General Education Review Committee
Agenda

12:30-1:30
February 12, 2010
ADM 204

I. Call to Order

Roll

( ) Suzanne Forster	UAB/CAS	Written Communication
( ) Oliver Hedgepeth	UAB/CBPP	
( ) Utpal Dutta	UAB/SOE	
( ) Kevin Keating	UAB/Library	
( ) Deborah Fox	UAB/Mat-Su	
( ) Kenrick Mock	UAB/CAS	
( ) Len Smiley	CAS	Quantitative Skills
( ) Barbara Harville	CAS	Oral Communication
( ) Walter Olivares	CAS	Fine Arts
( ) Patricia Fagan	CAS	Humanities
( ) Beverly Barker		Natural and Physical Sciences
( ) Catherine Sullivan	CHSW	
( ) Robert Capuozzo	COE	
( ) Sandra Pence	CTC	
( ) Vacant		Social Sciences
( ) Hilary Davies	UAB	Ex officio/UAB Chair
( ) Bart Quimby	UAB	Ex officio/OAA
( ) Vacant	Student	

II. Approval of Agenda (pg. 1)

III. Approval of Summary (pg. 2-3)

IV. Report from Associate Vice Provost Bart Quimby

V. Chair's Report

VI. Course Action Requests

Chg GEOL A360 Geochemistry (3 cr) (3+0) (pg. 4-11)

VII. Old Business
A. Subcommittee Discussions

VIII. New Business

IX. Informational Items and Adjournment

General Education Review Committee
Summary

12:30-1:30
January 22, 2010
ADM 204

I. Call to Order

Roll

(x) Suzanne Forster	UAB/CAS	Written Communication
(e) Oliver Hedgepeth	UAB/CBPP	
( ) Utpal Dutta	UAB/SOE	
(x) Kevin Keating	UAB/Library	
(x) Deborah Fox	UAB/Mat-Su	
(e) Kenrick Mock	UAB/CAS	
(x) Len Smiley	CAS	Quantitative Skills
(x) Barbara Harville	CAS	Oral Communication
(x) Walter Olivares	CAS	Fine Arts
(x) Patricia Fagan	CAS	Humanities
(x) Beverly Barker		Natural and Physical Sciences
(x) Catherine Sullivan	CHSW	
(x) Robert Capuozzo	COE	
(x) Sandra Pence	CTC	
( ) Vacant		Social Sciences
(e) Hilary Davies	UAB	Ex officio/UAB Chair
(e) Bart Quimby	UAB	Ex officio/OAA
( ) Vacant	Student	

II. Approval of Agenda (pg. 1)
Approved

III. Approval of Summary (pg. 2-3)
Add additional names of people who were added to the subcommittees:
Student Survey
Hilary
Marcia/Barbara
Len
Sandra

Faculty Survey
Debi
Kenrick
Kevin
Utpal

Artifacts
Suzanne
Patricia
Catherine Sullivan (Susan Wilson)
Walter
Robert

Clarify the motion by adding the word Review and a comma.
MOTION: The General Education **Review** Committee supports the creation of a funded faculty group**,** General Education Assessment Committee.
Approved with changes

IV. Report from Associate Vice Provost Bart Quimby
Unable to attend

V. Chair's Report

VI. Course Action Requests

Chg SOC A202 Social Institutions: Sex, Knowledge, Money, Power, and God (3 cr) (3+0) (pg. 4-7)
Approved

Add ECON A123 Introduction to Behavioral Economics (3 cr) (3+0) (pg. 8-14)
Approved

VII. Old Business
A. Update from last week's subcommittees

VIII. New Business

IX. Informational Items and Adjournment

Course Action Request
University of Alaska Anchorage
Proposal to Initiate, Add, Change, or Delete a Course

1a. School or College	1b. Division	1c. Department
AS CAS	AMSC Division of Math Science	Geological Sciences

2. Course Prefix	3. Course Number	4. Previous Course Prefix & Number	5a. Credits/CEUs	5b. Contact Hours (Lecture + Lab)
GEOL	A360		3	(3+0)

6. Complete Course Title
Geochemistry

Abbreviated Title for Transcript (30 character)

7. Type of Course ☒ Academic ☐ Preparatory/Development ☐ Non-credit ☐ CEU ☐ Professional Development

8. Type of Action: ☐ Add *or* ☒ Change *or* ☐ Delete

If a change, mark appropriate boxes:

- ☐ Prefix
- ☐ Credits
- ☐ Title
- ☐ Grading Basis
- ☐ Course Description
- ☐ Test Score Prerequisites
- ☐ Other Restrictions
  - ☐ Class ☐ Level
  - ☐ College ☐ Major
- ☐ Course Number
- ☐ Contact Hours
- ☐ Repeat Status
- ☐ Cross-Listed/Stacked
- ☒ Course Prerequisites
- ☐ Co-requisites
- ☐ Registration Restrictions
- ☒ Other GER capstone, CCG (please specify)

9. Repeat Status No # of Repeats Max Credits

10. Grading Basis ☒ A-F ☐ P/NP ☐ NG

11. Implementation Date semester/year
From: Fall/2010 To: /9999

12. ☐ Cross Listed with _____
☐ Stacked with Cross-Listed Coordination Signature

13a. Impacted Courses or Programs: List any programs or college requirements that require this course.

Please type into fields provided in table. If more than three entries, submit a separate table. A template is available at www.uaa.alaska.edu/governance.

Impacted Program/Course	*Catalog Page(s) Impacted*	*Date of Coordination*	*Chair/Coordinator Contacted*
1. BS Geological Sciences	103-105	10-26-09	LeeAnn Munk
2. BS Chemistry			Eric Holmberg
3. GEOL A321, A460, and A465/665			LeeAnn Munk

Initiator Name (typed): LeeAnn Munk

Initiator Signed Initials: _____ Date: _____

13b. Coordination Email Date: 10-30-09
submitted to Faculty Listserv: (uaa-faculty@lists.uaa.alaska.edu)

13c. Coordination with Library Liaison Date: 10-30-09

14. General Education Requirement
Mark appropriate box:
☐ Oral Communication ☐ Written Communication ☐ Quantitative Skills ☐ Humanities
☐ Fine Arts ☐ Social Sciences ☐ Natural Sciences ☒ Integrative Capstone

15. Course Description *(suggested length 20 to 50 words)*
Introduction to principles and applications of inorganic geochemistry. Emphasis on crystal structures and substitution in crystals, equilibrium geochemistry, dissociation of acids and bases, and mineral stability. Applying the laws of thermodynamics, Eh-pH diagrams, and oxidation-reduction reactions to geologic problems. Principles of radioactivity and geochronometers for age determination. A review of applications of stable isotopes to geologic problems.

16a. Course Prerequisite(s) *(list prefix and number)*	16b. Test Score(s)	16c. Co-requisite(s) *(concurrent enrollment required)*
GEOL A221 and CHEM A106	NA	NA

16d. Other Restriction(s)
☐ College ☐ Major ☐ Class ☐ Level

16e. Registration Restriction(s) *(non-codable)*
Junior standing; completion of all GER Tier 1 (basic college-level skills) courses.

17. ☐ Mark if course has fees

18. ☐ Mark if course is a selected topic course

19. Justification for Action
GEOL A360 is an exisiting course offered every year and is a natural fit for the GER integrative capstone because it is interdisciplinary requiring both geological sciences and chemistry.

Initiator (faculty only)	Date	☐ Approved ☐ Disapproved	Dean/Director of School/College	Date
LeeAnn Munk Initiator (TYPE NAME)				
☐ Approved ☐ Disapproved	Department Chairperson	Date	☐ Approved ☐ Disapproved	Undergraduate/Graduate Academic Board Chairperson	Date
☐ Approved ☐ Disapproved	Curriculum Committee Chairperson	Date	☐ Approved ☐ Disapproved	Provost or Designee	Date

Course Content Guide
University of Alaska Anchorage

GEOL A360
Geochemistry

I. Date of Initiation: Spring 2010

II. Course Information:

A. College or School: CAS
B. Course Subject: Geological Sciences
C. Course Number: A360
D. Number of Credits: 3.0 (3+0)
E. Course Title: Geochemistry
F. Grading Basis: A-F
G. Course Description: Introduction to principles and applications of inorganic geochemistry. Emphasis on crystal structures and substitution in crystals, equilibrium geochemistry, dissociation of acids and bases, and mineral stability. Applying the laws of thermodynamics, Eh-pH diagrams, and oxidation-reduction reactions to geologic problems. Principles of radioactivity and geochronometers for age determination. A review of applications of stable isotopes to geologic problems.
H. Status of Course Relative to Degree Program: Required core course for BSGS major and elective capstone course for BS-Chemistry majors and BS-Natural Science majors.
I. Course Fees: no
J. Lab fees: no
K. Coordination: UAA faculty list-serv, Chemistry Department
L. Cross-listing: none
M. Course Prerequisites: GEOL A221 and CHEM A106
N. Restrictions: Junior standing; completion of all GER Tier 1 (basic college-level skills) courses.
O. Course Attributes: UAA GER Integrative Capstone, required course for BSGS

III. Course Activities

This is primarily a lecture course. However, students will be engaged in every lecture through a systematic series of question and answer sessions lead by the professor. Student participation by articlation of their understanding of the coure material and readings is an integral part of the course. Students are required to research, read and summarize information from the literature on a topic of modern geochemistry that has an application to relevant scientific problems ranging from environmental contamination to the origin of the solar system. This research will be presented in written and oral format.

IV. Course Evaluation

The course will assess each student's ability to communicate effectively in both the written and oral formats through individual and in-class participation and through written synthesis of the professional literature. Students will be required to utilize a variety of peer-reviewed resources to complete their projects. The assignments will require quantitative and critical thinking skills to solve geochemistry problems relevant to the earth and climate sciences as well as ecological sciences. The outcomes will be evaluated using problem sets, exams, interactive class exercises, class discussions, and each student will give a lecture on a topic of geochemistry and its relevance to modern society as their final exam.

V. Course Level Justification

This is a 300-level course because it requires a 200-level prerequisite in geological sciences as well as a full year of inorganic chemistry at the 100 level. In order to meet the requirements of the GER integrative capstone this course provides students with content and problem solving skills that utilize chemistry and geologic concepts learned in other courses in the geological sciences and chemistry curriculum. Students are expected to analyze geochemical data and utilize it for problem solving applications in geology, chemistry and other sciences.

Specifically this course meets the various requirements of the GER integrative capstone in:

1. Knowledge Integration / Interrelationships and synergy among GER disciplines: Geochemitry is the foundation of many interdisciplinary scientific fields. It focuses on the connections between chemical principles and complex geologic processes and problems. There are applications to all areas of natural science as well as to relevant issues that face society such as water pollution, disposal of nuclear waste, and resource development.

2. Effective communication skills: Students are expected to articulate orally and in written format not only information related to course content but to apply it to modern scientific problems. This is accomplished through daily in class participation by answering question posed by the professor as well as through formal oral and written presentation.

3. Critical Thinking: Successful learning only happens when students must apply their knowledge to problem solving. This is a very important aspect of the course as students will complete homework problems that require not only a conceptual understanding of the lecture and reading material but the ability to solve geochemical problems with the application of equations and chemical principles. This requires integrating information across disciplines.

4. Information literacy: Students will use a combination of professional scientific journal articles as well as computer software to aquire the informatin they need for both homework assignments and for research papers.

5. Quantitative Perspectives: All aspects of geochemistry involve developing conceptual modesl based on an underestanding of how the Earth works and then applying various mathematical and chemical principles to quantifying the processes. Students must be able to generate and interpret scientific graphs of quantitative data, graphically displayed), and to generate graphs showing the relationship between different properties (such as the temperature and luminosity of a star). Exams will specifically test on these skills.

6. Evolving realities of the 21st Century: Many modern environmental problems that face the global society can be addressed with the science of geochemistry. Some examples include many types of environmental pollution of water, sediment, and the atmosphere. In addition, geochemistry has many applications to the understanding of global climate change. In addition, other aspects of resource exploration and development require a working knowledge of geochemical principles to ensure that the world has both energy and mineral resources that are developed in environmentally and socially responsible ways.

VI. Topical Course Outline

1. Introduction to geochemistry
    a. The history of the development of geochemistry as a science
    b. Early applications of geochemistry vs. modern
    c. Limitations of applying geochemistry to complex geologic problems
2. Basics of atomic physics as applied to minerals
    a. Electronic structure of atoms
    b. Periodic table and atomic weights
    c. Bonding, ionic crystals and radii
    d. Ionic substitutions in crystals
3. Aqueous geochemistry and mineral stability
    a. Acids, bases, and salts
    b. Chemical equilibria
    c. Law of Mass Action
    d. Dissociation of weak acids and bases
    e. pH control of dissociation equilibria
    f. Solubility of amorphous silica
    g. Solubility of salts and hydrolysis
    h. Activities and concentrations
    i. Carbonate equilibria
    j. Dissolution of feldspar
4. Review of thermodynamics
    a. Laws of thermodynamics
5. Mineral Stability Diagrams

    a. Common rock-forming minerals
    b. Weathering of sulfide ore deposits
6. Oxidation– reduction reactions
    a. Principles of redox
    b. Eh – pH diagrams
7. Geochronometery
    a. Law of radioactivity
    b. Radioactive decay modes
    c. Isotope geochronometers
    d. Methods of dating
8. Stable Isotopes
    a. Hydrologic cycle
    b. Climate change

VII. Instructional Goals and Student Outcomes:

A. Instructional Goals. The instructor will:

1) Present the use of geological and chemical principles to solve geochemistry problems.
2) Demonstrate the applications of geochemistry to solving relevant problems in the earth, natural and ecological sciences.
3) Prompt students to utilize problem solving skills gained from their training in both the geological sciences and chemistry to understand the integration and application of the two sciences.

B. Student Outcomes

Students will be able to:	Assessment Method
Demonstrate their knowledge of geochemical processes that are relevant to Earth systems.	Homework, in class discussions and exams
Diagram the periodic properties of the elements and integrate the principles of atomic structure with chemical bonding, crystal structure and elemental substitution in minerals of the Earth.	Homework, in class discussions and exams
Apply equilibrium geochemistry to principles and processes such as solubility, weathering, and effects of redox in aqueous environments.	Homework, in class discussions and exams
Derive the thermodynamic equations for mineral stability and construct mineral	Homework, in class discussions and exams

stability/solubility diagrams and apply the results to relevant geologic problems.	
Utilize the Law of radioactivity to generategeochronometry equations and graphical displays for age determination and compare the validity of various dating methods based on geologic situations. Apply stable isotope geochemistry to understand the hydrologic cycle and climate change.	Homework, in class discussions and exams
Develop both oral and written communication skills through demostrating their grasp of the field of geochemistry and its applications to solving important scientific problems.	In class discussions and presentations and written assignments

VII. Suggested Text(s)

Albarede, F., 2009, Geochemistry, an introduction, 2nd edition: Cambridge University Press, 356p.

Faure, G., 1998, Principles and applications of geochemistry, 2nd edition: New Jersey, Prentice Hall, 600p. (note: 3rd ed. by Faure, G. and Munk, L.A. in prep to be published 2012)

Walther, J., 2009, Essentials of geochemistry, 2nd edition: Sudbury, MA, Jones and Bartlett Publishers, 797p.

VIII. Bibliography

*Bowen, N.L., 1908. The evolution of the igneous rocks. Princeton University Press, Princeton, NJ, 332p.

Faure, G. and Mensing T., 2007. Principles and Applications of Isotope Geology, 3nd ed., Wiley, New York, 589p.

Hagedorn, B., Sletten, R.S., Hallet, B., McTigue, D.F., Steig, E.J., 2010, Ground ice recharge via brine transport in frozen soils of Victoria Valley, Antarctica: Insights from modeling of $\delta^{18}O$ and δD profiles, Geochimica et Cosmochimica Acta, no. 74, pp. 435-448.

Hoefs, J., 2009, Stable isotope geochemistry, 6th edition, Germany, Springer, 285p.

Huminicki, D.M.C., and Rimstidt, J.D., 2009, Iron oxyhydroxide coating of pyrite for acid mine drainage control, Applied Geochemistry, vol. 24, no. 9, pp. 1626-1634.

Palmer, M.R., and Pearson, P.N., 2003, A 23,000-year record of surface water pH and Pco_2 in Western Equatorial Pacific Ocean, Nature, v. 300, pp. 480-482.

Scanlon, B.R., Nicot J.P., Reedy, R.C., Kurtzman, D., Mukherjee, A., and Nordstrom, D.K., 2009, Elevated naturally occurring arsenic in semiarid oxidizing system, Southern High Planis aquifer, Texas, USA, Applied Geochemistry, v. 24, no. 11, pp. 2061-2071.

*classic reading