Geology Program Review—
2010 Executive Summary

Geology integrates the concepts of biology, chemistry, physics, and mathematics in the study of Earth processes and history. Modern geology is studied from the perspective of a unified Earth System in which the atmosphere, biosphere, hydrosphere, and lithosphere are studied as an integrated whole. The roles of geoscientists are to better understand the global environment, predict likely outcomes of the interaction of Earth processes, identify and quantify physical resources, and understand the role of anthropogenic forces and societal choices that impact the Earth system. Geologists pursue careers in industry, government, or academia—in areas such as environmental investigation and remediation, geologic compliance and regulation, teaching, and basic research. The ability to investigate processes over a wide range of spatial and temporal scales is the most significant aspect of the geoscience perspective.

The SNC geology major prepares students to enter the workforce as professional geologists or to pursue advanced study and research in a graduate program. The goal of the Geology Discipline is to develop the whole person—intellectually, ethically, personally, and professionally. To this end, we teach 'beyond the classroom' and emphasize professional and personal mentoring of our students throughout their tenure at SNC. We advance and embrace the hallmarks of St. Norbert College: Catholic, liberal arts, Norbertine. We are guided by the Norbertine ideal of Communio. The Discipline strives to make the major intellectually demanding and personally rewarding while also challenging students to consider moral and ethical issues regarding human-induced changes of the Earth System and our use of its natural resources.

Students majoring in geology at SNC are expected to acquire a basic knowledge of the sciences and geology in particular, learn the basic skill set of a geoscientist, develop critical problem solving and thinking skills, develop effective written and oral communication skills, and acquire the appropriate quantitative competency for their field. Values and ethical considerations, especially related to the human condition and the environment, are woven throughout the curriculum. To these ends, the SNC geology curriculum is traditional and rigorous. We require that our students complete a year of chemistry and physics, and one semester of calculus in addition to a core of geology courses covering the traditional sub-disciplines of study.

The Geology Discipline emphasizes field experience and research as core to its undergraduate program. All majors must complete a 4-6 week field camp offered by another institution as part of their graduation requirements. This course serves as an ideal capstone experience to the major. The Discipline also integrates field trips throughout the curriculum—as part of regular courses and as special offerings. Extended trips have gone to places such as The Galapagos Islands, Costa Rica, Belize, Hawaii, Florida and California. Research projects are integrated into several courses including field trips, in addition to the traditional senior thesis option. Many of our students have participated in summer research programs sponsored by the National Science Foundation (REU) at other institutions.
We believe our themes of field experience and research have provided our majors with experiences that often set them above undergraduates from other institutions—and thus have made them very competitive for professional positions and entrance to graduate programs. In the past 20+ years, approximately 70% of SNC geology graduates have matriculated to graduate programs with research or teaching assistantships. Additionally, nearly all of our graduates have found employment in geoscience (or a related field).

The faculty of the Geology Discipline contributes in significant and sustained ways to the College. The Discipline contributes from 35% to more than 50% of the Area 4 General Education offerings (seats to non-science majors) per year. The geology faculty has offered writing-intensive and honors sections, and now contributes regularly to Area 11 as well. We have served regularly on a variety of elected and appointed committees to include the Faculty Personnel Committee. The faculty members are active professionally in their respective sub-disciplines of geology, as indicated by contributions to professional conferences and publications. The two tenured faculty members of the Discipline have both earned the Ledvina Teaching Award and the King Scholarship Award.

The Geology Discipline's assessment tools, although basic, have yielded clear information about our program's shortcomings and also allowed us to formulate goals for improvement. We recognize the need for incorporating more training with modern computer-based mapping instrumentation in our curriculum, to include both field equipment and lab software. We are focused on changes in the curriculum that will foster a smooth transition from geology as a general education course to geology as a field of study for our newest majors. We are committed to raising our travel endowment to reduce the financial burden of field trips on students. We look forward to the renovation of Minahan Science Hall, which will provide new and expanded geology facilities. Finally, we are excited about the addition of our newest faculty member in the Fall of 2010, Dr. Rebecca Schmeisser—a former SNC geology major. She brings a wealth of new expertise to the Discipline in paleontology and sedimentology, and will be an ideal mentor to our students.
GEOLOGY PROGRAM REVIEW
APRIL 2010

Introduction
This document summarizes the program review findings of the Geology Discipline inclusive of the 2003/04 through 2007/08 academic years. The review is organized according to the Academic Program Review Guidelines.

I. Vision Statement and its relation to SNC's Mission and Core

Geology integrates the concepts of biology, chemistry, physics, and mathematics in the study of Earth processes and history. The goal of the discipline is to develop the whole person, intellectually, ethically, personally and professionally. We strive for this end through our commitment to continued improvement that leads to sustained excellence. We advance and embrace the hallmarks of St. Norbert College; Catholic, liberal arts, Norbertine. We are guided by the Norbertine ideal of Commumo. Evidence of our commitment to excellence is rooted in our student learning outcomes that include the development of critical thinking, problem solving, oral and written communication, and quantitative skills.

Geology at St. Norbert College is consistent with the Mission of the College
The Geology Discipline fosters an appreciation and understanding of geology from the perspective of a unified Earth System in which the atmosphere, biosphere, hydrosphere, and lithosphere are studied as an integrated whole - each sphere incapable of changing without affecting the others. The roles of geoscientists are to better understand the global environment, predict likely outcomes of the interaction of Earth processes, identify and quantify natural physical resources, and understand the role of anthropogenic forces and societal choices that impact the Earth system. The ability to investigate processes over a wide range of spatial and temporal scales is the most significant aspect of the geoscience perspective. The Discipline strives to make the major intellectually demanding and personally rewarding while also challenging students to consider moral and ethical issues regarding human-induced changes of the Earth System and our use of its natural resources. The geology major prepares students to directly enter the workforce as professional geologists or to pursue advanced study and research in a graduate program. The geology paradigm emphasizes knowledge of fundamental skills and application of the scientific method - thus allowing the greatest flexibility for solving geologic problems.

H. Program Description

A. Objectives of the program and learning outcomes
Geology is a field of study that allows students to broaden their understanding of basic scientific knowledge and skills applied to the earth system. Students studying geology may pursue careers related to geology in industry, government, or academia; in areas as diverse as environmental investigation and remediation, to resource allocation and distribution, to geologic compliance and regulation, to teaching and basic research. Students majoring in geology are expected to:
- Acquire a basic knowledge of science overall and geology in particular
- Acquire the basic skill set of a geoscientist
- Develop critical problem solving and thinking skills
• Be able to effectively communicate, both written and oral
• Acquire the appropriate quantitative competency of a professional level geoscientist

The knowledge and skill sets developed through study of geology at SNC are, as noted earlier, rooted in the values espoused by St. Norbert College. Values and ethical considerations, especially related to the human condition and the environment, are woven throughout the curriculum.

B. Description of the Curriculum
The Geology Curriculum is traditional in its core program and unique in some electives. The core curriculum consists of 14 Courses:

GEOL 105 Introductory Geology or GEOL 107 Environmental Geology or
GEOL 120 Geology of Wisconsin, followed by
GEOL 225 Hydrogeology
GEOL 320 Petrology
GEOL 322 Sedimentology and Stratigraphy
GEOL 325 Structural Geology
GEOL 450 Geology Field Camp

CHEM 105 General Chemistry 1
CHEM 107 General Chemistry 2

PHYS 112 Fundamentals of Physics 2 or PHYS 121 General Physics 1 and PHYS 122 General Physics 2

Two courses from the following list (only one may be at the 100 level):

GEOL 115 Oceanography
* GEOL 120 Geology of Wisconsin
* GEOL 240 Tectonics
GEOL 250 Geomorphology
* GEOL 301 Evolution of the Earth
* GEOL 307 World Resources
* GEOL 330 Geological Field Methods

GEOL 350 Glacial and Quaternary Geology
GEOL 354 Natural History Field Course
GEOL 428 Environmental Geology Research
GEOL 490 Independent Study
GEOL 492 Directed Research
GEOL 496 Senior Thesis
BIOL430 Paleobiology

(* indicates courses that are offered intermittently)

Students may receive an academic minor in geology by successfully completing six courses approved by the Geology Discipline. Only one course at the 100 level may count toward the minor.

Additional explanation of the curriculum follows. All courses taught are 4-credit courses with the exception of GEOL 354 (Natural History Field Course) and GEOL 450 (Geology Field Camp). GEOL 354 is offered alternately as a 4-credit course (winter break trip of approximately 18 days) or 2-credit course (spring break trip of approximately 8 days). GEOL 450 is a six-credit course. Most of the major course offerings are on a three-semester rotation. For example, if GEOL 300 (Mineralogy) is taught during fall of 2009, it will not be offered again until spring of 2011. This best practice allows for greater flexibility in offering major courses and increases enrollment in the major courses.

C. Program Administration
The Discipline Coordinator of Geology alternates approximately every three years between the tenured members of the Discipline, Nelson Ham and Tim Flood (current). The Discipline Coordinator is in charge of all matters related to the Discipline (i.e. budget, schedules, course offerings, liaison with Associate Dean of Science, and miscellaneous other). Although the
Discipline Coordinator is responsible for most matters related to the Discipline, the workload is regularly distributed in a sharing and collegial manner.

III. Assessment of Student Learning Outcomes

A. Viable Assessment Plan
The Geology Discipline has an approved assessment plan that was developed and implemented in the spring of 2004 with the assistance of Dr. Bob Rutter (on file at OIE). An initial plan had been developed in 1995. The current plan relies on three primary measures as indicators of program effectiveness, all of which have been useful in making programmatic improvements.

B. Direct Evidence
Field Camp Evaluation
The geology paradigm requires that all SNC geology majors attend a 4-6 week summer field camp. Field camp teaches students geologic field techniques and allows them to synthesize knowledge acquired mostly in the classroom, thus it is the ideal capstone course. Most students attend camp after completing their junior year of study. SNC does not offer its own field camp (few institutions our size do). Our students are taught and evaluated by faculty from outside SNC—thus the performance of SNC geology majors at camp is an independent measure of the competence of our graduates in basic geologic skills and knowledge. We assess the performance of our students at camp via an evaluation sent to their respective field camp directors (Appendix 1).

With the first Geology Discipline Assessment Plan Review in fall of 2005, 10 evaluations were available for SNC students. Since that time, an additional 9 evaluations have been sent to field-camp directors and returned. Appendix 1 summarizes all the evaluations. SNC geology majors have been evaluated favorably by camp directors with regard to basic skills and competencies, and no major areas of weakness have been noted. Our five-year goal following the first assessment report in 2005 was to maintain or exceed the following level of achievement at field camp by our majors:

- Core competencies—curriculum: Core 80% of students at score of 3 or above
- Core competencies—program: 80% of students ranked at 75% or above

Although these goals have been met or exceeded (at 100%), we recognize several curricular issues that could be improved based on some of the sub-rankings and comments, and discuss these in section D below.

Alumni Survey
Another measure of program effectiveness is our alumni survey (Appendix 2), initiated in 2005 at 5-year intervals. The Survey asks alums similar questions asked of field-camp directors. The survey provides feedback from former students on (a) their reflections about the quality of their SNC education, (b) their recommendations on curricular changes based on their experiences in graduate school and/or in jobs, and (c) their recommendations on the strengths of the SNC Geology Program that should be kept 'as is' and perhaps even emphasized based on their perceived value. Most of our graduates have found employment as professional geologists in a variety of positions (academic, industry, government). We believe they provide an important perspective on the current 'state of the science'.
A total of 44 surveys were mailed to all known graduates of the SNC Geology Program in the spring of 2005. The return rate of completed surveys was 20%. The statistical significance of the surveys is unclear; however, several comments are repeated by respondents and corroborate faculty perceptions of program needs and shortcomings. We believe the next survey (this year) will result in a considerably higher return rate—we have better tracking of our most recent graduates and plan to administer the survey online.

The most significant results of the 2005 alumni survey are as follows. Student's perceptions of competency in core curriculum areas and program skills were generally ‘acceptable’ to 'outstanding'. Some of the comments concerning their training in sedimentology & stratigraphy were directed toward adjunct faculty that were hired during a time that Dr. Tim Flood was serving as Chair of the Division of Natural Sciences.

All students ranked themselves at a score of '70%' or higher with regard to their overall academic ability/preparation in comparison with other geology students/employees once they left SNC. The perceived strengths of the Geology Discipline related largely to field experiences, emphasis on undergraduate research, and quality teaching. Perceived weaknesses of the program focused on the following: lack of adequate classroom space, more use/practice with technology common to modern geological research, addition of a historical geology course, and more focus on use of primary literature in geology/writing skills/presentation skills. Our improvement efforts based on this part of our assessment plan are discussed in part D below.

C. Indirect Evidence

Success in Graduate School Admittance and Employment

Another measure of program effectiveness is the success of our students when applying for entry to graduate school or positions in industry and public agencies. The Geology Discipline has tracked graduates of the SNC Geology Program quite closely since the program began (Appendix 3). Students who are academically competent should be competitive for geology jobs or graduate school positions on an on-going basis (although economic and personal factors must be considered when evaluating such things as employment data). Although establishing a specific target (%) for graduate school admittance or job success isn’t our overriding goal, we have maintained approximately 70% of our graduates being accepted to graduate school with financial support (assistantships), and nearly all of the graduates of our program work broadly in the field of geology.

D. Document program improvement efforts based on assessment

The Geology Discipline has attempted to address the primary issues raised by its ongoing assessment program. Some of the improvement efforts summarized below are discussed in detail in our last assessment report filed with the SNC OIE. Additional efforts are underway to revise our assessment plan.

Assessment Action Steps Completed or Underway:

a. Room additions:
The Geology Discipline added a second dedicated classroom (JMS 420) for upper-level courses. Renovation, furniture purchases, and equipment upgrades were completed by August 2005 with funds made available by the SNC Administration, specifically Academic Affairs Division. This addition nearly doubled the usable teaching space for geology.
b. Technology:
A continuing struggle is the acquisition of "high tech" lab and field equipment for use in the program. The SNC Kresge Endowment provided funds to purchase a new petrographic microscope with digital imaging equipment several years ago. Additional teaching microscopes were requested as part of capital budget requests in 2007 and resulted in six new, research-grade microscopes. More recently, the acquisition/installation of the ESRI ARC Geographic Information System software by the Education Discipline has opened the possibility of a GIS course at SNC (via the Geography Discipline) and the use of the software for the purposes of teaching computer-based mapping techniques to geology students. Krissy Lukens and Nelson Ham have recently been meeting to discuss ways in which GIS data (from geology) can be utilized by Education, and vice versa. This is an exciting development for Geology in several ways—courses, undergraduate research, and faculty research.

c. Curriculum changes—courses:
Historical geology is typically the second semester course of a one-year introductory geology sequence at most institutions. Staffing formerly prevented us from offering this course on a regular basis and some alumni noted concerns about the quality of the Sedimentology and Stratigraphy course offered by adjunct faculty during the past several years. To address these issues, and others, the Discipline requested the addition of a third tenure-track faculty member; eight years ago. The request was approved, and Dr. Elizabeth Gordon was hired in the fall of 2003. Dr. Gordon's expertise is such that she taught both sedimentology stratigraphy on a regular basis, but historical geology was only rarely offered (for a number of reasons). Dr. Rebecca Schmeisser, who will take over Dr. Gordon's teaching duties in the fall of 2010 has been hired with the expectation of fully developing these courses (successfully) and offering them on a regular basis.

d. Curriculum changes—research methods:
Some alumni noted that they would have liked more experience in primary research methods of geology. Most students who graduate from the Geology Program have completed some type of senior research project or thesis, and thus have gained this type of experience. However, clearly not every student is consistently being given this experience (or believes they have adequate training in this area upon leaving the program).

The geology faculty started to address this issue by implementing a "mini" research project in the igneous and metamorphic petrology course required of all majors and taught by Dr. Tim Flood. Students are required to develop a small research project that can be completed over the course of the semester. The project involves basic research methods in mineralogy and petrology, work in acquiring and reading primary literature (using online database programs such as GeoRef), and use of Adobe Illustrator to construct poster presentations.

e. Curriculum changes—course requirements/design:
Although SNC students consistently were ranked has having acceptable to excellent knowledge in major content and skill areas by their field camp instructors, in some instances a shortcoming was their exposure to surficial processes. In the current curriculum, this course (GEOL 350 Geomorphology course) is an elective. Those students who ranked lower in this content area than others did not have the course. With changes in the SNC General Education Program, as well as an increase in the number of credits a student can take per semester (without additional charge), students will have more flexibility to take two or three additional courses as electives. Additionally, we are considering the implementation of two half-courses (required) for our majors—one to be taken during the sophomore year and another at the beginning of their senior
year. The purpose of the first course would be to bridge the gap between their Introductory Geology (GEOL 105) Area 4 course and their first majors courses in terms of content and basic field skills. In addition, the course would provide guidance on how to plan for their next three years of study. The second course, a type of senior seminar, would focus on refining advanced, critical thinking, writing, and presentation skills.

f. Ongoing efforts to improve our assessment program
   We seek to improve our assessment program beyond its current structure. Dr. Ham was a participant in an NSF-sponsored 2-day workshop on "Assessing Geoscience Programs: Theory and Practice" held at Carleton College, MN, in February of 2009. The workshop webpage begins at: http://serc.carleton.edu/departments/programassessment/index.html.
   The workshop consisted of presenters talking about their respective experiences in departmental assessment and also the workshop participants developing 'rough' assessment tools or ideas. Assessment tools discussed and evaluated were portfolios, alumni surveys, exit surveys, performance exams, student surveys, course evaluations, and a variety of rubric structures (all of which are online at the workshop website). We believe several key ideas that can be adapted to our program are:
   
   a. improving the quality of our alumni survey in terms of information requested and method of delivery (web based vs. paper). These changes are underway.
   
   b. considering the implementation of a portfolio concept for key projects that are already integrated into several majors courses.
   
   c. considering the development of a performance exam to test basic content and skills knowledge
   
In summary, even the basic assessment tools we have employed have resulted in concrete changes and significant improvements to our program. Forthcoming changes in the General Education Program provide some new curricular opportunities for our majors that address some assessment issues. And with additional information from the recent NSF Geoscience Assessment Workshop, we have new and significant changes to consider in our assessment program once our new faculty member is on board in the fall of 2010.

IV. Program Demographics and Comparisons

A. FTE program faculty with Beginning/end years at SNC
   
   Tim Flood, Ph.D., Professor of Geology (1987)
   Nelson Ham, Ph.D., Professor of Geology (1994)
   Elizabeth Gordon Ph.D., Assistant. Professor of Geology (2003-2010)
   Rebecca Schmeisser, Ph.D., Assistant Professor of Geology (starting 2010)

B. Number of majors and or/minors
   The number of geology majors may be noted in Table 1. We suggest that this data is not particularly relevant because in some years (i.e. 2006/07) we had more geology graduates than we
had number of majors. Nonetheless, we would like to increase the number of majors and have majors declare their major more effectively.

Table 1. Majors by Class / Sex

<table>
<thead>
<tr>
<th>Class / Sex</th>
<th>95-96</th>
<th>96-97</th>
<th>97-98</th>
<th>98-99</th>
<th>99-00</th>
<th>00-01</th>
<th>01-02</th>
<th>02-03</th>
<th>03-04</th>
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<th>06-07</th>
<th>07-08</th>
<th>08-09</th>
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<td>New Freshmen</td>
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<td>0</td>
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<td></td>
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<td>7</td>
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<tr>
<td>Seniors / Others</td>
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<td>5</td>
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<td>8</td>
<td>4</td>
<td>1</td>
<td>3</td>
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<td>Total</td>
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<td>8</td>
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<td>0</td>
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</table>

C. Number of Graduates

The number of geology graduates may be noted in Table 2 and Table 9. According to Table 2., geology graduated 10 students between the five year period of May 2003 to May 2007. According to Table 9, 14 students graduated during that time. Although the difference between the absolute numbers is not really that significant, the percentage comparisons, especially between peer and aspirant institutions (Appendix 4) may be significant. Obviously, the reason is the small number of data points used to compute percentages. A small change in the absolute number can make a significant change in the percentage number.

Table 2. Total Geology Program Graduates *indicates updated data with actual number in the denominator

<table>
<thead>
<tr>
<th>IPEDS Reporting Year of July - June</th>
<th>94-95</th>
<th>96-97</th>
<th>97-98</th>
<th>98-99</th>
<th>99-00</th>
<th>00-01</th>
<th>01-02</th>
<th>02-03</th>
<th>03-04</th>
<th>04-05</th>
<th>05-06</th>
<th>06-07</th>
<th>07-08</th>
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<td>470</td>
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<td>459</td>
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<td>414</td>
<td>447</td>
<td>450</td>
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<td>3</td>
<td>2</td>
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<tr>
<td>Total Majors</td>
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<td>4</td>
<td>4</td>
<td>0</td>
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<td>3</td>
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<tr>
<td>% of All Grads</td>
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<td>1%</td>
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<td>Total Minors &amp; Majors</td>
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<td>4</td>
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<td>3</td>
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</table>

D. Ratio of Graduates to Majors

The ratio of graduates to geology major obtained from program review data is noted in Table 3.

Table 3. EPEDS Graduates to Fall Declared Majors

<table>
<thead>
<tr>
<th>Ratio Grads to Majors</th>
<th>94-95</th>
<th>96-97</th>
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<th>98-99</th>
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<tbody>
<tr>
<td>95-96</td>
<td>0.00</td>
<td>0.44</td>
<td>0.57</td>
<td>0.00</td>
<td>0.25</td>
<td>0.67</td>
<td>0.25</td>
<td>0.25</td>
<td>0.30</td>
<td>0.25</td>
<td>0.10</td>
<td>0.22</td>
<td>0.57</td>
<td></td>
</tr>
<tr>
<td>Ratio Grads to Minors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.50</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
<td>0.40</td>
<td>0.29</td>
<td>0.33</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
E. **Ratio of Majors to FTE**
The ratio of majors to FTE full-time faculty is noted in Table 4.

<table>
<thead>
<tr>
<th>Table 4. Ratio of majors to FTE full-time faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year</strong></td>
</tr>
<tr>
<td>Ratio of Grads to FTE</td>
</tr>
</tbody>
</table>

F. **Course Enrollments and Grade Distribution**
Course enrollments (Table 5) and grade distribution (Appendix 5 and 6) are noted below. The course enrollments data highlights the number of general education courses to major's course taught by geology (discussed under distinctiveness of program). The grade distribution data (Appendix 5) indicates that geology's overall grade distribution is comparable to other Disciplines in the Natural Sciences and lower than mat of the overall College. Grade point averages for geology are noted in Appendix 6.

<table>
<thead>
<tr>
<th>Table 5. Geology course enrollments 03-09.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geology Program Enrollment</strong></td>
</tr>
<tr>
<td>Total Class Enrollments by Academic Year (Fall, Spring, Summer Semester)</td>
</tr>
<tr>
<td>Other Enrollment = Arranged, Independent Study, Internships</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Regular Enrollment</td>
</tr>
<tr>
<td>GS Enrollment</td>
</tr>
<tr>
<td>Other Enrollment</td>
</tr>
<tr>
<td>Total Enrollment</td>
</tr>
</tbody>
</table>

G. **Advising load per full-time faculty**
The academic advising load is noted in Table 6. According to Jeff Ritter, the typical advisement load is approximately 16 for full-time faculty. The Geology Discipline advising load is comparable to the College average.

<table>
<thead>
<tr>
<th>Table 6. ACADEMIC ADVISING - GEOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advisor</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Flood</td>
</tr>
<tr>
<td>Gordon</td>
</tr>
<tr>
<td>Ham</td>
</tr>
</tbody>
</table>

H. **Percent of course sections taught by full-time faculty**-100% since Fall 2003.
I. Peer and aspirant comparisons

Our graduation information (Appendix 4) is comparable to our peer and aspirant institutions. Over the period of 2005-07, our peers graduated on average 3-4 per year and our aspirant graduated 5-7 per year. Geology graduated on average 3 per year (* indicates updated data with actual number in the denominator). Increasing the number of geology graduates is a priority discussed later in the reflection section.

V. Teaching and Learning

A. Indicators of Teaching and Advising Quality

The Geology Discipline has maintained a level of teaching effectiveness, as measured by student opinion of teaching (Appendix 7) at or near the College average and from the alumni survey (Appendix 2). The advisement of students has also been reported favorably (Appendix 2).

B. Scholarly/Creative Efforts

Please see attached vitae.

C. Collegial and Community Service

Please see attached vitae.

VI. Other Indicators of Program Achievement and contribution

A. Quality of entering Students Attracted to Major

Please see Appendix 8.

B. Contributions to General Education and Other College Programs

The Geology Discipline is a significant contributor to the General Education Program of the College. We embrace this role and try to offer courses that are truly intended for the general education audience. All three faculty contribute 50% or more of their regular teaching load to general education. In terms of comparison, geology teaches more general education courses than any other discipline in the Division of Natural Science (Table 7). In fact, greater than 30% of all general education courses taught in the Natural Sciences Division are taught by geology faculty. Most of these courses are in Area IV and include Introductory Geology (GEOL 105), Environmental Geology (GEOL 107), Geology of Wisconsin (GEOL 120) and Oceanography (GEOL 115). Dr. Nelson Ham occasionally contributes to Area XI by teaching Environmental Science, ES 300. In addition, geology teaches an Introductory Geology Area 4 Honors course approximately every other year. Introductory Geology was the first course (2004) in the Natural Science Division to contribute to Area 9, the writing intensive component of general education. Since then, three additional writing intensive courses have been offered by geology.

Table 7. Contributions to General Education by disciplines in Natural Science.

<table>
<thead>
<tr>
<th></th>
<th>Biology</th>
<th>Chemistry</th>
<th>Envi. Sci.</th>
<th>Physics</th>
<th>Geology</th>
<th>Total</th>
<th>Geol % of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003/04</td>
<td>96</td>
<td>103</td>
<td>17</td>
<td>125</td>
<td>184</td>
<td>525</td>
<td>35%</td>
</tr>
<tr>
<td>2004/05</td>
<td>129</td>
<td>130</td>
<td>39</td>
<td>148</td>
<td>190</td>
<td>636</td>
<td>30%</td>
</tr>
<tr>
<td>2005/06</td>
<td>112</td>
<td>108</td>
<td>11</td>
<td>126</td>
<td>203</td>
<td>560</td>
<td>36%</td>
</tr>
<tr>
<td>2006/07</td>
<td>133</td>
<td>100</td>
<td>21</td>
<td>155</td>
<td>217</td>
<td>626</td>
<td>35%</td>
</tr>
<tr>
<td>2007/08</td>
<td>181</td>
<td>136</td>
<td>27</td>
<td>85</td>
<td>210</td>
<td>639</td>
<td>33%</td>
</tr>
</tbody>
</table>
C. Uniqueness/Distinctiveness of Program

Two areas significantly contribute to the uniqueness and distinctiveness of the Geology Program, extended field courses and student/faculty collaborative research. Geology program has offered extended field trips for credit in 21 of the last 23 years. Since 2003, the Discipline has offered five of these courses (Table 8). These courses provide unique learning/scientific experiences for the students. This is especially so for the 4-credit courses, which typically have a research component to them. We believe these experiences help our students with their professional preparation. For example, a student who participates in one of these courses with a research component, and presents the results of their original research, significantly improves their ability to compete for graduate school placement. These courses allow us to compete with other high quality geology programs such as Carleton College and Macalester College in generating national recognition for our program. These courses have contributed significantly to the scholarly agenda of the faculty (see vitae). Although the trips themselves may seem glamorous, they can be labor intensive to design/implement and stress intensive to run (especially from a liability standpoint). In addition, the faculty members receive no compensation in the form of workload compensation or salary. These courses are per gratis except for travel expenses.

Table 8. Extended Natural History Field Courses

<table>
<thead>
<tr>
<th>Location</th>
<th># of students</th>
<th># of days</th>
<th># of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003/04</td>
<td>Florida Keys</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>2004/05</td>
<td>Death Valley</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>2005/06</td>
<td>Hawaii</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>2006/07</td>
<td>None</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2007/08</td>
<td>Death Valley</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>2008/09</td>
<td>Galapagos</td>
<td>11</td>
<td>14</td>
</tr>
</tbody>
</table>

The second area that adds to the uniqueness and distinctiveness of our program is student faculty research. Like many others programs at the College or hi the Natural Sciences, geology believes that independent student/faculty collaborative research is an important tool for educating our students. Since 2003, approximately 25 students have participated in some form of student/faculty research at SNC that resulted in a presentation or publication. These have occurred either as a senior thesis, as part of a field course or just independently. Since 2003, 3 presentations have been made by our students at national conferences, 4 presentations at regional conferences, 12 presentations at the SNC day of student/faculty celebration and 1 has been published hi an international journal (see Flood's vita). In addition, 21 students from a variety of colleges and universities completed summer research projects as part of the NSF-REU program in Alaska co-directed by Nelson Ham during the period from 2-003-07. All of these projects were presented at regional meetings of the Geological Society of America.

D. Contribution to Diversity Goals

The faculty of the Geology Discipline takes diversity seriously. Although the majority of recent PhD's in geology are white males, attracting women and minority candidates was a high priority during our recent recruitment process for a new assistant professor. Our last two tenure-track hires in geology have been women.
With respect to diversity among our majors and minors, half of our former geology students (27 of 54) have been women, and 5 of our 6 graduates who have earned Ph.D.s have been women. In a traditionally male-dominated science, we are especially proud of this accomplishment.

E. Special/Accreditation Status
Not applicable.

F. Evidence of Integrating Strategic Planning Into Practice

G. Efforts to Attract Grant Funding
Since 2003, faculty members in the geology discipline have written a total of 6 external grants totaling nearly $1,000,000 (see vitae). Unfortunately, none were funded. It is our intent to keep up our efforts.

H. Success Indicators for Career Preparation
Success indicators of career preparation may be measured in the percentage of graduates who go pursue advanced degrees and number of graduates working as geologists. Since 2003, 10 of 14 graduates (71%) have matriculated into such graduate programs as, UW-Madison, U of Minnesota, U of Iowa, U of Utah, and U of Arizona (Table 9). This is consistent with our historical average of approximately 75%. Although it is harder to quantify because it is harder to track, most geology graduates are working in the field of geology (Appendix 3).

Table 9. Names of graduating geology majors (* indicates went on to graduate school).

<table>
<thead>
<tr>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Paul Albers</td>
<td>*Nate Meyer</td>
<td>*Jackie Shumway</td>
<td>*Tom Nelson</td>
<td>*Dan Costello</td>
</tr>
<tr>
<td>*Heather Bleick</td>
<td>*Rebecca Schmeisser</td>
<td>*Jake Steimle</td>
<td>*Renata</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*CMs Bradford</td>
<td>Derrick Maur</td>
<td>Nate Magnusson</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Troy Boisjoli</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Megan Mitchell</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I. Other Indicators of Program Quality
Two faculty in the Geology Discipline have won both the Leonard Ledvina Award for Excellence in Teaching (Flood-1995, Ham-2001) and the Donald B. King Distinguished Scholar Award (Ham-2005, Flood-2009).

VII. Reflections and Recommendations of the Geology Discipline
This document represents the geology program's formal component to the program review process for the most recent five-year period. Much of the data for this report was supplied by the Office of Institutional Effectiveness (OIE), especially as it related to most internal data and all external (peer and aspirant) comparison data. We look forward to discussing this document with the Curriculum and Educational Policy Committee and the Dean of the College as the next step in the process. The purpose of the program review process, as stated in the most recent program review guidelines, is "strengthening them where needed, modifying or eliminating them as judged appropriate, and redirecting resources as warranted". We look forward to successful completion of the process.
The reflections and recommendation essay to follow is focuses on three broad themes: 1) What were the recommendations from the last formal program review? Were sincere efforts undertaken to advance those recommendations? Were these efforts successful? 2) What were the significant issues of the geology program over the last 5 years. What were the successes, challenges and failures? 3) What does the geology program hope to accomplish in the future? Specifically, based in large part on this program review, what does the geology program hope to improve upon or change for the future.

Recommendations of Last Program Review
The last formal review of the geology program was in spring of 2004. The summary report listed strengths, concerns and recommendations. The strengths cited include; support of Area IV, international and capstone field experience, matriculation of graduates into graduate schools, collegial service, student-faculty collaborative research, tracking graduates, dedication to students outside of class time, diversity efforts, plan to increase visibility of program and scholarship of faculty. We believe that, at a minimum, we have maintained these strengths within the confines of the tenured faculty. The concerns cited include; lack of space and equipment, program has not completed program assessment, mission statement not in sync with the College, small number of majors, over optimistic about future number of graduates, and poor record of hiring temporary faculty. Each of these concerns will be addressed in the reflections of the last five years to follow below.

The previous program review listed six recommendations for the geology program. Geology has made a sincere effort to address those recommendations.

1) "Develop a mission statement that is more closely tied to that of the College ". The geology program has reflected on our mission and our new statement is more closely tied to that of the College's, which was itself revised since our last review.

2) "Develop strategies for fully funding field experience courses and student research." One source for. funding field experience courses and student field research is the Geology Travel Endowment. The very specific charge of that account is "to be used exclusively to support student travel related to geology". In the past five years, the principal in that account has increased from approximately $5,000 to approximately $40,000. Our goal in the next five years, through solicitation of alums and friends of the College is to increase that amount to a minimum of $100,000.

3) "Develop a formal method to assess graduates." An approved program assessment plan was approved and implemented. The first round of assessment has been completed and improvements have been made to the geology program based on the quantitative and qualitative data. Review and modification of our assessment-plan is underway based-on techniques and ideas learned from a recent NSF workshop on assessment in the geosciences (spring 2009).

4) "Develop courses to cover other areas of the General Studies curriculum, such as Area 11." Nelson Ham is contributing courses in Area 11 (Environmental Science ES 300) approximately every third semester. Geology will be an active participant when the "new" general education program is implemented.
5) "Develop an action plan that prioritizes the needs of the program and tie specific resources requests to growth in the program." The needs of the program and how we are addressing them will be discussed synergistically in the section to follow. In short, the majority of our current needs are space (to be addressed by the new building) and support for field experiences (which we are aggressively working on). We are comfortable with our current level of staffing.

6) "Complete the program assessment." Assessment plan completed, approved, and implemented (see also #3 above).

**Reflections on the past five years**

Over that last five years, the Geology Program has maintained core strengths of the program (such as field instruction) and engaged in new activities (pedagogical scholarship) that continue to contribute to the mission and growth of the College. During this time we strived to stretch ourselves intellectually and we invested a great deal of sweat equity into the program. We have had our share of successes and some disappointments. We have a sense of who/where we are and who/where we would like to be in the future.

The geology program has strengths that we have tried to maintain. In general, we have tried to improve the quality of instruction and rigor of our program. Our overall quality of instruction and the quality of our courses is at or near the College average (Appendix 7) as measured by the quantitative portion of the SOOTs and generally higher as assessed by our alums (Appendix 2). Written comments support the quantitative data. At the same time our high standard of rigor, using GPA's (Appendix 6) as one proxy, has been maintained. For example, we take pride in our Introductory Geology course. In terms of rigor, it is not a "rocks for jocks" course. The rigor of the courses in the major program can be attested to by the successes of our alums in getting into graduate school (Table 9) and the informal feedback we get of their success in the workplace.

We also believe that the best way to educate and prepare our students is through a field-based curriculum. To that end, we continue to get students out into the field. Each semester a minimum of two weekend field trips to regional locals are run by geology faculty. Generally they are run as part of one of the upper level courses but all interested students are encouraged to attend. These field trips allow for the development of geologic concepts and skills beyond the limited confines of the laboratory. They serve as a format for the development of the more subtle areas of professional etiquette and ethics, for informal advisement, and for ingrain the notion of "diligent curiosity" (Ham and Flood, 2009). These trips allow us to really get to know our students and develop a *esprit de corps* amongst and between the students and faculty. We believe they have been integral to the success of our graduates. The national and international courses have many of the same goals as local field trips. In the past five years (see Table 8), we have taken students to Hawaii and Death Valley (twice). Most recently we have visited the Galapagos Islands and Florida Keys. These trips serve as great tools for educating our students to broader concepts, such as environmental ethics. These courses are distinctive and similar to those at other high-quality liberal arts colleges such as DePauw, Carleton, and Macalester. Through these initiatives and others, the geology faculty continues to invest time and energy into the program, especially the students. For example, from 2003-2008, the geology faculty has taught a total of 15 independent courses such as senior thesis, independent research or individual/specialty courses. That is an average of 1.5 per semester and does not include any of the above mentioned field courses. No
faculty member has received compensation in any form for this work. We feel it is necessary for our program and hope the new workload policy guidelines assist these efforts.

Geology has tried to maintain a high level of scholarship over the past five years (see attached vitae). These endeavors have included topical research, pedagogical research, and student/faculty collaborative research. We believe we have been relatively successful in this area.

The geology program has invested efforts to secure support for the program over the last five years. A total of 6 grants totaling nearly one million dollars was submitted to external agencies (see vitae) to help support our teaching/scholarly agendas. Unfortunately, none of these efforts were successful but we will press forth. Geology has received internal support for equipment from the Kresge Endowment and through instructional support. These two sources have proved invaluable in our quest for excellence. Given our core philosophy of a field-based program, funding for student travel is critical. The Geology Travel Endowment, started in 1999 by the Geology Club, was increased from approximately $7,000 in 2003 to approximately $40,000 today. The Discipline has lobbied internal sources successfully for new and renovated space. IMS 420 was converted from a general use classroom to a geology specific classroom/laboratory. It nearly doubled our teaching/research space. Storage space, incredibly important to our program, was also increased significantly with the addition of the old "photography dark room" space in the basement of JMS.

Geology has maintained its collegial efforts over the past five years (see vitae). Members have served on a number of College-wide and Divisional-wide committees, have participated in the intellectual life of the College and the local community through numerous presentations, and regularly attended Faculty and Divisional meetings. We will continue our contributions in these areas.

A quality program review must also address aspects of the past five years that have not been successful or have not met our expectations. A third tenure-track geology faculty member was added to the Discipline in Fall 2003. Unfortunately, the tenure-track was not able to be converted to a tenured faculty member. Consequently, the past few years have been uncomfortable for all in the Discipline. The Dean of the College implemented a workload policy for the Natural Science Division in 2008. The result was that our two Introductory Geology laboratories of approximately 20 students each was consolidated into one lab of approximately 30 students. While the result was a reduction of faculty contact hours from 14/week to 12/week, it increased the lab size by 10. Consequently, the one lab is spread out over two adjacent rooms. We believe this arrangement is a pedagogical detriment. We will work to remediate this. Finally, one of the comments from the previous program review was "The projections about the number of future graduates are based on assumptions that may be over-optimistic". Unfortunately the concern turned out to be founded. Even though our number of graduates to full-time faculty member is at or near our peer and aspirant institutions (Appendix 4), we did not meet the target we set for ourselves. We will continue to be aggressive in this area.

The Future
We believe the quality of the current geology program is excellent but we believe we can be better. Improvement comes by vision, often driven by resources. Below is an outline of our vision on some topics in geology for the next five years.
A new tenure-track faculty has been hired for Fall 2010, maintaining our full-time faculty in the Discipline at 3. From a realistic perspective, we believe this is sufficient for the next five years. We will not be asking for increased staff unless our number of majors significantly increase or because of general education needs.

Geology has always assisted in the area of general education. We will be prepared to modify existing courses and develop new course as suitable to the new and revised General Education Program.

We would like to expand the breadth of our international-type field courses. In the past we have successfully investigated Costa Rica, Belize, Hawaii and the Galapagos Islands. We are planning that our next major international destination will be New Zealand in January of 2012.

We intend to significantly upgrade our professional and collegial interactions with the Education Program. Scott Kirst and Tim Flood have written NSF grants in 2008 and 2009 with the goal of improving science education for early and middle school teachers. The idea would be to integrate the science methods class and the introductory geology class to fundamentally change the delivery system of science to future teachers. The most recent NSF reviews were mostly positive and the Program Director has encouraged us to modify the proposal and re-submit. We intend to. Nelson Ham has started collaborating with Krissy Lukens to consider ways in which resources can be shared among Geology and Teacher Education in the realm of Geographic Information System software. To sum, we feel there is a natural partnership between these two areas that can be developed.

Based on NSF Geoscience Assessment Workshop, we intend to test the implementation of a portfolio in our assessment program. Additionally we are working on an online version of our alumni and field-camp surveys to improve return rates. We also intend to develop a new, 2-credit course for beginning students in geology. This course will follow and expand upon the current Introductory Geology courses (Geol 105, Geol 115 and Geol 120). In philosophy and content, these courses are designed as general education courses. The new course will enhance philosophy and content for geology majors.

We intend to continue our efforts to increase the resources of the program. Grant writing for pedagogical innovation (i.e. science education for future teachers) and equipment (i.e. Scanning Electron Microscope) will continue. Efforts at increasing the Geology Travel Endowment will also continue.

Once again, we will attempt to increase the number of geology majors to an average of 5-8 graduates/year. Efforts have been made over the past five years (see vitae: The targeted field trip). Like last time, we believe we can be successful in this endeavor. For example, Geology will graduate 5 students in 2010 and 5 or 6 in 2011.

To sum, the program review has been a remarkably worthwhile endeavor. It has allowed us to recognize some of our accomplishments and cast aside some ghosts. It has allowed us to see and file that which did not work so well, and allowed us to see and maintain that which does work well. Most importantly, it has forced us to see who we are and what we want to become. It has given us a blueprint for the future. We are excited at the prospects. We know that the future we have booked will be challenging, but we are excited and optimistic.
List of Appendices

Appendix 1. Assessment of Field Camp Performance
Appendix 2. Alumni Survey
Appendix 3. Tracking Geology Graduates
Appendix 4. Peer and Aspirant Graduation comparisons
Appendix 5. College Grade Distribution Data
Appendix 6. Summary GPA of Geology Discipline
Appendix 7. SOOT Data from Program Review
Appendix 8. Quality of Entering/Exiting Students attracted to major
Appendix 1

Assessment Survey for Field Camp Director Responses

**Directions:** Please circle a number that best characterizes our students relative to all students that you have taught at field camp through the years. Space is provided and you are encouraged to provide comments.

1=unacceptable  2=below average  3=average  4=above average  5=outstanding

**Competency related to core curriculum:**

**Mineralogy** - ability to identify minerals and mode of origin

<table>
<thead>
<tr>
<th></th>
<th>Unacceptable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Other</th>
</tr>
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<tr>
<td>2004 and earlier Respondents: (10)</td>
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<td>6</td>
<td>2</td>
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<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage:</td>
<td>0%</td>
<td>0%</td>
<td>11%</td>
<td>22%</td>
<td>67%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Petrology** - ability to identify igneous and metamorphic rocks and understand the significance of their occurrence

<table>
<thead>
<tr>
<th></th>
<th>Unacceptable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Other</th>
</tr>
</thead>
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<tr>
<td>2004 and earlier Respondents: (10)</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage:</td>
<td>0%</td>
<td>0%</td>
<td>20%</td>
<td>50%</td>
<td>30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004-2008 Respondents: (9)</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage:</td>
<td>0%</td>
<td>0%</td>
<td>11%</td>
<td>22%</td>
<td>67%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Structural Geology** - ability to recognize, map and interpret deformed rocks

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Sedimentology/Stratigraphy—ability to identify and understand the significance of their occurrence

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Surficial processes—ability to recognize landforms and the processes that shape them

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Competency related to overall program:

Field geology—mastery of field equipment and techniques (e.g. keeping a field book, map construction, report writing, etc.)

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Geologic time—mastery of the general concepts of rates of geologic process

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**Plate tectonics** - mastery of this unifying principle of geology and ability to relate it to real world problem solving in geology

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**Scale analysis** - ability to recognize scale as a relevant concept

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**Communication** - ability to communicate geologic information in reports and on maps typical of field-camp assignments and exercises.

(new question—not asked prior to 2004 survey)

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Overall Assessment: How did ____ compare overall (percentage) to other students that have participated in your program through the years (please indicate on the scale below).

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| All-time best | 0 | 1 | 3 | 2 | 2 | 1 | 0  | 70 | 75 | 80 | 85 | 90 | 95 | 100 |
|---------------|---|---|---|---|---|---|----|----|----|----|----|----|-----|
| Respondents: (9) | 0 | 1 | 3 | 2 | 2 | 1 | 0  | 0% | 11% | 33% | 22% | 22% | 11% | 0% |
| Percentage: | 0% | 11% | 33% | 22% | 22% | 11% | 0% |

(ave.=84)
COMMENTS: Are there particular strengths or weaknesses of (student's name) that you would in particular like to note?

(2004 and earlier)

C. was well prepared. He was near the top of the class on almost all of the projects.

J. was a well-prepared student. She was top of the class & nominated for NAGT-USGS Internship – only one nominee per year.

In general, I would like to offer that our experience with students from SNC has been very positive. St. Norbert students are well prepared, display a strong work ethic, and are meticulous in their field techniques and note taking. I cannot recall any weaknesses in their knowledge of core curriculum. We do see weaknesses in students that come from programs that do not emphasize certain content areas, but this is not the case with your students.

Are there any other general comments that you would like to provide?

Paul was well prepared & had a great attitude.

(2004-2008)

Are there particular strengths or weaknesses of (student's name) that you would in particular like to note?

J. was one of our best students in my past 5 years of teaching this course. She was well prepared for the course and has a bright future in geology.

T. was well prepared for this course and had a solid foundation in geology.

D. Overall excellent student. Had an exceptional background coming into field camp which enabled him to do extremely well.

C. was very well prepared for this course. He will undoubtedly make a great Earth science teacher some day.

T. One of the best student's we've ever had. T. had an exceptional inquisitiveness which led him to think about, and solve problems other students hadn't even conceived. His strong background and exploration experience were key contributors to his success. (4 evaluations had no written comments)

Are there any other general comments that you would like to provide?

END
Appendix 2
(SUMMARIZES SURVEY RESULTS FROM SPRING SEMESTER/SUMMER 2005)

St. Norbert College
Geology Alumni Assessment Survey

Dear SNC Geology Graduate,

In recent years, educational programs in the United States have been mandated or strongly encouraged to undergo routine assessment as a means of improving curricula. We, the geology faculty at St. Norbert College, similarly wish to assess the effectiveness and quality of our academic program. To that end we recently implemented a basic assessment plan that includes: (1) tracking of graduates, (2) surveying field-camp directors about the academic preparation and performance of our students (anonymously) at their camps, (3) surveying current students who have just completed field camp about their self-perceived preparation and performance at camp, and (4) surveying alumni who graduated from the SNC geology program. The purpose of this last item is to understand how geology alumni believe the SNC geology curriculum prepared them for work in the geologic sciences (i.e. graduate school and professional work in the geological sciences).

Below is a series of questions that ask you to assess your self-perceived competency in core areas of the SNC geology curriculum. These questions are the same as or very similar to those asked on the field-camp director's assessment (of our students) and on our survey of student's currently enrolled in the geology program. In addition, we have added several additional questions specific to geology alumni.

We would be very grateful if you would take the time to fill out this survey and mail it back to us at the following address. Ultimately, your answers and comments will be collated (anonymously) and shared with the Faculty of the Geology Discipline, the Associate Dean of Sciences, the Dean of the College, the Office of Institutional Effectiveness, and the Curriculum and Educational Policy Committee (primarily for our program reviews). It would be most helpful to us if we received your completed survey by March 31, 2005. If you have any questions or comments, please do not hesitate to contact me at (920) 403-3977 or nelson.ham@snc.edu. On behalf of the entire geology faculty, Tim Flood, Elizabeth Gordon, and myself, thanks for your help.

Sincerely,

Nelson R. Ham
Associate Professor of Geology
Geology Department
St. Norbert College
100 Grant Street
DePere, WI 54115
**Directions:** The following two sections "Competency related to curriculum" and "Competency related to overall program" ask you to rate yourself in terms of perceived knowledge in core areas of a basic geology curriculum and the overall program. Please circle the appropriate number in each category based on the following scale. You may also add comments if you wish. If you have no basis for responding, please write "not applicable" or "N/A" in the space provided and do not circle a number (for example, some of you may be early graduates of the program when no specific courses were offered in surficial processes, etc.).

1= unacceptable 2= below average 3=average 4= above average 5=outstanding

**Competency related to core curriculum:**

Mineralogy-ability to identify common minerals and their mode(s) of origin

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Respondents: (9)

0 0 0 5 3 1

Percentage:
0% 0% 0% 56% 33% 11%

Comments:

In meeting with other TAs prior to teaching the Intro. Geology mineral lab, I found them looking at me to tell them the mineral names so they could identify them. I have had similar experiences in the field.

My master's degree was in environmental chemistry, had it not been for mineralogy, would have had to tackle a different project.

Petrology-ability to identify common igneous and metamorphic rocks, understand their mode(s) of formation, and the significance of their occurrence

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Respondents: (9)

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Percentage:
0% 0% 22% 44% 22% 11%

Comments:
**Structural Geology**—ability to recognize, map, and interpret deformed rocks

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Comments:

*I felt strong in this area at field camp (mostly after or towards the end) and stronger after taking the course at SNC. At a 5 day field trip to Lake Mead, we were set loose on a 5 day mapping project and I felt comfortable mapping by myself.*

**Sedimentology/Stratigraphy**—ability to identify common sediments, sedimentary structures, and sedimentary rocks; understand their mode(s) of origin; and the significance of their occurrence

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Comments:

*I took sed/strat with Hilary Sanders, who I felt did a below average job in explaining sed rocks and their formation processes. I do, however, feel like I learned almost as much as could be taught in class during field trips by other profs, and through my own readings. I don't feel the strongest in this area.*

**Surficial processes**—ability to recognize common landforms and the processes that shape them

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Comments:
Competency related to overall program:

Field geology—mastery of basic field equipment and techniques (e.g. proper use of a Brunton compass, keeping a field book, map construction, report writing)

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<td>Respondents: (9)</td>
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Comments:

Can always use more practice. Field trips are a must! Nelson was very helpful in developing good writing skills.

Field trips through SNC were incredibly helpful. One suggestion I have would be learning how to use a Brunton early on – as a freshman even.

Geologic time—mastery of the important general concepts of rates of geologic processes, the modern geologic time scale, and the basic principles of relative and numerical age dating

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Comments:

I still remember the hallway example of the time scale. I think students should be forced to memorize the time scale in classes.

I was tested on the geologic time scale in nearly every geology course, which I think was really beneficial, because it allows me a good understanding of when certain geologic processes occurred in relation to the age of the earth.
Plate tectonics—thorough understanding of the unifying theory of earth science (to include origin of the theory, mechanism of plate motion, types of plate boundaries, and geologic activity associated with different types of plate boundaries, etc.)

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Respondents: (9)

| Percentage: | 0% | 0% | 11% | 33% | 56% |

Comments:

*It would be great if a formal class were taught on this.*

Scale analysis—ability to understand scale as an important concept in the study of geology

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Respondents: (9)

| Percentage: | 0% | 11% | 22% | 22% | 44% |

Comments:

*This was reinforced in every single class and field trip.*

Directions: On the scale below, how would you rank yourself in terms of overall academic ability and preparation in comparison with other geology students/employees of similar background once you left SNG (five years after graduate school and/or when you became a professional geologist in any capacity)? Please mark an "X" on the scale.

0..................................25 ..................................50 ..................................75 ......................... 90 ............... 100
felt grossly underprepared/ inadequate . felt incredibly well prepared/ no problems

70  75  80  85  90  95  100

Respondents: (8)  1  1  1  1  2  1  1

Percentage:     12%  13%  13%  13%  25%  13%  12%

Comments:

Most of the missing info was because of personal study skills and lack of going to field camp, which I believe gives the final application of all learned skills.

Before I started grad school, I wasn't really sure how prepared I'd be when compared to other grad students. Now that I'm near the completion of my degree, I definitely know that I was either equally prepared or more prepared than other students, regardless of what the GRE scores said.

I felt very confident in my writing abilities and have been told by numerous professor (including my advisor and the members of committee) that my writing is excellent. I also felt confident teaching as I had experience. In addition, I felt comfortable in my knowledge as a geologist and as a field geologist. I spent time in the field with my advisor this summer and felt very well prepared.
Directions: For the following questions, we would like to know what you believe are the strengths and weaknesses of the geology program at SNC. You are welcome to comment on any aspect of the program to include faculty, facilities, other resources, field experiences, curriculum, etc.

What are the particular strengths that you would like to note?

Faculty: Dr. Tim Flood & Dr. Nelson Ham made geology into an interesting/fun major.
Field Experiences: Practical application of knowledge in classroom is crucial in every job.
Curriculum: I use many facets of geology in my own teaching (currently teaching Forensics). It applies everywhere.

I believe SNC Geology was good at core geology curriculum - mineralogy, petrology, earth processes & structures & their meanings.
The care, concern, and individual attention given to students by the professors was outstanding. The field trips were highly valuable and great learning experiences — not just for curriculum purposes but for helping students see what field work could be like, and showing students how to socialize in the field (learning how to camp if they had never done so).

Undergraduate research, field trips/hands on learning, preparation for graduate studies.

Personal and approachable faculty members, yearly field trips, strong encouragement by faculty to (do) well and attend grad school, senior thesis and/or undergrad research projects, encouragement to attend national meetings (GSA, ILSG, etc.), guest speakers.
I like the different teaching styles of Tim and Nelson. They do have a great balance of knowledge in complementing their area of expertise. The field trips were extremely valuable in bringing what you learned in the classroom.

#1 strength is faculty who are obviously interested in the subject, & interested in & dedicated to teaching. Students learn specific concepts through class work but the broader skills of inquiry & the scientific method are taught & reinforced most strongly by faculty role modeling — often outside the classroom. These are skills valuable in any discipline & they serve students well.

#2 strength is field trips - both weekends in WI & longer "break" trips. Seeing a variety of rocks, structure, & landforms is the best way to solidify concepts & prepare for field camp & beyond. I know they are a lot of work but they are so critical — keep it up & keep telling students they have to go.

#3 strength is camaraderie. The rapport between faculty members, between faculty & students, & among students creates an environment where people want to be, & a great environment for contagious curiosity & learning.

The Faculty were wonderful! Way to go Tim & Nelson! Most of the topics taught wee at Graduate level, esp. when students were involved in upper level courses. Hands on experiences were the most helpful. Lectures were not boring, but kept highly interesting via excellent teaching styles.

Writing skills — they were improved during every geology course where a term paper was required. I feel it is very important to be able to write scientifically.

Field skills — very important and were gained on oilfield trips.

Faculty in the geology program are outstanding. Good at teaching and promoting enthusiasm for the subject and fantastic at running field trips. Also really aid in preparation for graduate school.

My strengths are in the areas of sedimentolgy and stratigraphy because of my further education. This is also a direct result from the many local and distant field trips that I participated in. I would also like to mention my strengths in glacial formations, processes and resulting depositional settings. Dr. Ham should be recognized as the best professor for relating the material to students because he is so thorough in covering each topic. My field experience is also highly noted from the various field trip(s) that are so valuable to any geologist.

What are the particular weaknesses that you would like to note?

Having access to just one classroom is a hindrance, but the professors made it work.
Although the field trips were wonderful, I would have liked it if we used the maps, compasses, & other tools (GPS) even more — at the time I was at SNC, we sort of used the tools, but I think an experience like going out for a weekend with a topo map, Brunton compass, & field book and mapping with just one partner would have better prepared me for field camp — some of the students at field camp were already old hands at mapping, whereas I understood the basic ideas, but had never done it myself and was a little unprepared. Of course, one could argue that the point of field camp is to teach all those skills — but compared to some of the other field campers, I was unprepared. Compared to others, I was normal or above normal.

The dept. could benefit from having additional resources such as petrographic microscopes and other types of equipment such as an XRD or some other analytical equipment.

I think it's important to periodically incorporate recent geologic papers into each course. I also think that it would be good for students to give an oral presentation or a particular topic in each geology course. If a student can teach the other students, even if it's just a short talk, then I think they'll be able to really learn that material. The only other weakness, from when I was at SNC, was that I didn't think Hilary Sanders was a very effective professor. But that's just my opinion.

Graduating with only a geology minor, I would like to have at least one year of chemistry. It would have helped me especially in mineralogy.

I could have used more practice mapping to gain confidence before going to field camp.

I wish we would have had even more hands-on experience. Trips were good. I wish we had more technology to learn with, supplies were lacking. I wish we would have used transits much more. Computer models would also have been interesting.

A course in historical geology would be very useful.
My knowledge in sed/strat is weak due to the instructor at the time.
There is a lack of adequate library resources.

If you have any additional comments you wish to provide, please feel free to use the back of the survey pages or additional paper. Once again, we greatly appreciate your willingness to provide feedback about the SNC geology discipline. Assessment is now a permanent and important aspect of our academic program.
Thank you,
The SNC Geology Faculty

Additional comments:

I received the Geology Alumni Assessment Survey and I wanted to make sure to respond. While I didn't pursue Geology after graduation from St. Norbert, I am extremely grateful to Professors Nelson Ham and Tim Flood for their dedication and guidance. It is truly an amazing faculty that will spend an entire weekend, several weekends a month, taking fieldtrips with their students. Thanks to both of you.

END
Appendix 3
(updated April 16, 2010)

Graduates of the Geology Program at St. Norbert College through 2007 (either
geology majors or natural science majors-geology emphasis; also includes most minors)

2007
Dan Costello  Geologist, South Dakota Geological Survey, Rapid City, SD
M.S. Geology, University of Minnesota-Duluth, 2010
Renata Jasinevicius  employment unknown
M.S. Geology, Arizona State University, 2009
Kim Pattern  Elementary School Teacher (sub), Green Bay, WI
(geology minor)
Colin Clark  employment unknown (geology minor)

2006
Thomas Nelson  M.S. Student, Utah State University
Travis King  unknown (geology minor)
Jacob Steimle  M.S. Student, South Florida University
Derrick Maurer  Hydrogeologist, Appleton, WI

2005
Jacqueline Shumway  Hydrogeologist, AECOM, Green Bay, WI
M.S. Geology, Iowa State University, 2007
Erin Deno  Hydrogeologist, Green Bay, WI (geology minor)
Courtney Hall  unknown, (geology minor)

2005 (winter 04-05)
Chris Bradford  Earth Science Teacher, Madison, WI
Received teaching certification from SNC

2004
Kim Rohrbough  unknown (geology minor)
Dan Goebel  Banker, Milwaukee, WI (geology minor)
Rebecca Schmeisser  Assistant Professor, St. Norbert College (begin fall 2010)
Ph.D. Geology, The Univ. of Nebraska-Lincoln, 2008
M.S. Geology, Northern Arizona University, 2006
Nathan Meyer  Employment unknown
M.S. Geophysics, University of Wisconsin-Madison, 2006

2003
Paul Albers  Economic Geologist, Mining Company, Minnesota
M.S., University of Minnesota-Duluth, 2005
Heather Bleick  Geologist, US Geological Survey, Anchorage, Alaska
M.S., Vanderbilt University, TN 2005

2002
Kelly Gillespie(?)  Education Major, Concordia University, IL

2001
Katherine Rodriguez  Geologist, Environmental Protection Agency, Chicago, IL
Daniel Fitch(?)  employed as an environmental geologist in the Eau Claire area, WI.
Tory Schultz  Consulting Hydrogeologist, AECOM, Milwaukee, WI
M.S. Student, University of Wisconsin-Milwaukee
Shioban Fackelman  Consulting Hydrogeologist, Denver, CO
M.S., University of Northern Colorado, 2007?
Former M.S. Student, Colorado State University
Nicole Richmond  Hydrologist, Wisconsin Department of Natural Resources, Madison, WI
M.S. Geology, Miami University, Ohio, 2003
Marty Fallon  Environmental Geologist, Envirogen Inc., St. Charles, IL
Mike VanAelstyn (?)  M.S. Student (Chemistry), University of Kentucky
(chemistry major/geology minor at SNC)
Sarah Derouin  Quaternary Geologist, Bureau of Land Management Denver CO
Ph.D., University of Cincinnati 2008
Lori Schmidt  Hydrogeologist, Department of Natural Resources, Milwaukee, Wisconsin
M.S. Geology, University of Wisconsin-Milwaukee, 2003

Julie Damon  Sustainable Forestry Program (China), The Nature Conservancy
Washington, D.C.
M.S. Environmental Science, The Ohio State University, 2003
Erin Rebhan (?)  M.A. Spanish, University of California-Santa Barbara
(spanish major/geology minor)

Ann Dansart  Consulting Hydrogeologist, Madison, Wisconsin
M.S. Geology, University of Wisconsin-Madison, 2001
Matt Hildreth  Consulting Environmental Geologist, Chicago, Illinois
M.S. Geology, University of Wisconsin-Madison, 2001
Craig Stencel  Project Manager, Survey Center, St. Norbert College
M.S. Industrial Archaeology, Michigan Tech University, 2000
(sociology major/geology minor)
Ed Haas  Consulting Hydrogeologist, Sacramento, California
M.S., University of California-Davis 2002?
Consulting Hydrogeologist, Sacramento, California

Adam Boettner  currently an environmental geologist in southern California
formerly Staff Scientist, Patrick Center for Environmental Research,
The Academy of Natural Sciences, Philadelphia, PA
M.S. Geology, Indiana Univ./Purdue Univ. at Indianapolis, 1999
Lois Glatczak  Earth Science Teacher, Ridgefield High School, Connecticut
M.S. Geology, University of Minnesota (Duluth), 2001
Amber Wallgren (?)  M.S. Student (part-time), University of Minnesota (Duluth)

Steve Tiber  Environmental Geologist, Environmental Audits Inc., Brookfield, WI
Shawn Nelezen (?)  Consulting Environmental Geologist, Twin Cities, MN

Greg Waite  Assistant Professor of Geophysics, Michigan Tech. University
Research Geophysicist, U.S. Geological Survey, California
Ph.D. Student, University of Utah
M.S. Geophysics, University of Utah, 1999
(physics major/geology minor)

Candice Burg  Science Teacher, Lena, Wisconsin
M.S. Student, University of Minnesota (Duluth)
Jennifer Piontek  Research Assoc., Stable Isotope Laboratory, Univ. of California-Berkeley
Ph.D., Massachusetts Institute of Technology, 2000?
M.S. Geology, University of Texas (Austin), 1999
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<td></td>
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<td>1992</td>
<td>Kathy Licht</td>
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<td>Jim Sullivan(?)</td>
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<td>Jolene McConaghy(?)</td>
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<td>Bruce Meissner</td>
<td>Consulting Hydrogeologist, Robert E. Lee and Assoc. Green Bay</td>
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<td>Kurt Zacharias(?)</td>
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### Appendix 4

**IPEDS Data on Total Graduates and Geology Major Graduates**

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**Aspirant Institutions**

| Median of Aspirants | 575 | 0 | 0 | 0 | 0 | 0.00% |
| Median of Aspirants w/Geology | 451 | 6 | 6 | 3 | 5 | 0.96% |
| Avg. of Aspirants w/Geology | 519 | 8 | 6 | 4 | 6 | 1.23% |
| **Schools excluded** |
| St. Norbert College | 438 | 479 | 521 | 479 | *2/3 | *1/5 | *2/1 | 2 | 0.35% |
## Appendix 5

### Comparison Grade Distribution Summary

**Discipline versus College and Natural Sciences 2003-2008 in percentage**

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## Appendix 6

### Geology Program Grade Distribution by Semester

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## Appendix 7

### Selected SOOT summary data 2004-08.

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## Appendix 8

### Profile of entering students and existing graduates.

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<th>Have Minor</th>
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<th>G.P.A. 3.0-3.49</th>
<th>G.P.A. 2.5-2.99</th>
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</table>
Name: Timothy P. Flood

Date of Appointment to St. Norbert College Faculty: August 1987

Current Rank and Date Received: Professor, 2006

Tenure Date: 1992

Promotion: Associate Professor, 1995
Professor, 2006

Educational Background:
PhD. Michigan State University, 1986 M.S.
University of Minnesota-Duluth, 1981 B.S.
University of Wisconsin-Oshkosh, 1978

Administrative: Chair (Associate Dean), Natural Science Division 1997-2002

Awards: Donald B. King Distinguished Scholar, 2009
Leonard Ledvina Excellence in Teaching Award, 1995
Geological Society of America Fellow, 1995

Sabbatical:
Sabbatical Fall 2002 at Michigan State University. Initiated investigation into the origin of silicic volcanism in the Macolod Corridor, Luzon Island Philippines, including three site visits to the Philippines.

Sabbatical Fall 1997 at University of Alaska-Fairbanks Geochronology Laboratory. Ar/Ar laser step-heating experiments on plutonic minerals from the Wasatch/Uinta Intrusive belt in order to constrain timing and mechanisms of emplacement.

Publications and Professional Presentations:


1994  Flood, T.P. and Rutter, R.A., Successful certification proposals for the Broadfield Science and Earth Science Education programs to the Wisconsin Department of Public Instruction.


Student Presentations:
2010  Bader, N., and Folz-Donahue, K., Petrological Origins of the Mellen Granite. Celebration of Student and Faculty/Staff Collaborations, St. Norbert College.

2010  Domrois, S., and Patz, M., The Origin of Textures in a 1.1 Billion Year Old Granitic Pegmatite Near Mellen, WI. Celebration of Student and Faculty/Staff Collaborations, St. Norbert College.

2010  Fischer, B., and Potier, C., Gabbroic Xenoliths in a Granitic Matrix From 1.1 Billion Year Old Rocks Near Mellen, Wisconsin. Celebration of Student and Faculty/Staff Collaborations, St. Norbert College.

2009  Bier, P., Natural Art of the Galapagos. Celebration of Student and Faculty/Staff Collaborations, St. Norbert College.


2007  Boisjoli, T., Petrographic Differentiation of the Five Phases of the Lower Cretaceous Star Kimberlite, Saskatchewan, Canada. Celebration of Student and Faculty/Staff Collaborations, St. Norbert College.

2007  Costello, D., Origin of a Mafic Pegmatite Within the 1.1 Billion Year Old Duluth Complex, Northern Minnesota. Celebration of Student and Faculty/Staff Collaborations, St. Norbert College.

2006  Knesting, K., Schuh, A., Kubista, L., and Baudhuin, K. A Comparison of Selected Metal Ions from Hawaiian Streams. Celebration of Student and Faculty/Staff Collaborations, St. Norbert College.

2006  Maurer, D., Costello, D., and Knuteson, C. A Comparison of Composition and Texture of Selected Hawaiian Sands. Celebration of Student and Faculty/Staff Collaborations, St. Norbert College.
2006 Patton, K., and Greuel, M. Lesson Plan Development for Middle School Students Based on Field Experience in Hawaii. Celebration of Student and Faculty/Staff Collaborations, St. Norbert College.


2004 Schmeisser, R. Comparison of Gastroliths and Paleogastroliths using a Scanning Electron Microscope. Celebration of Student and Faculty/Staff Collaborations, St. Norbert College.


Workshops:
2002    Summer Math and Science Camp for Teachers: A Pedagogical Exploration. Co-leader and instructor with Dr. Reid Riggle. Developed, planned, and lead a three-day field exploration of Otter Lake in Northern Wisconsin with four in-service and two pre-service teachers. Part of "Enhancing Field-Based Teacher Training" a Congressionally-authorized grant administered by the U.S. Department of Education.

Program Reviewer:
2009    NSF-REU Sites program in the Division of Earth Sciences
2008    NSF-REU Sites program in the Division of Earth Sciences
2007    NSF-REU Sites program in the Division of Earth Sciences
1999    Geology Program at Macalester College

Grant History:
2010    NSF-MRI: Acquisition of an X-Ray Fluorescence Spectrometer for Geoscience Research (University of Wisconsin-Oshkosh), senior contributor, Grant request of $265,000. Pending.


2009    NSF-MRI: Acquisition of an X-Ray Fluorescence Spectrometer for Geoscience Research (University of Wisconsin-Oshkosh), senior contributor, Grant request of $254,762. Not Funded.

2003       ESEA Grant for the Improvement of Math/Science Education, co-author. Grant request of $143,000. Not Funded.

2002       Recipient of Faculty Development Student-Faculty Collaborative Research Award.

2002       FIPSE Grant: Co-author on proposal to improve science mathematics education. Grant request of $400,000. Not Funded.


2001       Wisconsin Department of Public Instruction Grant for Improvement of Post Secondary Education, co-author. Grant request of $82,000. Not funded.

2001       Claire Boothe Luce Foundation Grant: Lead author on proposal for science scholarships for women. Grant request of $100,000. Funded.

2000       Recipient of Faculty Development Student-Faculty Collaborative Research Award

1999       FIPSE Grant: Lead author on proposal to improve science mathematics education. Grant request of $555,000. Not Funded.

1993       Recipient of Student-Faculty Development Endowment Fund

1991       Recipient of Student-Faculty Development Endowment Fund

1990       Goldwater Scholarship: Lead author on proposal for outstanding young scientists. Grant request of $15,000. Funded

1990       First recipient of the Student-Faculty Development Endowment Fund.

1988       Summer Faculty Development Grant to pursue research on Archean Rocks in Northeast Minnesota.

Field Camp:
1994-98       Director of Wasatch/Uinta Geology Field Camp. This summer camp is a consortium of five Big Ten schools; Michigan State University, University of Illinois, University of Iowa, University of Minnesota-Duluth, and University of Wisconsin-Madison.

1999-04       Faculty member at Wasatch/Uinta Geology Field Camp

Consulting:
2004       Geologic site characterization for Wisconsin Public Service Corporation.
Course Credit Extended Student Field Trips:

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<td>2005-06</td>
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<td>1987-88</td>
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Committee Service at St. Norbert College:

- 2008-Present: Faculty Policy Committee
- 2008-Present: Sabbatical Committee
- 2007-Present: Natural Science Advisory Council
- 2005-09: Committee on Tenure and promotion
- 2005-Present: Science Building Committee
- 2003-05: General Education Review Committee
- 2003-05: Natural Science Advisory Council
- 2003-05: Faculty Handbook Review Committee
- 2003-04: Search Committee for V.P. Advancement
- 1997-02: Chair of the Natural Sciences
- 1992-95: Personnel Committee
- 1990-93: College Community Relations Board
- 1990-92: Academic/Student Life Committee
- 1989-92: Election and Nomination Committee
- 1989-91: Speakers Committee
- 1989-90: Environmental Science Curriculum Evaluation Committee
- 1988-90: Ad-Hoc Committee Evaluating Student Opinion of Teaching (SOOTS)
- 1988-90: Student Life Committee
- 1988-89: Natural Science Advisory Council
- 1987-89: Computer Services Committee

Other Service to the College:

- Founded the Geology Club, 1987 Advisor to the Geology Club, 1987-1994
- New student mentor program, 1992-1994
Faculty Mentor Program, 1989, 1993, 1994

**Professional Activities in the Local Community:**
Invited Speaker to:
Lions Club of Green Bay, 1992,
Optimist Club of Green Bay, 1988, 1993
Optimist Club of De Pere, 1989
Numerous local grade schools and high schools

**Participation in the Intellectual Life of the College:**
Spotlight on Scholarship, *Reinventing the wheel or reinflating the tire; thoughts on the process of reengaging in scholarship*, November 2009
Contributor to the *Beacon*, *British Columbia Rocks*, October, 2001
Contributor to the *Beacon*, *Right on the Mark*, October, 1994
Contributor to the *Beacon*, *The Volcanic Joy of Stumping a Star*, October, 1992
Contributor to the *Beacon*, *Faculty/Student Research Team. Explores Ancient Sea Floor in Central Wisconsin*, September, 1991
Contributor to the *Beacon*, *Between a Rock and the Faculty Development Fund*, May, 1989
Contributor to a Brown Bag Seminar, *Value of Field Trips*, Fall 1989

**Other:**
- Author of Geology Major proposal, 1994
- Participated in the American Indian Summer Math Camp program, 1990-1993
- Solicitor of a $40,000 mineral collection donated to SNC, 1994
Elizabeth A. Gordon  
Curriculum Vitae

Office: JMS 410  St. Norbert College  100 Grant St. De Pere, WI 54115  
Phone: 920-403-3227  E-mail: elizabeth.gordon@snc.edu

EDUCATION

1981-1986  BINGHAMTON UNIVERSITY, NEW YORK  GPA: 3.86/4.00  
Ph.D. in Geological Sciences and Environmental Studies, 1986 Dissertation:  The sedimentology and paleohydraulics of the early Frasnian Upper Devonian Catskill Fades, southeastern New York. Advisor: Dr. John S. Bridge

1977-1979  UNIVERSITY OF MONTANA - Missoula  GPA: 3.77/4.00  
M.S. in Geology, 1979 Thesis: Petrology and field relations of Precambrian metasedimentary and metaigneous rocks west of Twin Bridges, southwestern Montana. Advisor: Dr. Donald Hyndman

1973-1977  DICKINSON COLLEGE, Carlisle, Pennsylvania. B.S. double major in Geology and Physics, 1977

HONORS

1989-1990  Lilly Teaching Fellow, University of Georgia

TEACHING EXPERIENCE

All Courses Taught

Undergraduate non-major classes  
Earth Processes and Resources  
The Earth Through Time  
Environmental Geology  
Geology of California

Geology major classes  
Physical Geology  
Mineralogy  
Sedimentation and Stratigraphy  
Oceanography  
Evolution of the Earth

Graduate classes  
Advanced General Oceanography  
Advanced Sedimentation  
Sedimentary Facies Models  
Seminars in Sedimentology

Current Position

2003-  Assistant Professor of Geology, St. Norbert College

Previous Positions

2000-2003. Adjunct Assistant Professor at three colleges in California: Las Positas Community College in Livermore; Diablo Valley College in Pleasant Hill; California State University-Hayward.  
1993-1996 (Part time) Assistant Professor of Marine Sciences, University of Georgia  
1986-1993  Assistant Professor of Geology, University of Georgia  
1984-1985  Visiting Lecturer in Geology, Hobart and William Smith Colleges, Geneva NY  
1980 Fall  Instructor of Geology, Dickinson College (1 semester sabbatical replacement)
Other Activities and Contributions

Geology Field Trips
- regional field trips to Minnesota; Iowa; Michigan and various localities in Wisconsin
- national field trips to Georgia-Florida and Death Valley
- day and overnight undergraduate field trips in central California
- 1986-1996: ~20 trips graduate student trips to various localities in Georgia, Alabama, Tennessee, Arkansas

Instructional Development Grants
- 2007: "Geology of the Yucatan Peninsula, Mexico," SNC Office of Faculty Development.
- 1989: "Video of Flow and Sediment Transport by Currents, Waves and Tides: examples from Sapelo Island, Georgia," Office of Faculty Development, University of Georgia, Lilly Fellowship Grant.

Instructional Materials, Conferences and Workshops
- Collection of maps, posters, films, and samples used in teaching a variety of courses
- 2005: attended 25th Annual Lilly Teaching Conference, University of Miami, Ohio
- 2003: prepared "Field Guide to the Geology of Sapelo Island, Georgia"
- 2003: "WOW: Water-on-the-Web", a workshop training teachers to learn applications of real-time scientific data for updating and improving use of technology in the classroom and laboratory. SUNY-New Paltz, NY
- 1985: wrote "Field Trip Guidebook to the Geology of the Devonian Catskill Delta" for the 3rd International Fluvial Sedimentology Conference, and made all organizational preparations for this 3 day excursion.

NON-ACADEMIC POSITIONS (TEMPORARY)

1991 Geological Consultant, Southeastern Archaeological Services, Athens, Georgia.
Evaluated the geomorphology of several archaeological sites on the Savannah River floodplain; supervised coring (to 6 meter depths) at two sites. Analyzed sediment cores and reconstructed the paleogeomorphology of the area as it pertained to early (10,000 ybp) human settlements. Collaborated with archaeologists in writing an extensive report of the data and analysis, which shows how landforms near the Savannah River influenced the social evolution of early human communities in this area, and how dramatic changes in river conditions led to site abandonment. Collaborated in detailed publications on an extremely important archaeological site in the southeastern United States.

1981 Metals Exploration Geologist; Duval Corporation; Reno, Nevada.
Conducted detailed geologic mapping in rugged terrain. Chose drilling sites, supervised two drilling targets for gold exploration. One target yielded a small gold-hosting ore, later sold to a smaller company for development.

1979 Metals Exploration Geologist; Noranda Corp.; Missoula, Montana.
Conducted detailed field mapping in extremely rugged terrain. Visited dozens of old mine sites in Precambrian-outcropS7Southwestern-Montana.--Wrote-short-geological-reports-on-abandoned*mine-site for re-evaluation of gold potential.

1977 Petroleum Exploration Geologist; Hunt Energy Corporation; Oklahoma City, Oklahoma.
Compiled well, stratigraphic and seismic data for oil targets in the Arkoma Basin. Used compiled data to create isopach maps and geologic cross-sections for potential exploration targets.

1976 Field Assistant, South Dakota State Geological Survey; Rapid City, South Dakota.
Assisted state geologists on a variety of projects, including studies of Tertiary stratigraphy of the Badlands, to river water quality studies, and analysis of aquifer problems in eastern South Dakota.
SCHOLARSHIP AND PROFESSIONAL ACTIVITIES

Peer-Reviewed Journal Articles and Special Publications


2. Elliott, Daniel T. Elliott, Ledbetter, Jerald, and Gordon, Elizabeth A., 1994, Data Recovery at Lovers Lane, Phinizy Swamp and the Old Dike Sites, Bobby Jones Expressway Extension Corridor, Augusta, Georgia; Georgia D.O.T., Occasional Papers in Cultural Resource Management #7; Office of Environment/ Location; Atlanta, Georgia. 397 pages.


Peer-Reviewed Paper and Poster Presentations (asterisk denotes speaker; underline, denotes student)


Funded Research Grants and Contracts

2007: MRI: Acquisition of a Powder X-Ray Diffractometer for Multidisciplinary/Multi-Institutional Research and Training; National Science Foundation Equipment Grant; Principal Investigator (PI): Andrew Knudsen (Lawrence University); 12 co-investigators include Elizabeth A. Gordon.

2006: "Paleoenvironmental Reconstruction of Cambrian 'Sandstones In Central Wisconsin;' SNC Student-Faculty Collaborative Grant with Casey Knuteson.

2006: "Biostratigraphy of Lower Paleozoic Rocks from Schaal Quarry, NE Wisconsin, and Comparison with Equivalent Strata in central Wisconsin and SE Minnesota," SNC Summer Faculty Development Grant.

2005: "Stratigraphic and Paleoenvironmental Interpretation of Lower(?) Paleozoic Rocks near Gillett, Northeastern Wisconsin", SNC Summer Faculty Development Grant.

2004: "Paleoenvironmental Reconstruction of a Paleozoic Reef; SNC Student-Faculty Collaborative Grant with Renata Jasinevicius.


1991: "Geomorphic and Sedimentologic Analysis of Archaeological Sites Near Augusta, Georgia"; Southeastern Archaeological Services, Athens, Georgia.

1990: "Hydrodynamic Controls on Sedimentation in Tidal Creeks of the Georgia Coast"; National Science Foundation.

1989: "Evolution of a Salt Marsh Tidal Creek, Sapelo Island, Georgia"; University of Georgia Research Foundation.

1989: "Quantitative Analysis of Storm Related Sedimentation, Sapelo Island, Georgia"; Sea Grant College, University of Georgia.

1989: "Development of a mini-vibracoring system for sampling modern sediments"; Sea Grant College at the University of Georgia, School of Marine Sciences.

1989: "Funds for Constructing Stainless Steel Can Cores;" University of Georgia Sea Grant College.


EDUCATION

Ph.D. Geology 1994, University of Wisconsin, Madison.
Quaternary Geology Program
Researched late Wisconsin ice-sheet dynamics in north-central Wisconsin based primarily on geologic mapping, aerial photo interpretation, and subsurface investigation.
David Mickelson and John Attig, co-advisors

M.S. Geology 1991, University of Wisconsin, Madison.
Quaternary Geology Program
Studied till and debris-flow deposition at Burroughs Glacier, Alaska, using field sedimentology (primarily macrofabric analysis)
David Mickelson, advisor

Geology Field Camp, 1988, Southern Rocky Mountains, Colorado, Waynesburg College.

EMPLOYMENT and APPOINTMENTS

St. Norbert College 1994-present
Professor of Geology and Environmental Science
Regularly taught Introductory Geology, Geology of Wisconsin, Geomorphology, Hydrogeology, Glacial & Quaternary Geology, and Environmental Science. Organized, led, and co-led numerous geology field trips and field courses to Hawaii, Costa Rica, Alabama, Georgia, Florida, Texas, New Mexico, California, Nevada, Alaska, Michigan, and Wisconsin. Researched the origin of glacial landscapes and deposits in Wisconsin and Alaska. Wrote research and instructional grant proposals. Presented and published results of research in professional, academic, and public venues.

University of Wisconsin-Extension Geological and Natural History Survey 1994-present
Research Associate, Quaternary Mapping Program

University of Wisconsin-Extension Geological and Natural History Survey Spring 2006
Visiting Scientist (Sabbatical)
Researched Quaternary deposits of Walworth County, Wisconsin by interpreting drillers logs, mapping stratigraphic units, and conducting landform analysis in ArcView. Researched
historical interpretations of the origin(s) of the Kettle Moraine, Wisconsin. Prepared manuscripts for publication.

**St. Norbert College**  
**Administrative Intern to Dean of the College and Vice President for Academic Affairs**  
2004-2005

Researched faculty work loads of like-sized colleges and wrote recommendation plan. Attended administrative and professional meetings.

**St. Norbert College**  
**Co-Director, Matanuska Glacier, Alaska, National Science Foundation- Research Experience for Undergraduates (NSF-REU)**  
Summer 2004

Collaborated with undergraduate students and university research scientists to conduct research on modern glacial processes related to erosion, weathering, glaciology, hydrology, glacio-tectonics, and late-glacial and post-glacial environmental changes.

**Northwest Missouri State University (adjunct faculty)**  
**Co-Director, Matanuska Glacier, Alaska, National Science Foundation- Research Experience for Undergraduates (NSF-REU)**  
Summers 2002-2003

Collaborated as stated above; REU grant was administered through NWMSU.

**Augustana College**  
**Visiting Instructor, Matanuska Glacier, Alaska, National Science Foundation- Research Experience for Undergraduates (NSF-REU)**  
July 2001

Collaborated as stated above. REU grant was administered through Augustana College.

**University of Wisconsin-Department of Geology and Geophysics**  
**Graduate Research Assistant, Graduate Teaching Assistant, and Head Graduate Teaching Assistant**  
1989-1994

**ARCO Oil and Gas Company, Midland, Texas**  
**Summer Professional Geologist**  
Summer 1991

Conducted a two-month study of the structure and geologic history of deep Paleozoic sedimentary rocks in the Permian Basin of west Texas using geophysical information (well logs and 2-dimensional seismic profiles)

**GRANT SUPPORT**

Delineation of inland sand dunes & implications for post-glacial climatic change in eastern Wisconsin  
(Wisconsin Geological and Natural History Survey Grant, 2004, $2000)

Geology of sand and gravel resources in Walworth County, Wisconsin  
(Wisconsin Geological and Natural History Survey Grant 1998-2000, $15,500)

Development of an interdisciplinary science course Introduction to Physical Science  
(SNC Summer Faculty Development Grant, 1998, $1250, Co-Pi w/L. Scheich)

Distribution of Fishes in the West Twin River Drainage in Relation to Late-Glacial Events: Implications for the Assessment of Biotic Integrity  
(Lois Almon Small Grants Program, Wisconsin Academy of Sciences, Arts and Letters, 1997, $1000, Co-Pi w/P. Cochran)

Origin and Paleoclimatic Significance of Inland Sand Dunes in Northeastern Wisconsin  
(SNC Summer Faculty Development Grant, 1997, $1750, PI)
Fostering an ecosystem perspective with a watershed initiative  
(National Science Foundation, Instrumentation and Lab Improvement Grant, 1996-1997, $79,025; 
Co-Pi w/J. Hodgson, P. Cochran, and D. Poister)

Pleistocene Geology of Walworth County, Wisconsin—Year 2  
(U.S. Geological Survey STATEMAP and Wisconsin Geological and Natural History Survey, 
1995-1996, $79,382 co-Pi w/J. Attig)

Pleistocene Geology of Walworth County, Wisconsin—Year 1  
(U.S. Geological Survey STATEMAP and Wisconsin Geological and Natural History Survey, 
1994-1995, $90,518 co-Pi w/J. Attig)

Ice-Sheet morphology and dynamics of the Green Bay Lobe of the Laurentide Ice Sheet during the 
Greatlakean Substage-undergraduate research support (WGNHS, 1994-1995, $200)

Meltwater drainage along the Green Bay and Lake Michigan Lobes of the Laurentide Ice Sheet-- 
undergraduate research support--(WGNHS, 1994-1995, $200)

Pleistocene Geology of Lincoln County, Wisconsin  
(U.S. Geological Survey COGEOMAP and Wisconsin Geological and Natural History Survey, 
1993-1994, $74,706; co-Pi w/J. Attig)

GRANT SUPPORT (as senior personnel/teaching faculty)

Undergraduate Research in Quaternary Geology at the Matanuska Glacier, Alaska  
(National Science Foundation, Research Experience for Undergraduates program, 2002-2004, 
$184,600; Co-Pi's Dr. S. Goetz, Central Michigan University and Dr. J. Strasser, Augustana 
College, Illinois); *my direct support from this grant was about $30,000

AWARDS AND HONORS

- Donald B. King Scholarship Award (2005), St. Norbert College
- L. Ledvina Outstanding Teacher Award (2001), St. Norbert College
- C.R. Van Hise Research Fellowship (to outstanding scholars), Spring Semester 1993, 
  Department of Geology and Geophysics, University of Wisconsin, Madison
- T.A. Mentor Award, Fall and Spring Semesters 1992-93, College of Letters and Sciences, 
  University of Wisconsin, Madison
- Teaching Fellow, 1991, College of Letters and Sciences, University of Wisconsin, Madison
- Tyler Teaching Award (1990) Department of Geology and Geophysics, University of 
  Wisconsin, Madison
- National Association of Geology Teachers/U.S. Geological Survey-Cooperative Summer Field 

SNC FACULTY DEVELOPMENT GRANTS

$500 Support for travel expenses associated with participation in the 2003 national meeting of the 
Geological Society of America, Seattle, Washington
$500 Support for travel expenses associated with participation in the 2003 North-Central Section 
Meeting of the Geological Society of America, Kansas City, Missouri
$500 Support for travel expenses associated with participation in the 2004 annual meeting of the 
American Geophysical Union, San Francisco, California.
$500 Support for travel expenses associated with participation in the 2005 annual meeting of the 
Geological Society of America, Salt Lake City, Utah
COMMITTEE/ADMINISTRATIVE WORK


PROFESSIONAL ACTIVITIES

REVIEWER


CONVENER OF CONFERENCE THEME SESSIONS

2003 'New Insights into the Origins of Glacial Landscapes' Theme session of 14 papers presented at the 2003 annual meeting of the Geological Society of America, Seattle, Washington; Drs. Staci Goetz-Ensminger and Jeffrey Strasser, co-conveners 2005 'International Undergraduate Field Trips: Logistics, Challenges, and Successes' Theme session of 14 papers presented at the 2005 annual meeting of the Geological Society of America, Salt Lake City, Utah; Dr. Tim Flood, co-convener
CONSULTING/WORKSHOPS
Neville Public Museum, Green Bay, Wisconsin
   Conducted teacher workshops on Wisconsin Glacial Geology and Archaeology
N.E.W. Archaeological Research, Luxemburg/Casco, Wisconsin
   Interpreted the geologic context of archaeological sites
Wisconsin Public Service, Green Bay, Wisconsin
   Conducted geological site characterization using driller's records, field reconnaissance, and
topographic map and aerial photograph interpretation for several legal cases involving WPS.

INVITED LECTURER/SPEAKER
Door County Auditorium, SNC Winter Speaker Series
Central Wisconsin Chapter of Trout Unlimited
Wisconsin Smallmouth Alliance (fall banquet speaker)
Allouez Cub Scout Troop
Lehigh University, Department of Earth and Environmental Science
Central Michigan University, Department of Geology
Northwest Missouri State University, Department of Geology and Geography
University of Wisconsin-Oshkosh, Department of Geology
Neville Public Museum, Geology Club
Lake Superior Institute of Geology, Annual Meeting——Keynote Speaker

COURSES TAUGHT AT ST. NORBERT COLLEGE

   GL105 Physical Geology (including w/writing intensive sections; honors sections)
   GL107 Environmental Geology
   GL120 Geology of Wisconsin
   GE120 Physical Geography
   GL225 Hydrogeology
   GL250 Geomorphology
   GL322 Sedimentology and Stratigraphy
   GL330 Geological Field Methods
   GL350 Glacial and Quaternary Geology
   GL354 Field Geology of Costa Rica
   GL428 Environmental Geology Research (senior thesis option for ES major)
   GL495 Independent Study
   GL499 Senior Thesis-Geology
   ES300 Environmental Science
   Extended field trips to Florida, Georgia, Texas, New Mexico, California, Nevada, and Hawaii
   (usually offered winter or spring break every academic year)

   Plus numerous special topics/seminar courses and guest lectures.

PROFESSIONAL WORKS
j=journal article/article in edited volume, r=report, m=geologic map, g=field conference guide,
a=abstract (conference presentation), th=thesis/dissertation, br=book review, m=magazine
article, ir=in review
* indicates undergraduate student co-authors (resulting from student/faculty collaborative research or supervised student research) indicates graduate student co-authors (resulting from collaborative or co-advised research)


63(a)  Reynolds*, H., Swanson, S., Goetz, S., and Ham, N., 2005, Evaluation of relationships between supraglacial stream discharge, ablation rates, and climate conditions at the Matanuska


30(a) Ham, N.R., 1999, Ice-flow dynamics and landform development along the southern margin of the Laurentide Ice Sheet: Institute of Lake Superior Geology, Annual Conference, Marquette, Michigan (Keynote Speaker).


14(a) Piontek*, J. and Ham, N.R., 1995, Meltwater drainage along the Green Bay and Lake Michigan Lobes of the Laurentide Ice Sheet, Warworth County, Wisconsin: Wisconsin Academy of Sciences, Arts and Letters, Conference Proceedings, p.32. (Best Student Paper Award in Geology)


Current Projects/Interests/Writing:


2. **Inland sand dunes in NE Wisconsin**—indicators of Late Pleistocene and Holocene Climate Change with Rebecca Schmeisser and SNC undergraduates

3. **Quaternary Geology of Walworth County, Wisconsin** (map and report) Wisconsin Geological and Natural History Survey

4. **Chapter contributions on geology and hydrology of Wisconsin** to the e-book *Fishes of Wisconsin*, Wisconsin Department of Natural Resources, with John Lyons, Wis. DNR, and Phil Cochran, St. Mary's University, editors

5. **Complex flow and composite moraines in southern lobes of the Laurentide Ice Sheet** with John Attig, Wisconsin Geological and Natural History Survey, Mark Johnson, University of Gothenburg, Sweden, Kent Syverson, UW-Eau Claire

6. **Influence of historic logging on modern stream hydrology in NE Wisconsin**

7. **Geology of cold and warmwater fisheries in Central and NE Wisconsin**—influence on habitat and physical hydrology

END-Updated April 18, 2020
OIE Review of Discipline Efforts to Assess Student Learning for CEPC
Program Review

GEOLOGY

Overview

- Does the discipline/program have a viable assessment plan?
  Yes.
- Does the plan include intended student learning outcomes?
  Yes.
- Does the plan include direct as well as indirect measures of student learning?
  Yes.
- Are the sources of evidence for student learning appropriate?
  Yes, definitely. These are external independent assessments of SNC students preparation by field camp supervisors.
- Is data collection and analysis ongoing?
  Yes.
- Are all program faulty/staff appropriately engaged in assessment?
  To my knowledge, yes.
- Has the program made or proposed changes/improvements (intended to enhance student learning) based on learning outcomes data?
  Yes. These are documented in the Program Review narrative.
Geology Program Review Report

Prepared by the Curriculum and Educational Policy Committee
April 29, 2010

The CEPC reviewed the Geology Program Review during its meeting held on April 29, 2010. Dr. Nelson Ham was present to answer questions from the Committee. This review summarizes the Committee’s deliberations. The numbering of items is not meant to indicate any order of importance or priority.

Strengths

1. The Program’s vision statement is clearly connected to the mission statement of the College. This statement improves upon a previous articulation in the last program review. (I)

2. The Program has a viable, and much improved, assessment plan. (III)

3. The Program’s faculty members have been recognized as outstanding teachers, and effective mentors to their students. (V)

4. The Program contributes extensively to Area 4 of the General Education program (V) (but see under ‘Observations’).

5. The various field experiences provided by the Program to Geology majors is outstanding, contributes to the uniqueness of the program, and prepares students for success in future graduate and professional programs. (V)

6. The Program’s faculty members are active in grant-seeking activities. (VI)

Observations

1. For the purposes of assessment, alumni surveys constitute indirect evidence (III).

2. While it is true that the Geology program contributes to the Gen. Ed. program, this contribution does not seem to very intentional. (V)

Concerns

1. ‘Best practices’ in Geology undergraduate programs are neither identified nor discussed, and there is no indication that the Program follows such best practices. (I)
2. There is no description of the Program’s curriculum. (II)

3. Efforts to improve the program based on assessment were not clearly articulated. (II)

4. While data on the number of majors and graduates were presented, there was no analysis of those data or its implication for the program. (III)

5. The data on peer and aspirant institutions were not presented in a systematic manner nor fully explored. (IV)

6. There is no strategic plan for increasing the number of graduates in the program. (IV)

7. Indicators of teaching effectiveness such as SOOT data were not sufficiently analyzed. (V)

8. While the faculty CVs indicate considerable collegial contributions, these are not presented in the appropriate sections of the Program Review. (V)

**Recommendations**

1. Identify and discuss ‘best practices’ in Geology undergraduate programs. (I)

2. Provide a clear description of the Program’s curriculum. (II)

3. Provide evidence of efforts to improve the program based on assessment. (II)

4. Undertake a meaningful critique of the number of majors and graduates in the program and develop a strategic plan for increasing them. (III)

5. Explore comparisons with peer and aspirant institutions in a more meaningful manner. (IV)

6. The collegial contributions of the Program’s faculty members should be presented in the appropriate sections of the Program Review. (V)

7. Consider undertaking an external review of the Program.