**2009 Geology Report**

**Step1: Department/Program Mission**

The Albion College Department of Geological Sciences provides undergraduate students intellectually engaging and challenging learning opportunities in geology through classroom, laboratory, and field experiences and conducts primary research that involves students whenever possible.

Our academic program has several specific goals, including 1) to provide a sound program for Geology and Earth Science majors and minors that prepares them for graduate school or careers in the geological sciences, education, and related fields; 2) to provide superior liberal arts science experiences for non-majors as part of their general education requirement; 3) to support the Environmental Studies and Environmental Science concentrations and Category; and 4) to provide high quality First-Year and Honors Seminars. Within our courses we combine lecture and other in-class experiences, laboratories, field trips, and research projects in order to enhance our students’ understanding of scientific methodology and hypothesis testing, geological processes, and the relationships between geology and the other sciences and society. In further support of our majors, we conduct departmental colloquia, field trips, and a summer field course in the Rocky Mountains.

Our research mission is to plan, conduct, complete, present, and publish scholarly investigations into a wide variety of geological problems. We strive to include students in every phase of the research experience as summer students, directed study students, first-year research partners, and honors thesis advisees. We emphasize the use of fieldwork, literature review, laboratory and computer analyses of data, and report preparation in our research projects. We have active research programs in Tibet (Carrie Menold), Antarctica (Thom Wilch), Wyoming (Bill Bartels), California (Chris Van de Ven), and South Dakota (Beth and Tim Lincoln), as well as several on-going projects in Michigan.

In support of our research and teaching mission, we maintain superb collections of minerals, rocks, fossils, maps, and digital data. We further support teaching and research by maintaining up-to-date analytical and computing facilities.

**Step 2: List goals/outcomes**

**Learning Goals & Outcomes**

1. **Content Goals/Outcomes:** Students can articulate and apply fundamental concepts in core areas of geology including Plate Tectonics, Earth History, Solid-Earth Composition/Structure and Surface and Atmospheric Processes. Our students will also develop a set of general, computer, field, laboratory, and interpretive skills appropriate to their major or minor.

**2. Communication Goals/Outcomes:**

1. Students are able to effectively articulate their ideas in writing.
2. Students are able to effectively articulate their ideas orally

**3. Critical Thinking Goals/Outcomes:** Students able to generate, manipulate and interpret quantitative data, use geologic concepts to solve problems and understand and apply scientific methodology. Specific goals are under discussion.

**4. Creativity & Initiative Goals/Outcomes:**

**A.** Students demonstrate independence of thought and expression. Student work also demonstrates integrative thinking by approaching problems through multiple approaches.

**B.** Students demonstrate initiative in pursuit of research and solution to problems.

**5. Earth Science Methods Goals/Outcomes:** Students possess a demonstrated ability to apply Field/Laboratory skills, Map Interpretation/Geographical Information skills, and Information Technology skills.

**6. Graduate Preparedness Goals /Outcomes .** The attainment of goals 1-5 (above) will prepare graduates well for further education or careers as earth scientists or educators.

**Step 3: Identify program components**

Required courses, elective courses,out-of-classroom or other experiences that are designed to achieve each educational objective. NOTE: Every class will not, nor is it expected to,achieve each outcome. The goal is to get an even distribution of experiences that achieve the outcomes.

Goals/Outcomes 1-5 will be achieved through experiences in specific courses, research experiences, and weekly departmental colloquia. The table below shows where in our curriculum specific goals/outcomes will be introduced, emphasized, and comprehensively assessed.

See the attached pdf file GeoMatrix\_GoalsCourses.pdf, which shows where goals are introduced, emphasized or comprehensively covered.

**Step 4: Select methods/data sources and instruments**

We will use a variety of quantitative and qualitative methods/data sources and instruments.

**1. Assessment of Content Goals/Outcomes**.

a. Incremental assessment of understanding of goals will be carried out in individual courses beginning in 2009-10. Probably final exam scores or key questions on final.

b. Senior Exam. We administer a senior exam to graduating Geology and Earth Science to assess whether they have obtained a comprehensive understanding of the geological sciences. Graduating seniors in both majors will take an unannounced written exam covering all of the basic fields of geology. Since standardized tests do not exist, the exam will be derived from the combined finals of Geology 101 and Geology 103. Current exam is under review.

**2.Assessment of Communication Goals/Outcomes.**

a.Writing. Departmental Writing Rubric to be used for writing assignments in designated courses and for written component of senior thesis and directed studies. Rubric is under development and will be implemented in 2009-10.

b.Oral Communication. Beginning in 2009-10, performance on colloquium presentations (done four times by each of our majors) will be assessed using the newly developed Departmental Oral Presentation Rubric. In the past, assessment of the required colloquia was informal and qualitative.

**3. Assessment of Critical Thinking Goals/Outcomes.**

a.Quantitative Reasoning. Performance on quantitative areas of specific advanced geology courses.

b.Application of Scientific Methodology. This is being assess in introductory geology lab courses in spring 2009 and will be assessed in select upper level courses with research projects.

**4.Assessment of Creativity & Initiative Goals/Outcomes.**

a.As these are newly articulated goals the department has not yet assessed. Assessment tools for independent thinking, integrative thinking and initiative are under discussion

**5.Assessment of Earth Science Methods Goals/Outcomes.**

a.Field Skills 1. Incremental assessment. Field geology skills will be assessed incrementally by performance in specified courses, Geology 210, field-based research projects, and/or Geology 314. Rubric will include assessment of field notebooks and completion of specific field assignment.

b.Field Skills 2. Comparison of Albion student versus non-Albion student preparation for field camp (Geology 314). Field Camp (Geology 314) final grades for Albion College students will be compared to those of students from top echelon colleges and universities and better than those of students from lesser institutions. The expected outcome is that upper class students and graduates will be as well prepared for geology field camp as students from top-echelon colleges such as Brown, Franklin and Marshall, Macalester, Whitman, and Williams.

c.Lab Skills. Rubric will use some combination of lab exam scores and/or key exam questions in combination with assessment of lab reports of student research projects. This is under discussion.

**6.Assessment of Graduate Preparedness Goals /Outcomes.**

Alumni data on careers, graduate school, teacher education will be used to assess career preparedness goals/outcomes. We have been tracking graduates in our alumni newsletter for the past 20 years. Data compiled for the newsletter will be used to assess preparation for careers and graduate school. Specifically we will use alumni data to assess the following outcomes:

A. Graduates will have the proper academic background for success in graduate school.

B. Graduates will have the proper academic background for a geology-related career.

C. Education candidates majoring or minoring in Geology or Earth Science will be well prepared for careers as elementary and secondary educators.

**Steps 5&6**

**Draft date:  October 27, 2009**

ASSESSMENT AREA:

#### Department of Geological Sciences

                         Majors:  Geology, Earth Science, Earth Science (Secondary Education)

            Minors:  Geology, Environmental Geology, Paleontology, Geographic

                        Information Systems, Earth Science (Secondary Education)

**ACADEMIC YEAR**

            2008-2009

**ASSESSMENT TEAM MEMBERS**

Compiled by Dr. Thomas I. Wilch (chair) and Dr. William S. Bartels

With contributions from entire department

**Section I.  Geological Sciences Mission Statement**

The Albion College Department of Geological Sciences provides undergraduate students intellectually engaging and challenging learning opportunities in geology through classroom, laboratory, and field experiences and conducts primary research that involves students whenever possible.

Our academic program has several specific goals, including:  1) to provide a sound program for Geology and Earth Science majors and minors that prepares them for graduate school or careers in the geological sciences, education, and related fields; 2) to provide superior liberal arts science experiences for non-majors as part of their general education requirement; 3) to support the Environmental Studies and Environmental Science concentrations and Category; and 4) to provide high quality First-Year and Honors Seminars. Within our courses we combine lecture and other in-class experiences, laboratories, field trips, and research projects in order to enhance our students’ understanding of scientific methodology and hypothesis testing, geological processes, and the relationships between geology and the other sciences and society. In further support of our majors, we conduct departmental colloquia, field trips, and a summer field course in the Rocky Mountains.

Our research mission is to plan, conduct, complete, present, and publish scholarly investigations into a wide variety of geological problems. We strive to include students in every phase of the research experience as summer students, directed study students, first-year research partners, and honors thesis advisees. We emphasize the use of fieldwork, literature review, laboratory and computer analyses of data, and report preparation in our research projects. We have active research programs in Tibet (Carrie Menold), Antarctica (Thom Wilch), Wyoming (Bill Bartels), California (Chris Van de Ven), and South Dakota (Beth and Tim Lincoln), as well as several on-going projects in Michigan.

In support of our research and teaching mission, we maintain superb collections of minerals, rocks, fossils, maps, and digital data. We further support teaching and research by maintaining up-to-date analytical and computing facilities.  In addition, we maintain a strong alumni support system that includes an annual newsletter, employment networking, and substantial fundraising initiatives.

**Section II.  Learning Goals & Outcomes**

**1.**      **Content Goals/Outcomes**

1. **Content Goals:** Students can articulate and apply fundamental concepts in core areas of geology including Plate Tectonics, Earth History, Solid-Earth Composition/Structure and Surface and Atmospheric Processes.  Our students will also develop a set of general, computer, field, laboratory, and interpretive skills appropriate to their major or minor.

**B.**     **Content Assessment & Outcomes**

**a.**      **Incremental assessment** of understanding of goals will be carried out in individual courses beginning in 2009-10.  We are currently developing assessment instruments for specific geology courses.

**b.**      **Senior Exam.**   We administer a senior exam to graduating Geology and Earth Science to assess whether they have obtained a comprehensive understanding of the geological sciences.  Graduating seniors in both majors will take an unannounced written exam covering all of the basic fields of geology.  Since standardized tests do not exist, the exam has been derived from the combined finals of Geology 101 and Geology 103, but we are currently developing a more effective exam that mirrors our stated learning goals.

Senior Exam Assessment Goal.   When we initially designed the exam (6 years ago), we set the following expectations:  ninety percent of seniors will be able to answer 70% of exam questions, 67% of seniors will be able to answer 80% of the exam questions, and 33% will be able to answer 90% of the exam questions.

**Senior Exam Assessment** **Result.**    **We have administered our senior assessment exam to three graduating classes over the past 6 years.  The exam has been a combination of specific questions from the Geology 101 and 103 final exams.  The results have fallen short of our expectations with 75% (vs. 90%) scoring 70% or higher, 55% (vs. 67%) scoring 80% or higher, and 13% (vs. 33%) scoring 90% or higher.**

**2. Communication Goals/Outcomes:**

1. Communication Goals.

**a.**      **Writing Goal.**  Students are able to effectively articulate their ideas in writing.  (for 2009-10)

**b.**      **Oral Communication Goal:**  Graduates will be able to make an acceptable oral presentation on a geologic topic.  Graduates will be able to understand current geological literature.  (For 2009-10: the goal is simplified to: Students are able to effectively articulate their ideas orally.)

**B.**     **Communication Assessment & Outcomes**

**a.**      **Writing Assessment.**  Departmental Writing Rubric to be used for writing assignments in designated courses and for written component of senior thesis and directed studies.  Rubric is under development and will be implemented in 2009-10.

**b.**      **Oral Communication.**  Oral communication is assessed through our departmental colloquium, which is required of all junior and senior geology and earth science majors and attended by all faculty members in the department.   Each major makes an oral presentation, based on their own research or research from the current geological literature.   In addition to the oral presentation, student speakers prepare a 2-page handout summarizing their talk.  Beginning in 2009-10, performance on colloquium presentations (done four times by each of our majors) will be assessed using the newly developed Departmental Oral Presentation Rubric.  In the past (including 2008-9), assessment of the required colloquia was informal and qualitative.

**Oral Communication Assessment Goal:** 100% of graduates will a) give an acceptable oral presentation (in colloquium) on a geologic topic, and b) prepare an acceptable summary of an article from the current geological literature.

**Oral Communication Assessment Results: All 116 graduates (100%) fulfilled this requirement between 1994 and 2009.**

**3.**      **Critical Thinking Goals/Outcomes**

1. **Critical Thinking Goals**.  Students are able to generate, manipulate and interpret quantitative data, use geologic concepts to solve problems and understand and apply scientific methodology.  Specific goals are under discussion.
2. **Critical Thinking Assessment & Outcomes**

a.       **Quantitative Reasoning.**  Performance on quantitative areas of specific advanced geology courses. Specific measures are under discussion.

b.      **Application of Scientific Methodology.** This was assessed in Introductory Geology (Geo 101) lab courses in spring 2009 and will be assessed in Geology 103 and select upper level courses with research projects in future semesters.  The same assessment instrument was used in the spring 2005 Geology 101 lab research project.

**Scientific Methodology Assessment Goals.**   The objective is that students demonstrate understanding of the scientific method, particularly hypothesis-testing, through an open-ended real research project that is carried out over multiple weeks.

 For Geology 101, the faculty teaching the course decided to assess student’s understanding and application of hypothesis-testing in group student research projects.  The research projects assigned as part of the laboratory portion of the course and are described in the lab manual (see Attachment #1).  This semester the scientific method is described in their textbook and in a lab handout for the project (see Attachment #2) as well as discussed in both lecture and lab.

 The learning goal is assessed in the papers associated with the research projects.  The students were told to pose a testable hypothesis and to test it with their research.  In 2009, the instructor (Menold) evaluated the 34 students understanding of hypothesis-testing based on a four point scale, according to the table below.  In 2005, the instructor (Wilch) evaluated the 40 students using the same rubric.

Scientific Methodology Assessment Results.    The table below shows summary results from 2009 with comparative values from 2005.   The four point rating scale is not linked directly to the grading of the papers, although there is a rough correlation in that students who failed to mention a hypothesis most likely omitted other important aspects from their papers.

|  |  |  |  |
| --- | --- | --- | --- |
| 2005 Spring  % Students (n=40) | 2009 Spring  % Students (n= 34) | Rating | Description of Rating |
| 2.5% | 0% | 0 | Students failed to mention their hypothesis in their papers |
| 2.5% | 14.7% | 1 | Students posed a hypothesis but did not adequately test it, the quality of the hypothesis was so weak that it was difficult to test |
| 55.0% | 38.2% | 2 | Students posed a hypothesis and tested it adequately, the quality of the hypothesis was acceptable but tended to be too general to be tested adequately in lab study |
| 40.0% | 47.1% | 3 | Students posed a hypothesis, tested it, and posed a follow-up hypothesis, the quality of the hypothesis high and appropriately tested |

The conclusion from the 2009 assessment is that 100% of students posed a hypothesis in their research papers.  This is an improvement over 2005.   In 2009,  only 85% both understood the concept of a hypothesis and were able to successfully test it through independent research (combined ratings of 2-3); whereas in 2005, 95% of students both understood and tested hypotheses at an acceptable level.  In 2009, there is an improvement of the percentage of students (47.1% with a rating of 3, compared to 40% in 2005) who understood the iterative process of hypothesis-testing which is an important extension of the scientific method.

**4.  Creativity & Initiative Goals/Outcomes (beginning 2009-10)**

**A.**    **Creativity & Initiative Goals.** Students demonstrate independence of thought and expression. Student work also demonstrates integrative thinking by approaching problems through multiple approaches. Students demonstrate initiative in pursuit of research and solution to problems.

**B.**     **Creativity & Initiative Assessment & Outcomes.** The department has not yet assessed these recently articulated goals.  Assessment tools for  independent thinking, integrative thinking and initiative are under discussion

**5.**      **Earth Science Methods Goals/Outcomes**

1. **Earth Science Methods Goals** Students possess a demonstrated ability to apply Field/Laboratory skills, Map Interpretation/Geographical Information skills, and Information Technology skills.
2. **Earth Science Methods Assessment & Outcomes**

a. **Field Skills 1.**   **Incremental assessment.**  Beginning in 2009-10, field geology skills will be assessed incrementally by performance in specified courses, Geology 210, field-based research projects, and/or Geology 314.   Rubric will include assessment of field notebooks and completion of specific field assignment.

b. **Field Skills 2.  Comparison of Albion student versus non-Albion student preparation for field camp (Geology 314).**  Field Camp (Geology 314) is a traditional capstone experience for undergraduate geology majors.  The Albion College field camp recruits students from across the country to participate in this integrative course.  Field Camp (Geology 314) final grades for Albion College students will be similar to those of students from top echelon colleges and universities and better than those of students from lesser institutions.  The expected outcome is that upper class students and graduates will be as well prepared for geology field camp as students from top-echelon colleges such as Brown, Franklin and Marshall, Hamilton, Macalester, Whitman, and Williams.

**Field Skills 2 Assessment Goal.** Field Camp final grades for Albion College students will be comparable to those of students from top echelon colleges and universities and better than those of students from lesser institutions.

**Field Skills 2 Assessment Results.  Since 2003, the GPA for 19 Albion students is 3.38 compared to a GPA of 3.39 for 31 students from top colleges.  The overall GPA for Field Camp over this interval (including all students) is 3.25.**

c.       **Lab Skills.**  Beginning in 2009-10, lab skills rubrics will use some combination of lab exam scores and/or key exam questions in combination with assessment of lab reports of student research projects.  This is under discussion.

1. **Graduate Preparedness Goals/Outcomes.**

**A.**    **Graduate Preparedness Goals** The attainment of goals 1-5 (above) will prepare graduates well for further education or careers as earth scientists or educators.

**B.**     **Graduate Preparedness Assessment & Outcomes**

##### Alumni data on careers, graduate school, teacher education will be used to assess career preparedness goals/outcomes.   We have been tracking graduates in our alumni newsletter for the past 20 years.  Data compiled for the newsletter will be used to assess preparation for careers and graduate school.  Specifically we will use alumni data to assess the following outcomes:

a.  **Graduate Preparedness 1.** Graduates will have the proper academic background for success in graduate school.

**Graduate Preparedness 1 Goal:** 90% of seniors who apply will be admitted to a graduate program in geology.

**Graduate Preparedness 1 Results.**  **48 of 50 graduates (96%) applying to graduate or professional school were accepted between 1994 and 2009.  Between 2001 and 2009, 26 of 27 students who applied for graduate school were accepted.  Nine geology/earth science graduates from the past two years are currently enrolled in graduate school at the following schools: Chicago, George Mason, Kentucky, London School of Economics, Michigan, Missouri (Rolla), Nebraska, and New Mexico.**

 b.  **Graduate Preparedness 2.** Graduates will have the proper academic background for a geology-related career.

**Graduate Preparedness 2a Goal:** 80% of graduates seeking employment in the field will find it within 1 year of graduation.

**Graduate Preparedness 2a Result.**  **43 of 52 graduates (82.7%) who sought employment in the geological sciences or education found work within one year between 1994 and 2008**.  **Between 2001 and 2008, 17 of 20 (85%) found employment in the field within one year.**  Note that students who pursue careers in other fields or those with whom we have lost contact are not included in this data set.

**Graduate Preparedness 2b Goal:  5**0% of graduates on a long-term basis will remain in careers directly related to the geological sciences.

**Graduate Preparedness 2b Result.**  **57.2% of all graduates (1966-2008) are reported to be in careers directly related to geology; 26.2 % are reported to be in fields other than geology or retired; 15.9% are categorized as unknown (i.e., we lack employment information on them).   Graduates are working in the following geologically related fields: industry (mostly environmental and petroleum) (28.8%), government service (7.0%), education (14.2%), and graduate school (7.9%).**  It is likely that the 57.2% reporting careers in geology underestimates the total number of graduates who are geologists, since we do not have results for 15.9% of graduates.  Non-geologists include graduates professionally employed as lawyers, doctors, business professional, etc.

**Graduate Preparedness 3.** Education candidates majoring or minoring in Geology or Earth Science will be well prepared for careers as elementary and secondary educators.

**Graduate Preparedness 3 Goal.** Education candidates majoring or minoring in Geology or Earth Science will pass the MTTC test for Earth and Space Science at a higher rate that the state average.  Although this may seem to be a rather un-ambitious goal, most students taking the certification test are from large state schools that have special programs that focus specifically on teacher preparation.

**Graduate Preparedness 3 Result.  As of 2008, Albion College Geology and Earth Science graduates passed with an overall pass rate of 83.3% as opposed to the state average of 64.3%.**

##### SECTION 3: SUMMARY OF EVIDENCE COLLECTED

We are in the process of revamping our assessment goals and instruments. We began the process of establishing new goals and measures in spring 2009 and results will be included in the 2009-10 Assessment Report.  We reorganized our report to reflect the new goals/outcomes.

**Content Goals/Outcomes**

Our early attempts at a senior comprehensive assessment exam, without warning or preparation, have been disappointing.  We are in the process of reshaping the exam and the way we give the exam to try to make it a more accurate appraisal of our students’ grasp of the fundamentals of geology.  There are numerous very specific questions on the senior exam that cover information that may or may not be reinforced in the upper level curriculum selected by individual students.  Also, some students tested include those that majored in Earth Science, a program with few common upper-level courses and less reinforcement of intro-class subjects than would be found in the Geology major.

**Communication Goals/Outcomes**

We are satisfied that are colloquium permits all majors to meet our basic oral communication goal.  All of our graduates have read geological literature and have presented it to the geology faculty and other students at departmental colloquia.  We are currently piloting and editing an oral presentation rubric that will allow us to assess different skills expected during oral presentations.

**Critical Thinking Goals/Outcomes**

We assessed student understanding of the scientific method in our Geology 101 laboratory course in spring semester 2009.   This assessment was also part of the assessment of one of the criteria of the Scientific Analysis Mode of Inquiry general education requirement at Albion College.   We are satisfied that 85% of students in our Introductory Geology course were able to apply and write about hypothesis-testing in their laboratory research projects.    Our goal is to increase the number of students who are able to pose a high quality hypothesis, test the hypothesis in a research project, and then pose a follow-up testable hypothesis.

**Creativity & Initiative Goals/Outcomes (beginning 2009-10)**

**Earth Science Methods Goals/Outcomes**

Our students are competitive with students from the finest colleges and universities at geology field camp, a capstone experience where all of their geological background is used to solve real geological problems in the field.

**Graduate Preparedness Goals/Outcomes**

In the last fifteen years, 96% of graduates who have applied have been admitted to a graduate program.  Although unquantifiable, our majors also consistently get into top-quality graduate schools.  Nine geology/earth science graduates from the past two years are currently enrolled in graduate school at the following schools: U of Chicago, George Mason, Kentucky, London School of Economics, Michigan, Missouri (Rolla), Nebraska, and New Mexico.

In the last fifteen years, at least 82.7% of our graduates who sought employment in the field attained jobs within one year.  Over the long term, at least 57.9% of our graduates have remained employed in the general field of the geological sciences.

Our Earth Science education majors and minors have passed the state certification exam in Earth and Space Science at a much higher rate than the state average.

 SECTION 4: CONCLUSIONS, IMPROVEMENTS, RECOMMENDATIONS

##### CONCLUSIONS

            We feel that the results of our assessment analyses indicate that our programs are fundamentally sound and that our students are well prepared when they graduate.  We also believe that our program provides a diverse array of courses and activities that equally well-prepare the diverse body of students and programs we offer.  This is reflected in the fact that we have positive assessment results ranging from the success of geology majors getting into graduate school to the exam pass rate for earth science minors preparing for teaching careers.

##### IMPROVEMENTS

 We have, as we always have, continually reviewed our program and individual courses in the light of our evolving profession.  Assessment has helped us to formalize this process and has given us the structure and discipline to more closely track the success of our graduates. With our new assessment plan, which will be fully executed in 2009-10, we anticipate that we will be gathering new data that will help us make decisions about program improvements.  We further plan to coordinate the Skills and Outcomes Matrix with specific assessment goals and outcomes.  We anticipate that the matrix and assessment results will lead us to continually upgrade and refine our assessment plan.

Aside from individual course content and methodology, which we feel is beyond the scope of this report, we have made the following adjustments to our programs, in part at least, due to assessment results: continuously refined methods and procedures in Geology Colloquium; allowed more flexibility is the sequencing and selection of courses for majors and minors; revised our advanced track through geology to better suit students entering graduate school; added the senior assessment exam; and revised the requirements and courses for our education majors and minors.

Specific improvements:

*Senior Exam.*  We are in the process of redesigning our senior exam to try to make it a more accurate appraisal of our students’ grasp on the fundamentals of geology.  The current exam is multiple choice and drawn from final exams from our two required introductory courses.  There are numerous very specific questions on the senior exam that cover information that may or may not be reinforced in the upper level curriculum selected by individual students.  Also, some students tested include those that majored in Earth Science, a program with few common upper-level courses and less reinforcement of intro-class subjects than would be found in the Geology major.  We are using past results to discuss how we teach certain concepts (e.g. plate tectonics) and where in the curriculum these concepts are emphasized and assessed.

*Communication.*  We are implementing writing and oral presentation rubrics to assess these areas in 2009-10.

*Critical Thinking.*   We have assessed students’ understanding of scientific methodology in our Introductory Geology course and plan to use a similar assessment instrument for Geology 103 and research projects in upper-level courses.

*Creativity & Initiative.*  This area is still under discussion.

*Earth Science Methods.*  All of our students have field experiences but not all of our students attend field camp.  We are developing field skill assessment rubrics to be used  in field-intensive courses in 2009-10.

*Graduate Preparedness.*   We have a strong alumni base and would like to get feedback on their perspective on their preparedness upon graduation.   We are discussing including a survey with our annual newsletter to solicit feedback.

RECOMMENDATIONS

Wholesale revamping of any of our programs is not advisable given the results of our assessment analyses to date.  However, the addition of two new faculty members over the past five years and the evolving employment landscape within geology will undoubtedly bring changes to the department and our assessment procedures will have to evolve accordingly.

            The results of the senior assessment exam, as well as general observations in upper-level classes, field trip, and field camp, have been the springboard for us as a department to reflect on the pedagogy of our program and the degree to which it truly reinforces the basics of the earth sciences and develops the skills our students need to succeed in the various paths they follow after graduation.  To that end have developed and are continuing to discuss a **Skills and Outcomes Matrix** for our program, generally based on work done by the faculty at Carleton College.  We are looking at a broad array of skill sets and are discussing how these are developed and reinforced through our curriculum.  Potential improvements that will come from this analysis may include: better coordination of reinforcement areas in upper-level courses; required teaching assistantship as a graduation requirement; additional geology club activities (field trip, movie nights, etc.), and a continued reexamination of curriculum requirements and content.

### The entire department (5 FTE) reviewed and discussed the findings in our departmental meeting on October 23.   We are discussing possible changes to be implemented in our curriculum and in our assessment.  The departmental chair (Wilch) will make formal recommendations for curricular or other changes based on discussion and consensus at departmental meetings.