinement	
Lab		*XRD and crystal refinement*	
W	Sep 21	finish diffraction/review	
F	Sep 23	Systematic Mineralogy I – native elements, oxides, sulfides	Chpt 18-20
M	Sep 26	Optics I – interaction of light with matter, refractive index	Chpt 7
Lab		*Petrographic microscope I – introduction and refractive index*	
W	Sep 28	**Exam I** (thru 9/21)	
F	Sep 30	Systematic Mineralogy II - carbonates, sulfates, halides	Chpt 17, 18
M	Oct 3	Optics II –double refraction, retardation, birefringence, interference	

Lab		*Petrographic microscope II – uniaxial minerals*	
W	Oct 5	Optics III –optical indicatrix, uniaxial-biaxial crystals	
F	Oct 7	Systematic Mineralogy III - Structure of silicate melts and minerals	Chpt 11
M	Oct 10	**Fall Break**	
Lab			
W	Oct 12	Optics IV – conoscopic observations – interference figures	
F	Oct 14	**Lab Practical I** - Handsample Identification of Nonsilicate Minerals	
M	Oct 17	Optics V – accessory plates, optic sign, 2V	
Lab		*Petrographic microscope III – biaxial minerals*	
W	Oct 19	Thermo I - system, free energy, phase diagrams, phase rule	Chpt 5
F	Oct 21	Systematic Mineralogy IV - orthosilicates, ring silicates	Chpt 15, 16
M	Oct 24	Thermo II - unary systems, Clapeyron's equation	
Lab		*Ice-water-halite phase diagram*	
W	Oct 26	Thermo III – LaChatlier's principle, binary systems	
F	Oct 28	Thermo IV - ternary systems	
M	Oct 31	Mineral Transformations I - stability, kinetics, diffusion	
Lab		*Crystal Growing*	
W	Nov 2	Mineral Transformations II - nucleation and growth	
F	Nov 4	Mineral Transformations III - transformation rate	
M	Nov 7	catch-up/review	
Lab		*Magma Ascent Rate - application of mineral kinetics*	
W	Nov 9	**Exam II** (thru 11/4)	
F	Nov 11	**Veterans' Day Holiday**	
M	Nov 14	Fluids in the crust	handout
Lab		*Fluid inclusions*	
W	Nov 16	Mineral Properties I - polymorphism, ordering	Chpt 4
F	Nov 18	Systematic Mineralogy V – chain and sheet silicates	Chpt 13, 14
M	Nov 21	Systematic Mineralogy VI – framework silicates	Chpt 12
Lab		*Is the Moon made of Swiss Cheese? - Remote Sensing of Minerals*	
WF	Nov 23-25		**Thanksgiving Hol**
M	Nov 28	Mineral Properties II - twinning, exsolution	Chpt 5
Lab		*Feldspars*	
W	Nov 30	Mineral Properties III - imperfections, recrystallization	
F	Dec 2	**Lab Practical II** - Handsample Identification of Silicate Minerals	
M	Dec 5	Minerals and your Health	
Lab		*Electron Microscopy*	
W	Dec 7	Minerals - the Scaffold for Life	
F	Dec 9	review	
T	Dec 13, 8:30-10:30 **Exam III**		

Additional Documentation

OBR Use	Action
Approved	
Additional Information Requested	
Rejected	
Date	