

**The University of North Carolina
Program Review and Recommendations Form**

Date: November 12, 2008

Constituent University: University of North Carolina Wilmington

CIP Discipline Number: 400601

Exact Title of the Program: Geology

Exact Degree Abbreviation: BS and BA

- 1. The accompanying guidelines list questions about centrality to mission, quality, faculty and physical resources, demand, costs, duplication, and consequences of deletion. After considering those issues, which of the following does the campus recommend?**

Retain the program in its present configuration with specific steps to be taken to increase enrollments.

- 2. As more programs, certificates, licensure programs, and courses become available online through the University of North Carolina Online would you be willing to consider online courses or programs from another campus to meet the needs in this program?**

No Would you be interested in exploring a joint online offering with one or more other campuses to meet the needs this program is currently addressing?

No Would you be interested in utilizing an online degree program or courses from another campus to meet the needs this program is currently addressing?

- 3. Explain the above responses—either the rationale for leaving the program in its current configuration or specific steps proposed to increase enrollments or pursue other options.**

Global environmental change is one of the greatest challenges that society faces today. New and improved decision making tools are needed by resource managers and policy makers to identify ways to mitigate and adapt to global change. The development of such tools lies in a thorough understanding of the behavior of the global earth system. Thus geology, the study of the planet Earth - the materials of which it is made, the processes that act on these materials, the products formed, and the history of the planet and its life forms since its origin, plays a fundamental role in defining the options available for responding to global change. Through the UNC Tomorrow effort, North Carolinians have charged UNC campuses to be even more responsive to societal needs than ever before. Courses offered through the UNCW Geology Program are uniquely suited to train students for professional careers in fields related to climate change, energy resources, water resources (including clean water) and natural hazard resiliency. Because our curriculum emphasizes understanding and solving important problems in both the basic and applied earth sciences, our students develop both the knowledge base and the skills necessary to appreciate the nature of change and all its implications.

The UNCW Geology program also supports the university's emphasis on environmental science and marine and coastal science through its curricular offerings in the areas of oceanography, marine and coastal geology, environmental geology, global climate change, and hydrology. As the only branch of the UNC system located in southeastern North Carolina, UNCW offers a valuable service to the region by maintaining strong and viable undergraduate geology degree programs.

UNCW first began offering the B.S. and B.A. degree in geology in 1983. From 1973 to 1984, UNCW offered a B.A. degree in earth sciences with concentrations in earth science, geology, and geography. These programs have been field, laboratory, and project (i.e., applied) intensive since their inception and these experiences cannot be replicated effectively through distance learning. In addition, individual or small group projects associated with required field trips are an integral part of nearly every geology course beyond the basic studies level. The program is, and has been, very successful in fulfilling its mission as part of the University. The program has over 420 alumni who have established long successful careers in the profession. Over the past five years the geology program has averaged slightly more than 5360 credit hours per year. Annual reports, self studies and SACS reviews over the past 25 years document the program's success.

The UNCW Department of Geography and Geology has 19 full-time faculty members (13 geology and 6 geographers) as well as one 0.75 FTE lecturer and one faculty member currently in phased-retirement. All of the full-time geology faculty hold the Ph.D. in either geology, marine science, oceanography, paleontology, or hydrology. UNCW's location near the coast and access to existing assets including coastal facilities such as boats, observing systems, and equipment has allowed the UNCW geology program to create and maintain an integrated and powerful educational experience at both the undergraduate and graduate level. These opportunities also have allowed UNCW to recruit high quality faculty committed to the integration of teaching excellence with vigorous research programs.

All of the geology faculty are actively engaged in scholarly research. Last year alone, our faculty received more than \$2.7 million in extramural grants which not only directly supported faculty scholarship, but supported student research at both the undergraduate and graduate levels. Undergraduate students are routinely involved in cutting-edge scientific research. In the last several years, geology majors have participated in numerous oceanographic research cruises aboard ocean-going research vessels (including destinations such as the south Pacific), participated in NC statewide initiatives such as STATEMAP, or engaged in research with State/Federal agencies including the US Army Corps of Engineers, US Geological Survey, and

North Carolina Geological Survey (NCGS). Additional students participated in National Science Foundation funded Research Experiences for Undergraduates with geology faculty or presented the results of their research at regional and national professional conferences including Geological Society of America.

While program quality is influenced by numerous factors including curriculum offerings, instructional effectiveness, faculty and graduate achievements, the quality of the UNCW geology programs is defined by the degree to which they successfully contribute to our mission of quality in teaching, research, and professional service. Quality is continuously assessed at both the level of individual faculty and the program as a whole through the means of faculty evaluation, program evaluation, and student outcomes assessment. An assessment committee was established within the last two years and charged with developing a more comprehensive approach to outcomes assessment. The assessment manual will be finalized in spring 2009.

The number of majors in the geology degree programs has fluctuated since its introduction in the 1970s. This fluctuation has followed employment trends within the various sectors that hire geologists. In the 1980s, the fossil fuel industry employed the greatest number of geologists and the number of geology majors reflected the national trend increasing to about 200. In the late 1980s, the demand for geologists diminished in the fossil fuel industry and environmental concerns exploded resulting in a shift in the demand for geology graduates to the environmental industry. However, the demand in this industry has never been as great as the demand in the fossil fuel industry. This change resulted in new degree programs in environmental science and a decrease in the number of geology majors in the department to less than 100. This industry remained fairly constant in the employment demands through the 1990s and department geology majors, while reduced from the high numbers that existed earlier, fluctuated but remained at a solid level. In the beginning of the 21st century another shift occurred with a resurgence of growth in the oil and natural gas industry. This shift resulted in an increase in the demand for geologists as evidenced by a dramatic increase in advertisements for geologists in recruiting venues such as the Houston Chronicle and others. Although other employment sectors hire geologists, the resurgence in the petroleum industry will increase the need for geologists and the number of geology majors over the next few years.

Nonetheless, there is strong evidence that the UNCW geology degree programs are beneficial to our students. Our students gain employment nationwide even in years when employment opportunities are few. Many of our undergraduates of the 1970s and 1980s have retained their jobs even when other employees in a given corporation were terminated as part of a reduction in force. On several occasions, our undergraduates received a job offer over others in the applicant pool that included graduates of renowned national universities (Cal Tech, University of Texas, and others). Many of our undergraduates gained admittance into prestigious graduate programs nationwide. Several of these now hold the Ph.D. degree and are gainfully employed at respected universities including University of Kansas, University of Kentucky, UNC-Pembroke, and UNCW! Below are data indicating that about 85% of our graduates are employed professionally in either a commercial, governmental, or educational institution or are continuing their education. Based upon data acquired from alumni records (280 returns including 148 BA, 103 BS, and 29 MS responses), geology graduates are distributed as follows:

- 38.2% employed in a geology-related professional field (including college-level academic positions)
- 6.1% in geology graduate schools
- 1.1% in graduate school for a science other than geology
- 10.7% employed in a science-related professional field (including college-level academic positions)
- 15.0% employed in a non-science field

- 3.6% employed in K-12 teaching position (many are teaching physical science or earth sciences).

An additional indicator of quality is the pass rates on professional licensure exams in geology. Since 1986, the State of North Carolina has licensed geologists who wish to practice professionally in the State by requiring them to pass an examination. Records indicate that the success rate for our graduates is >50% . This rate is excellent considering that the examination is designed to test the level of competency expected of a professional geologist with at least 5 year experience or a terminal degree.

Although the quality of our programs is demonstrated by the success of our graduates, the program is currently under-enrolled using the critical values defined by UNC General Administration (one student below the cut-off using both criteria). The geology program, however, has upper level enrollments that are higher than most geology programs offered within the UNC system. The table below shows the upper level enrollments over the last five years for geology programs in the State (data from UNC-GA ProgAssess/SDF.PR006/12NOV08). UNCW numbers are highlighted in yellow and show UNCW ranked 2nd in the state behind UNC-Charlotte.

	F03	S04	F04	S05	F05	S06	F06	S07	F07	S08
ASU	21	19	17	20	22	22	25	29	24	21
ECSU	2	3	3	3	3	3	4	2	3	4
ECU	15	14	19	18	19	15	12	18	21	23
NCSU	11	14	12	13	18	20	24	28	19	21
UNC-C	41	40	37	25	26	27	41	48	63	67
UNC-CH	20	20	15	16	18	15	19	20	26	24
UNC-W	34	37	27	30	26	20	20	21	24	28
WCU	15	15	12	8	13	12	13	16	15	19

Fall 2008 census numbers provided by UNCW Institutional Research indicate that the number of declared geology majors (at the Jr/Sr level and not including double majors) is now 31. These numbers reflect a continued increase in program enrollments since 2006 as indicated in the table above. Nevertheless, the program is focused on attracting additional majors through a number of initiatives:

- Increase recruitment from basic studies and interdisciplinary courses with target of 5% recruitment from each introductory class.
- Review and streamline undergraduate curricula to better utilize departmental strengths and increase recruitment potential (i.e. those that appeal to a new category of students and have high visibility as reflected in national enrollment and employment trends).
- Include presentations by majors in introductory classes explaining why they became majors.
- Involve more women faculty in teaching basic studies classes because of the current majority of female undergraduates.
- Advertise job/licensure opportunities and salaries in geology.
- Develop tracks (or make other revisions) within the curriculum that prepare individuals for certification in secondary education.
- Actively recruit other science majors, with the goal of adding geology as a second major. This is particularly suited for increasing the number of B.A. students.

Because the geology degree program is both field and laboratory intensive, many upper level undergraduate course enrollments are low. These enrollments are controlled by the size of the

laboratory or the instruments available for use in the laboratory component. For example, advanced courses in petrology, sedimentology, and mineralogy all require microscopes and adequate power supplies. Currently, the availability of only 10 petrographic microscopes requires that each laboratory section is limited to 10 students. For field trip courses, enrollment is constrained by availability of 15 passenger vans. To offset these lower enrollments, the department serves the university by providing fundamentals courses for science majors and by offering survey courses that satisfy Basic Studies requirements in both the physical and life sciences. As noted above, these courses are also conduits to recruit additional majors.

In summary, the elimination of geology degree programs would negatively impact the university and seriously impact the purpose and quality of the department. The elimination of the undergraduate geology degree would adversely affect the department and university in the following ways:

- Render it impossible to attract (and retain) quality faculty who contribute not only to the geology program, but also to the marine science, chemistry, biology and marine biology and environmental studies programs (undergraduate and graduate). Ultimately, this will diminish faculty quality to the point that these programs will also suffer. Elimination of the undergraduate geology degree will also (eventually) render it impossible to maintain the graduate programs in Geology and Marine Science. A variety of undergraduate and graduate certificate programs will also be adversely affected by the reduced number and quality of faculty.
- Adversely impact enrollments in the geography program also housed in our department. Geology students, particularly in the B.A. frequently enroll in physical geography courses, thus geography enrollments would likely decline.
- Reduce geology to a service discipline, eliminate teacher training in Earth Science education for secondary science teachers, and reduce the size of the work force trained to address the challenges of global change in North Carolina.

4. Department contact person:

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