ARIZONA STATE UNIVERSITY

GENERAL STUDIES COURSE PROPOSAL COVER FORM

Course information:

*Copy and paste **current** course information from Class Search/Course Catalog.*

College/School: College of Liberal Arts and Sciences | Department: **School of Earth Space Exploration**

Prefix: **GLG** | Number: **489** | Title: Field Geochemistry | Units: 3.0

Is this a cross-listed course? Yes | If yes, please identify course(s): **CHM489**

Is this a shared course? (Choose one) | If so, list all academic units offering this course

*Note- For courses that are crosslisted and/or shared, a letter of support from the chair/director of **each** department that offers the course is required for **each** designation requested. By submitting this letter of support, the chair/director agrees to ensure that all faculty teaching the course are aware of the General Studies designation(s) and will teach the course in a manner that meets the criteria for each approved designation.*

Is this a permanent numbered course with topics? No

If yes, all topics under this permanent numbered course must be taught in a manner that meets the criteria for the approved designation(s). It is the responsibility of the chair/director to ensure that all faculty teaching the course are aware of the General Studies designation(s) and adhere to the above guidelines.

Chair/Director Initials _____ (Required)

Course description:

Requested designation: (Choose One)

*Note- a **separate** proposal is required for each designation requested*

Eligibility:

Permanent numbered courses must have completed the university's review and approval process.
For the rules governing approval of omnibus courses, contact Phyllis.Lucie@asu.edu or Lauren.Leo@asu.edu.

Submission deadlines dates are as follow:

For Fall 2016 Effective Date: October 1, 2015

For Spring 2017 Effective Date: March 10, 2016

Area(s) proposed course will serve:

A single course may be proposed for more than one core or awareness area. A course may satisfy a core area requirement and more than one awareness area requirements concurrently, but may not satisfy requirements in two core areas simultaneously, even if approved for those areas. With departmental consent, an approved General Studies course may be counted toward both the General Studies requirement and the major program of study.

Checklists for general studies designations:

Complete and attach the appropriate checklist

- Literacy and Critical Inquiry core courses (L)
- Mathematics core courses (MA)
- Computer/statistics/quantitative applications core courses (CS)
- Humanities, Arts and Design core courses (HU)
- Social-Behavioral Sciences core courses (SB)
- Natural Sciences core courses (SQ/SG)
- Cultural Diversity in the United States courses (C)
- Global Awareness courses (G)
- Historical Awareness courses (H)

A complete proposal should include:

- ☐ Signed course proposal cover form
- ☐ Criteria checklist for General Studies designation(s) being requested
- ☐ Course catalog description
- ☐ Sample syllabus for the course
- ☐ Copy of table of contents from the textbook and list of required readings/books

It is respectfully requested that proposals are submitted electronically with all files compiled into one PDF.

Contact information:

Name: Becca Dial | E-mail: bdial@asu.edu | Phone: 480-965-2213

Department Chair/Director approval: *(Required)*

Chair/Director name (Typed): Hilairy Hartnett | Date: 9/16/15

Chair/Director (Signature): Hilairy Hartnett 10/6/15

Rebecca Dial

From: Rebecca Dial
Sent: Thursday, October 01, 2015 7:48 AM
To: Anne Jones
Cc: Rebecca Polley; Hilairy Hartnett; Jo Anne Sercl
Subject: RE: application for Literacy & Critical Inquiry designation (L) for Field Geochemistry (GLG, CHM 489)

Hi Anne,
Actually, this email should suffice for your approval. Thank you for getting back to me so quickly!

Becca Dial
Academic Support Specialistly
School of Earth and Space Exploration
PO Box 876004
Tempe, AZ 85287-6004
Email: bdial@asu.edu
Phone: 480-965-2213

From: Anne Jones
Sent: Wednesday, September 30, 2015 10:47 PM
To: Rebecca Dial
Cc: Rebecca Polley; Hilairy Hartnett; Jo Anne Sercl
Subject: RE: application for Literacy & Critical Inquiry designation (L) for Field Geochemistry (GLG, CHM 489)

Dear Ms. Dial,

I will be happy to support Hilairy's application for the literacy designation for the field geology course. Please let me know to whom I should address the letter and any particular comments you would like me to include. Then I will make sure you get the letter.

Yours truly,

Anne

Anne Katherine Jones
Associate Director of Academic Affairs and Associate Professor
School of Molecular Sciences (formerly Department of Chemistry and Biochemistry)
Arizona State University

From: Rebecca Dial
Sent: Wednesday, September 30, 2015 9:40 AM
To: Anne Jones
Cc: Rebecca Polley; Hilairy Hartnett
Subject: RE: application for Literacy & Critical Inquiry designation (L) for Field Geochemistry (GLG, CHM 489)

Hello Professor Jones,
Hilairy Hartnett would like to add the Literacy designation for her GLG/CHM489 course. In order to submit our proposal we will need a letter of support from Chemistry. Will you please review the attached materials and let us know if you support this change?

Thanks!

Becca Dial
Academic Support Specialist
School of Earth and Space Exploration
PO Box 876004
Tempe, AZ 85287-6004
Email: bdial@asu.edu
Phone: 480-965-2213

From: Rebecca Dial
Sent: Wednesday, September 30, 2015 9:31 AM
To: Hilairy Hartnett; Rebecca Polley
Cc: Jo Anne Sercl
Subject: RE: application for Literacy & Critical Inquiry designation (L) for Field Geochemistry (GLG, CHM 489)

Hi Jo Anne,
Just following up on this. Will you please have your chair/director send us a letter of support to add the L designation to GLG/CHM489?

Thanks!

Becca Dial
Academic Support Specialist
School of Earth and Space Exploration
PO Box 876004
Tempe, AZ 85287-6004
Email: bdial@asu.edu
Phone: 480-965-2213

From: Rebecca Dial
Sent: Wednesday, September 16, 2015 1:48 PM
To: Hilairy Hartnett; Rebecca Polley
Cc: Jo Anne Sercl
Subject: RE: application for Literacy & Critical Inquiry designation (L) for Field Geochemistry (GLG, CHM 489)

Hi Jo Anne,
I will submit the paperwork for this course. I will need a letter of support from your chair/director that they agree with this change. Is that something you can take care of? If not, who do I need to contact?

Thanks!

Becca Dial
Academic Support Specialist
School of Earth and Space Exploration
PO Box 876004
Tempe, AZ 85287-6004
Email: bdial@asu.edu
Phone: 480-965-2213

From: Hilairy Hartnett [mailto:h.hartnett@asu.edu]
Sent: Wednesday, September 16, 2015 11:41 AM
To: Becca Dial; Rebecca Polley
Cc: Jo Anne Sercl
Subject: application for Literacy & Critical Inquiry designation (L) for Field Geochemistry (GLG, CHM 489)

Hi Everyone,
In order to make Field Geochemistry (GLG, CHM 489) a more useful option for the Environmental Chemistry majors it needs to have the Literacy and Critical Inquiry 'L' designation. I believe that based on the current structure of the class this should be an easy application.

I have assembled the information needed to apply for the literacy designation for Field Geochemistry.
Attached are my syllabus and appropriate project guidelines and rubrics, along with the Literacy checklist, and my narrative responses to the four questions.

I do need to make sure that this designation is applied to both the GLG489 and the CHM489 sections.

Please let me know what else I need to do to complete this process.
Thanks,
Hilairy

Hilairy Ellen Hartnett
Associate Professor School of Earth & Space Exploration and School of Molecular Sciences
Associate Director, Undergraduate Programs School of Earth & Space Exploration
Honors Faculty Barrett, the Honors College
Arizona State University

Arizona State University Criteria Checklist for

LITERACY AND CRITICAL INQUIRY - [L]

Rationale and Objectives

Literacy is here defined broadly as communicative competence—that is, competence in written and oral discourse. **Critical inquiry** involves the gathering, interpretation, and evaluation of evidence. Any field of university study may require unique critical skills that have little to do with language in the usual sense (words), but the analysis of written and spoken evidence pervades university study and everyday life. Thus, the General Studies requirements assume that all undergraduates should develop the ability to reason critically and communicate using the medium of language.

The requirement in Literacy and Critical Inquiry presumes, first, that training in literacy and critical inquiry must be sustained beyond traditional First Year English in order to create a habitual skill in every student; and, second, that the skill levels become more advanced, as well as more secure, as the student learns challenging subject matter. Thus, two courses beyond First Year English are required in order for students to meet the Literacy and Critical Inquiry requirement.

Most lower-level [L] courses are devoted primarily to the further development of critical skills in reading, writing, listening, speaking, or analysis of discourse. Upper-division [L] courses generally are courses in a particular discipline into which writing and critical thinking have been fully integrated as means of learning the content and, in most cases, demonstrating that it has been learned.
Notes:

1. ENG 101, 107 or ENG 105 must be prerequisites
2. Honors theses, XXX 493 meet [L] requirements
3. The list of criteria that must be satisfied for designation as a Literacy and Critical Inquiry [L] course is presented on the following page. This list will help you determine whether the current version of your course meets all of these requirements. If you decide to apply, please attach a current syllabus, or handouts, or other documentation that will provide sufficient information for the General Studies Council to make an informed decision regarding the status of your proposal.

Revised April 2014

Proposer: Please complete the following section and attach appropriate documentation.

ASU - [L] CRITERIA

TO QUALIFY FOR **[L]** DESIGNATION,THE COURSE DESIGN MUST PLACE A MAJOR EMPHASIS ON COMPLETING CRITICAL DISCOURSE--**AS EVIDENCED BY THE FOLLOWING CRITERIA:**

YES	NO		Identify Documentation Submitted
☒	☐	**CRITERION 1:** At least 50 percent of the grade in the course should depend upon writing assignments (see Criterion 3). Group projects are acceptable only if each student gathers, interprets, and evaluates evidence, and prepares a summary report. *In-class essay exams may not be used for [L] designation.*	syllabus

1. Please describe the assignments that are considered in the computation of course grades--and indicate the proportion of the final grade that is determined by each assignment.

2. **Also:**

Please **circle, underline, or otherwise mark** the information presented in the most recent course syllabus (or other material you have submitted) that verifies **this description** of the grading process--and label this information **"C-1".**

C-1

YES	NO		Identify Documentation Submitted
☒	☐	**CRITERION 2:** The writing assignments should involve gathering, interpreting, and evaluating evidence. They should reflect critical inquiry, extending beyond opinion and/or reflection.	Field Report rubrics

1. Please describe the way(s) in which this criterion is addressed in the course design.

2. **Also:**

Please **circle, underline,** or **otherwise mark** the information presented in the most recent course syllabus (or other material you have submitted) that verifies **this description** of the grading process--and label this information **"C-2".**

C-2

YES	NO		Identify Documentation Submitted
☒	☐	**CRITERION 3:** The syllabus should include a minimum of two writing and/or speaking assignments that are substantial in depth, quality, and quantity. Substantial writing assignments entail sustained in-depth engagement with the material. Examples include research papers, reports, articles, essays, or speeches that reflect critical inquiry and evaluation. Assignments such as brief reaction papers, opinion pieces, reflections, discussion posts, and impromptu presentations are not considered substantial writing/speaking assignments.	syllabus, field report rubrics, final project guidlelines

1. Please provide relatively detailed descriptions of two or more substantial writing or speaking tasks that are included in the course requirements

2. **Also:**

Please **circle, underline,** or **otherwise mark** the information presented in the most recent course syllabus (or other material you have submitted) that verifies **this description** of the grading process--and label this information **"C-3".**

C-3

ASU - [L] CRITERIA

YES	NO		Identify Documentation Submitted
☒	☐	**CRITERION 4:** These substantial writing or speaking assignments should be arranged so that the students will get timely feedback from the instructor on each assignment in time to help them do better on subsequent assignments. *Intervention at earlier stages in the writing process is especially welcomed.*	syllabus, project guidelines and rubric

1. Please describe the sequence of course assignments--and the nature of the feedback the current (or most recent) course instructor provides to help students do better on subsequent assignments

2. **Also:**

Please **circle, underline,** or **otherwise mark** the information presented in the most recent course syllabus (or other material you have submitted) that verifies **this description** of the grading process--and label this information **"C-4".**

C-4

Course Prefix	Number	Title	General Studies Designation
GLG	489	Field Geochemistry	L

Explain in detail which student activities correspond to the specific designation criteria.
Please use the following organizer to explain how the criteria are being met.

Criteria (from checksheet)	How course meets spirit (contextualize specific examples in next column)	Please provide detailed evidence of how course meets criteria (i.e., where in syllabus)
see attached page		

GLG, CHM 489 Field Geochemistry
Application for Literacy and Critical Inquiry [L].

1. Writing assignments considered in computation of course grade and proportion of final grade (in total, writing and critical inquiry constitutes 60-80% of the final grade; see attached assignments and rubrics)
    a. Lab notebooks – continual interpretation and evaluation of data (15%)
    b. Field Report 1 (7.5%)
    c. Field Report 2 (7.5%)
    d. Field Report 3 (7.5%)
    e. Field Report 4 (7.5%)
    f. Written Final Project (20%; 10% first draft, 10% final draft)
    g. Oral Presentation (10%)

2. The course requires students to gather data and then interpret and evaluate that information in written format. They are required to build from basic information to develop interpretations and hypotheses based on that information. Each field report (there are four, total) builds upon information over the course of the class to develop an understanding and ability to communicate complex information and ideas).

    The final project involves both written and oral components that require students to engage with their data and interpret and apply those data over the course of a semester-long project. This project

3. Field Reports and the final project are all substantial writing assignments. There is a also a formal oral assignment associated with the final project (see final project guidelines/rubric).
    a. Each field report constitutes an 8-page writing assignment with clear guidelines regarding format and which detail the specific interpretations and evaluations to be addressed for each report. These can include comparative assessments as well as interpretations based on previous patterns and evaluation of current results in the context of historical data or theory. See attached Field Report Guidelines I-IV.
    b. The final written project is a culminating written project with both outlining and draft stages with feedback. The students develop this project over the course of the semester based on data they collect and then place these results within the context of a variety of geochemical hypotheses and theories.
    c. The final oral presentation is a formal presentation.

4. The field reports are spaced evenly over the semester and the students receive detailed written feedback regarding science content, grammar & style, quality and sophistication of interpretations, etc. on each before the next assignment is due.

    In addition, the final project is conducted over the course of the entire semester, students are required to turn in both a topic statement/outline for feedback and to help focus their ideas and a first draft for which I provide feedback on science content, grammar & style, interpretations, etc. prior to the final document submission.

Course Catalog Description for GLG/CHM 489

Explores basic field measurements and sampling techniques for environmental systems, with a focus on carbon cycling in the Colorado River. Surveys a variety of geochemical principles, including: equilibrium aqueous speciation, acid-base chemistry, solution-mineral equilibrium systems, oxidation-reduction reactions, organic and environmental geochemistry and biogeochemical cycles. Applies chemical principles and analytical techniques to answer questions about environmental systems and processes.

Field Geochemistry – GLG489/598, CHM489/598 (3 credits)
Tu/Th 10:30-11:45, PSF-566

Instructor: **Hilairy Hartnett, 480-965-5593, h.hartnett@asu.edu**
Location: ISTB4-Rm. 765 **Office Hours: Tu/Th 9-10a (or by appointment)**

TA: **Maggie Bowman, 480-727-2549, maggie.bowman@asu.edu**
Location: ISTB4-Rm. 532/511 **Office Hours: M/W 9-10a (or by appointment)**

Course Description:

This course explores basic field measurements and sampling techniques for environmental systems. With a focus on carbon cycling in aquatic systems we will survey a variety of geochemical principles, including: equilibrium speciation, acid-base chemistry, solution-mineral equilibria, oxidation-reduction reactions, organic and environmental geochemistry and biogeochemical cycles. We will apply chemical principles and analytical techniques to answer questions about environmental processes.

Student Learning Outcomes:

Upon successful completion of the course, students will:

- *Develop field skills relevant to addressing fundamental geochemical problems*
- *Investigate and apply a wide range of analytical techniques in natural systems*
- *Solve a geochemical problem through appropriate field programs and analyses*
- *Develop the ability to work as team members in different sized groups*
- *Improve oral and written communication skills*

Teaching Philosophy:

Geochemistry is fun! Nowhere else can we work outside *and* apply the latest in high-technology to important environmental problems and questions. Students are expected to take an active approach to developing new skills. As the instructor, I will facilitate this process and will provide expertise and information that will guide you in the discovery process.

Textbook and Materials:

There is no textbook assigned for this course. Lecture notes, handouts and required readings will be posted on the Blackboard site. A calculator is recommended for in-class problems.

Course Requirements

Prerequisites: Instructor permission. Students are expected to have a knowledge of basic Chemistry, Geology/Earth Science and computer literacy. We encourage you to contact us for background material in geology or chemistry that may be unfamiliar to you.

Course Format

This course officially meets twice weekly for 75 min. Some weeks we will meet as scheduled, some weeks we will spend time doing sample analysis, data processing and interpretation. There will be four (4) required weekend field trips scheduled during the semester (see course outline/calendar). In addition, the class may meet at Tempe Town Lake or in a laboratory to do hands-on work; these meetings will be announced in advance. Lab access will be arranged as needed. Class time will be a combination of lectures, paper discussions, hand-on work, and problem solving. Students are expected to be prepared to participate in all discussions and activities.

Field Trips

All field trips are required, and are scheduled on weekends; usually Saturday & Sunday. If possible, one of the trips will leave on a Friday afternoon. There is one (1) one-day field trip, and three (3) overnight field trips. The overnight trips will generally leave *very* early on Saturday morning

and return relatively late on Sunday evening. Please make arrangements to participate in the field work as the practical work we do in the field cannot be made up.

Grading/Evaluation

C1

Course grades will be based on practical work & written lab notebooks (30%), written reports (30%), a final presentation/written project (30%), as well as in-class paper discussions, activities, and problems (10%). Please note, often with field work there is no 'right' answer and thus grades are not always dependent on getting a particular number (this is in some contrast to a traditional lab class). I am more concerned with your thought process, the procedures that you go through, and the clarity with which you report your findings.

Specific information about assignments will be posted throughout the semester. I will provided detailed information on the final proposal/presentation later in the semester

Classroom Policies

You will be responsible for the material that is covered in class. If you must miss class, try to notify the instructor in advance. Please do not arrive late to class as it demonstrates a lack of respect for your colleagues and your professor. *All cell phones must be turned off during class.*

400- vs. 500-level credit

In general, the same projects and problems will be given for both levels of credit; however, evaluation and grading for 400- and 500-level students will be determined independently.

Withdraw Policy

The ASU withdrawal policies and deadlines are available at **https://students.asu.edu/drop-add**. It is your responsibility to drop the course should you decide not to attend; failure to drop the course will result in a failing grade (E) for the semester.

Academic Integrity

The provost's website **http://provost.asu.edu/academicintegrity/students** provides information on ASU's academic integrity policy and avoiding plagiarism. It is your responsibility to understand the policy and to complete your work with integrity; academic dishonesty will not be tolerated and will result in a failing grade. If you have any concerns or questions please come see me.

Disability Policy Statement

An effort will be made to render this course fully accessible to all students. Qualified students with disabilities who will require disability accommodations in this class are encouraged to make their requests at the beginning of the semester either during office hours or by appointment.

Note: Prior to receiving disability accommodations, verification of eligibility from the Disability Resource Center (DRC) is required. DRC location: Matthews Center Building (8a-5p, M-F). Phone: 480-965-1234, 480-965-9000 (TTY). **www.asu.edu/studentaffairs/ed/drc**. Disability information is confidential.

Other useful information

This class requires significant effort on your part to grapple with the interdisciplinary material and practice the sampling skills and procedures. I expect you will spend a fair amount of time on the readings, projects, analyses and presentations (did you know that three (3) hours/week of non-classroom study time *per credit hour* is recommended by the AZ Board of Regents!).

This syllabus and the course outline are working documents and may be subject to change over the course of the semester. Any changes will be announced in class and posted to the Blackboard site.

Please do not hesitate to contact me if you have any questions or concerns!

FIELD GEOCHEMISTRY – Course Outline Spring 2015

Course Outline *(specific topics and dates may be subject to change as necessary).* **TTL** = *Tempe Town Lake, meet at the lake!!,* **CO R.** = Colorado River; Bb = BlackBoard

WEEK	DATE	TOPIC	COMMENTS
1	1/13	Introduction, Statistics, blanks & replicates	
	1/15	pH, Temperature, Conductivity, & Oxygen meters	*Bring a liter of water from home!*
2	1/20	**TTL** – Filtration, Alkalinity Titrations	*meet at the lake – see map on Bb*
	1/22	Carbonate System, Alkaline Springs	
	1/24	***FIELD TRIP I: Montezuma's Well Nat. Monument & Tonto Creek SP***	
3	1/27	*FIELD TRIP I follow up – Sample Archival, Data Reduction & Discussion of Experiments*	
	1/29	Nutrients & Major Ions: Spectrophotometry	
4	2/3	**TTL** – Spectrophotometry	*meet at the lake – see map on Bb*
	2/5	Dissolved Oxygen	Field Report I DUE
	2/7-8	***FIELD TRIP II: Colorado Riv.@ Willow Beach, Lks, Mead & Havasu***	
5	2/10	*FIELD TRIP II follow up – Sample Archival, Data Reduction & Planning of Experiments*	
	2/12		
6	2/17	Coordinate sample analyses, plan experiments	
	2/19	Arizona Rivers, *paper discussion – TBD*	
	2/21-22	***FIELD TRIP III: Salton Sea, Mud Volcanoes, Colorado Riv.@ Blythe, CA***	
7	2/24	*FIELD TRIP III follow up – Sample Archival, Data Reduction & sample processing*	
	2/26	Dissolved Organic Carbon (DOC)	Field Report II DUE
8	3/3	DOC, continued	
	3/5	Carbon characterization - introduction	
9	3/10	*Spring Break – no class*	
	3/12	*Spring Break – no class*	
10	3/17	Redox processes & Metal Speciation	
	3/19	Photosynthesis & Respiration, *paper discussion – TBD*	Field Report III DUE
11	3/24	Fluorescence Spectroscopy	***Meet in Hartnett Lab – ISTB4, Rm511***
	3/26	*paper discussion – TBD*	
12	3/31	Colorado River, *paper discussion – TBD*	
	4/2	*paper discussion – TBD*	
	4/4-5	***FIELD TRIP IV: Oak Creek, Lk. Marshall, Lk. Mary***	
13	4/7	*FIELD TRIP IV follow up – Sample Archival, Data Reduction & sample processing*	
	4/9	Sample Analysis & Data Interpretation	lab and experimental work in small groups
14	4/14	Sample Analysis & Data Interpretation	lab and experimental work in small groups
	4/16	Sample Analysis & Data Interpretation	Field Report IV DUE
15	4/21	Sample Analysis & Data Interpretation	data reduction in small groups
	4/23	Sample Analysis & Data Interpretation	data reduction in small groups
16	4/28	Student Presentations	
	4/30	Student Presentations	**Final Projects DUE**

Note. The field trip dates are firm, but the specific topics covered on each day may be subject to change depending on how much material we cover over the semester, how sample analyses go, etc.

FIELD GEOCHEMISTRY, FALL 2015 **FIELD REPORT – I GUIDELINES & RUBRIC**

Report Due : 02/05/15 *IN CLASS*

For this field report please include the following in your write-up:

C2,3

- An introduction outlining the questions this field research addressed and any background chemistry necessary to think about the system
- A short description of the study sites
- A brief outline of the methods used, including any problems or notable events
- A table of field results, including detailed labels with units and site descriptions.
- A discussion of preliminary results

In your discussion please draw on your knowledge of chemistry/geology/geochemistry to address the following:

1. Differences among the sites that may affect water chemistry at Montezuma's Well and at Tonto Bridge State Park
2. The processes affecting the carbonate system in both places
3. Using the measured alkalinity values as a proxy for total carbon, and the measured pH values, estimate the concentrations of the three carbonate species in each sample. Include this information in a separate table. What is the effect of assuming alkalinity = Total C?

   Note…you will need to express total carbon in moles of carbon first. See the handout called *Carbonate Equilibrium Calculations* for help with this section.

Be as quantitative as you can! Feel free to use figures where you think they are appropriate. You may also suggest analyses and/or additional data that would illuminate problems or provide information where we currently lack data. Please keep your report to no more than 8 double-spaced pages of text.

GRADING RUBRIC

C2

Component	Points Possible	**Grade**
Clarity: Is the field report clearly written? Are the goals of the trip clearly outlined?	**10**	
Coherence: Are the author's points well-developed and presented in an ordered, logical manner?	**15**	
Class Material: Does the author make an effort to incorporate material presented in the course? Are references provided?	**10**	
Use of figures: Are the figures and tables easy to read? Are the figures and captions effective in communicating the authors' points?	**5**	
TOTAL	**40**	
Additional Comments:		

FIELD GEOCHEMISTRY – SPRING 2015 **FIELD REPORT II - GUIDELINES**

Due Feb 19th (in class)

For Field Report II, please include the following in your write up:

- An introduction outlining the questions our field work hoped to address
- A description of the study sites
- An outline of the methods used, including any problems or notable events
- A table of field results, properly labeled with units and station descriptions

c2, 3

In your discussion of the preliminary results please draw on your knowledge of chemistry and geology to assess the following:

1. Similarities/differences between the Colorado River and Lake Mead samples from this trip.
2. Similarities/differences among the new river and reservoir samples, and other samples we have examined thus far in the class.
    a. When describing the above similarities/differences, focus on processes or conditions that might affect what you observe at the various locations and the *evidence* you have, or might need to support your ideas.

Grading Rubric

c2

Component	***Points Possible***	**Grade**
Clarity: Is the field report clearly written? Are the goals of the trip clearly outlined?	**10**	
Coherence: Are the author's points well-developed and presented in an ordered, logical manner?	**15**	
Class Material: Does the author make an effort to incorporate material presented in the course?	**5**	
Use of figures: **NOTE – I've place more emphasis on the figures this time!** Are the figures easy to read? Are the figures and figure captions effective in communicating the authors' points?	**10**	
TOTAL	**40**	
Additional Comments:		

FIELD GEOCHEMISTRY – SPRING 2015 **FIELD REPORT III - GUIDELINES**

Due March 19th (in class)

For Field Report III, please include the following in your write up:

- An introduction outlining the questions our field work hoped to address
- A description of the study sites
- An outline of the methods used, including any problems or notable events
- A table of field results, properly labeled with units and station descriptions
- Figures that summarize the relationships among the data for the different sites.

In your discussion of the preliminary results please draw on your knowledge of chemistry and geology to assess the following:

C2, 3

1. A very brief discussion of whether the basic chemistry (temperature/conductivity, etc) of the mud volcano site seems to have changed since the 1990's (see handout on Salton Sea area mud pots).
2. Similarities/differences between the spring-fed sites and the non-spring fed sites
   a. Do you think that 1000 Palms has multiple water sources or just one water source and why?
   b. Do you think that 1000 Palms and Big Morongo are fed by the same deep aquifer and why?
3. Similarities/differences between the Colorado River at Blythe and the Colorado River at Willow Beach from Field Trip 2.

Grading Rubric

C2

Component	*Points Possible*	Grade
Clarity: Is the field report clearly written? Are the goals of the trip clearly outlined?	**10**	
Coherence: Are the author's points well-developed and presented in an ordered, logical manner?	**10**	
Class Material: Does the author make an effort to incorporate material presented in the course?	**5**	
Use of figures: **NOTE – I've placed even more emphasis on the figures this time!** Are the figures easy to read? Are the figures and figure captions effective in communicating the authors' points?	**15**	
TOTAL	**40**	
Additional Comments:		

FIELD GEOCHEMISTRY **FIELD REPORT IV - GUIDELINES**

DUE Thursday 4/16

Please include the following in your write up:

- An introduction outlining the questions our field work hoped to address
- A description of the study sites
- An outline of the methods, including any problems or notable events
- A table of field results, properly labeled with units and station descriptions
- Figures provide a summary and/or interpretation of the data we collected

In your discussion of the preliminary results please draw on your knowledge of chemistry and geology to assess the following:

C2,3

1. similarities/differences between the two stream samples
2. similarities/differences between the two lake samples
3. similarities/differences among stream and lake samples
4. Lake Mary sits upon Kaibab limestone, Marshall Lake sits upon a basalt cap; how might the difference in geological setting affect the geochemistry of the two lakes, use data to support your discussion.
5. Examine the results from previous trips to these sites (posted to Blackboard) and discuss whether things have changes and what processes may have caused the changes, be specific.

Be as quantitative as you can! Please keep your report to no more than 8 double-spaced pages of text.

Grading Rubric

Component	**Points Possible**	**Grade**
C2 **Clarity**: Is the field report clearly written? Are the goals of the trip clearly outlined	**10**	
Coherence: Are the author's points well-developed and presented in an ordered, logical manner?	**10**	
Class Material: Does the author make an effort to incorporate material presented in the course?	**5**	
Use of figures: Are the figures easy to read? Are the figures and figure captions effective in communicating the authors' points?	**15**	
TOTAL	**40**	
Additional Comments:		

FIELD GEOCHEMISTRY (GLG-CHM 494/598) **FINAL PROJECT GUIDELINES**
SPRING 2015 **HARTNETT**

C3

Primary goal: The goal of the final project is to provide you with an opportunity to conduct a research project on a specific question that can be addressed using the data and samples we have collected throughout this course. The general theme this semester has been related to carbon cycling in the Arizona Aquatic Systems, including Springs, Rivers and Reservoirs. You will develop your own ideas about that topic, pose and test a scientific question or hypothesis that you will present in the form of a short (6-8 pages) written report, and communicate those results in the form of an oral presentation to the class. As scientists, this type of work is your most essential form of communication.

Overview: The report should follow the general style of a scientific paper (see "Components" below for details). To make it easier to meet deadlines at the end of the semester, the final project will be divided into several parts: a 1-page topic statement and outline, a class presentation, and the final paper. You will have the option to turn in a draft of your report for comments. These parts are as follows:

1. *Topic Statement & Outline:* This should **be ~1 page long**, and should include one paragraph clearly stating the question to be investigated in the proposed project. The outline should be a full working outline describing the details of each section of the paper.
2. *Presentation*: The presentation should be a **15 minute power-point** presentation, and should include a clear statement of the question you are addressing, background material supporting the scientific relevance of the question, and a summary of your proposed work to answer the questions. We will discuss the details of this presentation later in the semester.
3. *Written Report*: The paper should be **6-8** pages long using normal fonts/margins/reasonable spacing, etc. This length does not include figures and figure captions or references. Papers significantly longer than the maximum page limit will be returned for revisions.

Due dates: Since the term project comprises ~1/3 of your final grade, I expect that you will devote significant time and energy to this project, and as such some of our class time in the last month of the course will be available to you for research and data analysis. To avoid leaving things to the last minute (as all of us tend to do), the final project will be developed over the next few weeks. See the "Important Dates" section for specific due dates of each portion of the term project.

C4

Important Dates:

Topic Statements/Outlines:	March. 17th	(returned by March 26th)
1st Draft	Apr. 10th	(returned by April 16th)
Presentations	Apr. 28, 30th	
Final Report Due	April 30th	

How to submit: In an effort to try to make things smoother and to speed up my grading I am going to have you submit your documents to Blackboard. There will be an assignment posted for each part and you can upload your documents from the Blackboard site.

Grading: Your term project will be graded on clarity of your discussion and conclusions, organization, use of figures and illustrations, oral presentation, and your effort to incorporate material learned in the class. See the attached sheets for specific components that will be used in this evaluation. Points for each part of the project are as follows:

Topic Statement/outline:	3 points
Presentation:	15 + 2 points (2 pts for comments/questions on other presentations)
Final Report:	10 points
TOTAL:	**30 POINTS**

While you will not receive extra points for completing a first draft, I have found that students that go through a formal draft often do better on the final report.

Topic Statement and Outline: You should (and may already have) discuss your project topic with me before you launch into this project. You may choose any geochemical topic that interests you, and that can be investigated using data and samples from this class. The outline should be a working outline describing the each component of the project. Complete/near complete sentences should be included. This outline is meant to be your roadmap for executing the experiments/analyses and for writing the paper; it can also help you determine the parts of the paper that you need to clarify with more detail.

Components of the written document: While you can choose the exact organization of the paper, here is one possible format to follow:

1. **Project summary** (Abstract): one or two paragraphs summarizing what research you propose (1-page). Particular emphasis should be placed on the results and implications of the research.
2. **Introduction:** This section provides the motivation and background for the work you did. Use ~1-2 pages to set the stage and *clearly identify the question or hypothesis* you will address.
3. **Methods:** This is where you describe how you did the experiments or analyses. This is also where you describe any calculations or statistical analyses you employ.
4. **Results & Discussion:** This should be about half the total length of the paper; it should describe the results you obtained and discuss the implications for those results.
5. **References**: Please use one consistent format for the references. Check any recent peer-reviewed journal for a format, my only request is that your format include the titles of the articles (i.e., ACS, or Geochimica Cosmochimica Acta, etc.; so, not Science or Nature).

More Project Details

PLAGIARISM

There is a significant difference between plagiarizing and summarizing someone else's ideas. While you are expected to conduct original thinking in the paper, you are not expected to perform original research for it. Therefore, while direct quotes are not allowed, use copious referencing in your paper. If you are not sure whether you are plagiarizing someone's work or not, please ask!

FIGURES AND FIGURE CAPTIONS

I strongly suggest that you create original figures that synthesize the results of your analyses as well as potentially results from similar work in the literature. For any figures that are directly copied from other papers, provide a reference to that paper. Please number all figures, beginning with Figure 1. All figures must be referred to in the text. Figures should always be accompanied by a descriptive figure caption that includes the reference from which the figure originated. If the figure is your own creation based on the work of others, include a phrase such as "developed from Smith et al. [1990]" to avoid potential plagiarism issues. The caption should present in your own words, the key points of the figure, including items denoted by symbols, varying line types or widths, or color, as well as a brief summary of the pertinence of the figure. Your captions should be concise and to the point, but not so short that it is impossible to determine the figure content without searching through the main body text.

Oral Presentations

C3

Length: ~15 minutes, with an additional 5 minutes for questions.

Format: The presentation should be given in a lecture-style professional format using PowerPoint or a similar electronic presentation product. Please see me if you need help or advice on creating a simple yet effective PowerPoint presentation. All members of the audience will write a short assessment of the presentation, and include at least one question to help clarify points or provide more information about your presentation.

Grading: You will be graded on creativity, clarity, and coherence of your presentation. See the attached sheet for specific components that will be used in this evaluation.

Feel free to talk with me at any time if you have questions about your project, or about the details of this assignment!

C3

GLG-CHM 494/598: FIELD GEOCHEMISTRY (SPRING 2015)
GRADING RUBRIC – 1ST DRAFT/WRITTEN REPORT

Author's Name_____

Component	Points Possible	Grade
Clarity: Is the paper well-written, including proper grammar, sentence structure, and spelling? Is the report properly motivated by introductory background material? Proper use of references?	**3**	
Coherence: Are the author's points well-developed and presented in an ordered, logical manner?	**3**	
Creativity: Is there a clearly stated hypothesis or research question? Does the author develop the hypothesis from a grounding in the work of others?	**2**	
Use of figures: Are the figures easy to read? Are the figures and figure captions effective in communicating the author's points?	**2**	
TOTAL	**10**	
Additional Comments:		

C3

GLG-CHM 494/598: FIELD GEOCHEMISTRY (FALL 2006)
FINAL PROJECT ORAL PRESENTATION GRADE SHEET

Presenter's Name_____ **Date**_____

Component	Points Possible	Grade
Clarity: Was the presentation easy to understand and properly motivated by introductory background material?	**5**	
Creativity: Did the presenter develop new material or develop conclusions based on the work of others?	**5**	
Coherence & Figures: Did the presenter provide information in an ordered, logical manner? Were the figures easy to read and effective in illustrating the presenter's points?	**5**	
TOTAL	**15**	

Additional Comments:

Field Geochemistry, GLG/CHM 489
Required Readings and Recommended Texts

Recommended Texts (avail in ASU library)
Aquatic Chemistry. 2nd Ed. (1992) W. Stumm and J. Morgan. Wiley.
Principles of Environmental Chemistry. (2004) G. Nelson Eby. Thompson.

Required Readings (readings marked (*) are particularly related to scientific writing).
AZ Dept. Env. Quality. 2012. *Improvement Plan for the Oak Creek Watershed, Arizona.*

*Claerbout, J. 1995. Scrutiny of the Introduction. GNU public license.

Codispoti, L. 1988. *One Man's Advice on the Determination of Dissolved Oxygen in Seawater*

Cole, J.J. et al. 2007. Plumbing the Global Carbon Cycle: Integrating Inland Waters into the Terrestrial Carbon Budget. *Ecosystems.* ***10*****:** 171-184.

Denimal et al. 2005. Evolution of the aqueous geochemistry of mine pit lakes – Blanzy–Montceau-les-Mines coal basin (Massif Central, France): origin of sulfate contents; effects of stratification on water quality. *Applied Geochemistry* **20** 825-839

Fellman, J et al. 2010. Fluorescence spectroscopy opens new windows into dissolved organic matter dynamics in freshwater ecosystems: A review. *Limnol. Oceanogr.* **55**(6): 2452-2462.

Foust et al. 2004. Groundwater arsenic in the Verde Valley in central Arizona, USA. *Applied Geochemistry.* **19:** 251-255

*Gopen G. and J. Swan. 1990. The Science of Scientific Writing. *American Scientist.* **78:** 550-558.

Krivtsov and Sigee. 2005. Importance of biological and abiotic factors for geochemical cycling in a freshwater eutrophic lake. *Biogeochemistry* **74**: 205-230

*Landes, K. 1952. Scrutiny of the Abstract. *GEOPHYSICS*, **17**: 3, 645

*Little, J. and Parker, R. 2000. How to read a Scientific Paper. Univ. of Arizona. http://www.biochem.arizona.edu/classes/bioc568/bioc568.htm

Malusa et al. 2003. Potential for travertine formation: Fossil Creek, Arizona. *Applied Geochemistry.* ***18***: 1081-1093

Martin & Pedersen. 2004. Alteration to lake trophic status as a means to control arsenic mobility in a mine-impacted lake. *Water Research* **38**: 4415-4423

Meunier et al. 2005. Effects of size and origin of natural dissolved organic matter compounds on the redox cycling of iron in sunlit surface waters. *Aquatic Sciences* **67**: 292-307.

Nordstrom and Alpers. 1999. Negative pH, efflorescent mineralogy, and consequences for environmental restoration at the Iron Mountain Superfund site, California. *PNAS*. **96**: 3455-3462.

Parks, S. and Baker, L. 1997. Sources and transport of organic carbon in an Arizona river-reservoir system. *Water Res.* **31** (7)

Weiss, J. 2004. *Handbook of Ion Chromatography, Third, Completely Revised and Enlarged Edition.* **Ch. 1.** Wiley.