



UNIVERSITY OF WISCONSIN-MADISON

Department of Geology and Geophysics

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April 29, 1998

To: Alex Nagel  
From: John Valley  
Re: **Undergraduate Assessment**

I enclose the results of the Assessment of the Undergraduate Major Program in Geology + Geophysics. This study was made by the Undergraduate Studies Committee, chaired by Prof. Bentley.

I endorse the results contained here and acceptance will be voted at the Department Faculty Meeting of May 13, 1998.

DEPARTMENT OF GEOLOGY AND GEOPHYSICS:  
UNDERGRADUATE ASSESSMENT REPORT

Abstract

The principal tool the Department used in assessing the attainments of its undergraduates was a set of questionnaires that were distributed to senior majors, alumni majors who graduated in the last 5 years, and faculty, who were asked to evaluate only the currently graduating seniors. The questionnaires asked the seniors and alumni to rate what they had learned and, separately, how well they thought the Department did in teaching, in the several areas that were listed by the Department as its academic goals.

The main focus of Departmental activity in responding to the assessment results is a Curriculum Committee that is already at work. Here are some points that the Committee will consider in particular.

1. Does the Department need to pay more attention to its undergraduate teaching in general?

2. Laboratory and field courses are valuable and effective -- the value of those courses must be kept in view. No other signal came through any more strongly from the surveys.

3. There is a decided need for some kind of unifying activity that gives the students, by the time they graduate as geology majors, a sense of the subject as a whole. The Committee is already considering two possibilities -- the development of new, specifically designed "capstone" courses and the extension of the use of senior theses, perhaps to all majors.

Besides the activities of the Curriculum Committee, the Department will take up two other points that need attention.

1. Academic advising of undergraduates is not always satisfactory. Consideration will be given to a) increasing the number of undergraduate advisors and b) maintaining as even an advising load as possible on the advisors.

2. Besides the academic advising there is a well-perceived need for improved advice on what to do after graduation -- advice on getting jobs or entering graduate school.

Assessment Tools Used

Direct Indicators

Capstone Course(s)                      In the planning stage

Indirect Indicators

Student Surveys                              Completed in 1998

Alumni Surveys                                Completed in 1998

Faculty Surveys                               Completed in 1998

## Narrative

The principal tool the Department used in assessing the attainments of its undergraduates was a set of questionnaires that were distributed to senior majors, alumni majors who graduated in the last 5 years, and faculty, who were asked to evaluate only the currently graduating seniors. The questionnaires asked the seniors and alumni to rate what they had learned and, separately, how well they thought the Department did in teaching, in the several areas that were listed by the Department as its academic goals. We had 44 responses from alumni and 19 from seniors; 8 faculty returned a total of 82 rating sheets. All respondents were asked to fill out a table with numerical scores in 10 different areas, and then to add their comments on any aspects of their experiences as geology majors.

From analysis of the tabular results we have concluded the following.

1. The faculty rated the learning attainments of the seniors strikingly higher than the seniors (or alumni) did. Apparently the faculty has a higher opinion of its accomplishments than the students do. Nevertheless, the average rating by the students and alumni was about midway between good and very good and there were few average marks of fair or poor. We conclude that, on the whole, the Department is doing a good job, but that there is nevertheless cause for concern that the Department faculty may tend to be complacent and overconfident in its consideration of its undergraduate teaching performance.

2. The basics of doing and understanding geology, such as understanding geologic time, size scales, and mapping, were rated the highest by all groups. These are, in a sense, the easiest to learn. Literature evaluation and data collection rated next highest, doing something with the data after collection substantially lower, and learning in the basic sciences weakest of all. Among the basic sciences, learning in chemistry rated the highest, biology the lowest. In regard to data, the highest grades were for the simple collection of data, next highest for data "manipulation," and the lowest for modeling. It is probable that the last was interpreted by many respondents specifically to mean numerical modeling on a computer, a subject which is generally regarded as too advanced for undergraduate courses.

Study of the "Comments" has yielded this additional information.

1. Two categories of comments appeared by far the most often, and both were positive. First, there were generally high ratings of the accessibility of the faculty, their helpfulness in advising and other matters, and the informal and friendly atmosphere around the Department. A number of respondents commented favorably on our Department in comparison with others around the campus. Second, there was great enthusiasm for the field trips, and many strongly positive comments about the value of the laboratory work associated with several courses.

2. The next two most frequent categories of comments were both negative. Somewhat less than half as many comments as those favorable to the accessibility of the faculty were negative about the same point. The negative comments mostly centered around faculty who were perceived to be too busy with research and/or graduate students to pay attention to undergraduates. The other negative comment that appeared repeatedly was a weakness in the Department in handling data and relating them to the real world. Many alumni wished that there had been more emphasis on the practical application of geology, including the development of computer skills, which would be helpful after graduation. A related complaint was that the Department should maintain closer ties to industry and to sources of job opportunities after graduation.

3. No other comment showed up on more than half a dozen of the 63 student responses. Nevertheless, there were some significant points made. The Departmental facilities, including the Museum, were found to be excellent. The TAs were found helpful, five votes to one. There was a repeated complaint that team-taught courses, while good in bringing in teachers who were expert in their respective fields, were poorly organized with too little overall direction. Similar comments were directed at the course offerings as a whole -- too many courses without good integration into an overall picture; a varying level of quality in the courses offered; too much fragmentation in the Department because of the many, widely different, subdisciplines.

There were several comments that the courses were insufficiently rigorous, that there was too little reference to and use of the scientific literature, and that the basic sciences and other basic skills were not well incorporated into the courses.

4. Implicit in several of the comments, although explicit in only a few, was the idea that the Department and its students would benefit from a required curriculum.

#### Departmental activities in response.

The main focus of Departmental activity in responding to the assessment results is a Curriculum Committee that is already at work. These assessment results (which the Curriculum Committee will receive at the same time this report is sent to the Letters and Science Dean's office) will provide important information for that Committee's use. Here are some points that the Committee is considering, or will consider, in particular.

1. The Department needs to pay more attention to its undergraduate teaching in general. Whereas our performance is good -- better than that of many other University Departments -- we are not as good as we think we are.

2. Laboratory and field courses are valuable and effective, although time (and credit) consuming. In the effort to fit the constantly broadening field of earth science into a fixed number of total credits for the undergraduate major, the value of those courses must be kept in view. No other signal came through any more strongly from the surveys.

3. There is a decided need for some kind of unifying activity that gives the students, by the time they graduate as geology majors, a sense of the subject as a whole. The Committee is already considering two possibilities -- the development of new, specifically designed "capstone" courses, and the extension of the use of senior theses, perhaps to all majors.

4. Other needs are for

- a) more and better use of the research literature;
- b) more emphasis on what to do with data after they have been collected -- what are the techniques of interpretation, of learning to understand the significance to Earth processes and then to make predictions of events (past and future);
- c) more and better integration of chemistry and, particularly, physics and biology, into the appropriate geology courses. The undergraduate majors should be able to see why they were required to take those basic science courses by the manner in which they are used in geological practice;
- d) assurance that, with team taught courses, there is some well-organized and coherent overall plan, presumably with one faculty member explicitly in charge and responsible;
- e) care to be taken that all courses are properly rigorous. Students should not have the sense that they can "skate by" (in the words of one of them) without expending much effort;
- f) increased incorporation of computer usage into course exercises. Practical, hands-on application is needed, not just computer-enhanced demonstration in the classroom.

Besides the activities of the Curriculum Committee, the Department will take up two other points that need attention.

1. Academic advising of undergraduates is not always satisfactory, particularly at times when the call on advisors is heavy. At present there are five undergraduate advisors among the whole Department faculty. No effort is made to keep the division of advisees even between those five. Furthermore, there is no obvious reason for having only five advisors. Consideration will be given to a) increasing the number of undergraduate advisors and b) maintaining as even an advising load as possible on the advisors.

2. Besides the academic advising there is a well-perceived need for improved advice on what to do after graduation -- advice on getting jobs or entering graduate school. This need is felt not only as students approach graduation day, but much earlier in their undergraduate years, when they are trying to decide what their aims are and on what aspect(s) of earth science to concentrate their efforts.