

14. Program Assessment

- a. Describe the program's assessment plan, which should include the following elements: serving a distinct student population;
- Multiple performance measures, if necessary, that reflect the uniqueness of the academic program and discipline such as: (1) standardized or other comprehensive examinations; (2) certification/licensure examinations;
 - Feedback from key stakeholders (current students, alumni, employers, graduate schools, etc.); and
 - Evidence of a formal feedback/improvement mechanism, i.e., that the program/unit has a regular review process in place and that the results of this process are used to improve curriculum, instruction, and learning.
 - The program assessment plan should indicate submission of a progress report during the 3rd year of operation and participation in the IBHE's 8-year program review process.

Student Learning Objectives

The ability of a student to complete independent research is the most important measure of student achievement in a doctoral program and assessment should focus on this objective. The doctoral degree in Geosciences is also a terminal degree, and students should have a broad understanding of the earth sciences. Students at the end of the doctoral program in Geosciences will be able to:

- 1) demonstrate an exceptional awareness and understanding of pertinent knowledge in geosciences, ancillary sciences, and research methodologies;
- 2) think independently and critically as a problem solver (identify a problem; develop hypotheses; design laboratory experiments and/or field studies and conduct independent and original research that tests the hypotheses; and formulate valid conclusions concerning the hypotheses based on the analysis of acquired data);
- 3) exhibit professional communicative skills in reporting scientific results in both written and oral formats;
- 4) demonstrate a knowledge of professional ethics; and
- 5) demonstrate self-confidence in geological judgments.

Indicators of Student Performance Related to Objectives

The composite grade point average for graduate courses taken by the student must be 3.25 or higher. During their first semester in the program the student must meet with a preliminary counseling committee composed of faculty participating in the Geosciences doctoral program to approve the student's initial course work. This committee will evaluate the background of the student and may require specific coursework that may include undergraduate courses. During their second and third years in the program the student must assemble an advisory committee (5 faculty members), complete at least one research tool, take written and oral comprehensive exams, and write a dissertation proposal in National Science Foundation format. Once the student has completed residency requirements including at least one research tool, passed both the written and oral comprehensive exams, and has approval of his or her dissertation proposal, he or she is admitted to candidacy. Upon completion of the written dissertation the student must orally defend the dissertation before his/her advisory committee.

Student Objective 1: Student will demonstrate an exceptional awareness and understanding of pertinent knowledge in geosciences, ancillary sciences, and research methodologies.

Indicator 1: Written comprehensive examination.

Primary Trait: Knowledge of geologic concepts.

Superior: Ability to answer questions at a level equivalent to the level of expertise presented in a graduate textbook.

Acceptable: Ability to answer questions at a level equivalent to the level of expertise presented in an upper level undergraduate textbook.

Not Acceptable: Only able to answer questions at a level equivalent to the level of expertise presented in an introductory undergraduate textbook.

Primary Trait: Knowledge of pertinent ancillary science concepts.

Superior: Ability to answer questions at a level equivalent to the level of expertise presented in a graduate textbook.

Acceptable: Ability to answer questions at a level equivalent to the level of expertise presented in an upper level undergraduate textbook.

Not Acceptable: Only able to answer questions at a level equivalent to the level of expertise presented in an introductory undergraduate textbook.

Indicator 2: Dissertation proposal.

Primary Trait: Knowledge of research methodologies.

Superior: Proposal demonstrates that not only is the student aware of the latest research results in the area of specialization and the techniques that were used to obtain the results, but is also able to formulate new methodology(s) for hypothesis testing.

Acceptable: Proposal demonstrates that the student is aware of the latest research results in the area of specialization and the techniques that were used to obtain the results.

Not Acceptable: Proposal demonstrates that the student is not aware of the latest research results in the area of specialization and the techniques that were used to obtain the results.

Student Objective 2: Student will think independently and critically as a problem solver (identify a problem, develop hypotheses, design experiments and conduct independent and original research that tests the hypotheses, and formulate valid conclusions concerning the hypotheses based on the analysis of acquired data).

Indicator 1: Dissertation proposal.

Primary Trait: Appropriateness of problem.

Superior: Identifies problem that is of interest to the entire geologic community and its investigation will produce significant results.

Acceptable: Identifies problem that is of broad interest in the area of specialization and its investigation will produce significant results.

Not Acceptable: Identifies problem that is not of broad interest in the area of specialization and its investigation will not produce significant results.

Primary Trait: Formulating hypotheses.

Superior: Generates multiple working hypotheses about the problem that can be subjected to rigorous testing.

Acceptable: Generates at least one hypothesis about the problem that can be subjected to rigorous testing.

Not Acceptable: Generates a working hypothesis about the problem that cannot be subjected to rigorous testing.

Primary Trait: Design of doctoral study.

Superior: Designs study that develops new research methodology(s) to test hypotheses.

Acceptable: Designs study that uses the latest research methods to test hypotheses.

Not Acceptable: Designs a study that does not use the latest research methods to test hypotheses.

Indicator 2: Doctoral dissertation.

Primary Trait: Conduct independent and original research.

Superior: Able to conduct dissertation research with only minor supervision from faculty advisor.

Acceptable: Able to conduct dissertation research project with only moderate supervision from faculty advisor.

Not Acceptable: Only able to conduct dissertation research project with extensive supervision from faculty advisor.

Primary Trait: Formulation of valid conclusions based on experimental data.

Superior: Conclusions explain observations in a logical, unambiguous manner and represent a significant and original contribution to the discipline.

Acceptable: Conclusions explain observations in a logical, unambiguous manner and represent an original contribution to the discipline.

Not Acceptable: Conclusions do not explain observations in a logical, unambiguous manner and do not represent an original contribution to the discipline.

Student Objective 3: Student will exhibit professional communicative skills in reporting scientific results in both written and oral formats.

Indicator 1: Written comprehensive examination.

Primary Trait: Usage of written language.

Superior: Writing style is succinct, cohesive, logical and unambiguous and grammar and spelling are correct.

Acceptable: Writing style is logical and unambiguous and there are only minor grammar and spelling errors.

Not Acceptable: Writing style is not logical, is ambiguous, and there are numerous grammar and spelling errors.

Indicator 2: Dissertation proposal.

Primary Trait: Usage of written language.

Superior: Writing style is succinct, cohesive, logical and unambiguous and grammar and spelling are correct.

Acceptable: Writing style is logical and unambiguous and there are only minor grammar and spelling errors.

Not Acceptable: Writing style is not logical, is ambiguous, and there are numerous grammar and spelling errors.

Indicator 3: Doctoral dissertation.

Primary Trait: Usage of written language.

Superior: Writing style is succinct, cohesive, logical and unambiguous and grammar and spelling are correct.

Acceptable: Writing style is logical and unambiguous and there are only minor grammar and spelling errors.

Not Acceptable: Writing style is not logical, is ambiguous, and there are numerous grammar and spelling errors.

Indicator 4: Oral comprehensive examination

Primary Trait: Usage of spoken language.

Superior: Thought patterns are logical and the manner in which information is provided is unambiguous. Student speaks in a clear and confident manner. Grammar and pronunciation are correct.

Acceptable: Thought patterns are logical. Student consistently speaks in a clear and confident manner. Only minor mistakes in grammar and pronunciation are made.

Not Acceptable: Thought patterns are not logical and responses to questions asked are ambiguous. Student does not speak in a clear or confident manner.

Indicator 5: Oral defense of dissertation.

Primary Trait: Usage of spoken language.

Superior: Thought patterns are logical and the manner in which information is provided is unambiguous. Student speaks in a clear and confident manner. Grammar and pronunciation are correct.

Acceptable: Thought patterns are logical. Student consistently speaks in a clear and confident manner. Only minor mistakes in grammar and pronunciation are made.

Not Acceptable: Thought patterns are not logical and responses to questions asked are ambiguous. Student does not speak in a clear or confident manner.

Student Objective 4: Student will have a knowledge of professional ethics.

Indicator 1: Dissertation proposal.

Primary Trait: Knowledge of professional ethics.

Superior: Basic knowledge of primary source reference materials and proper citations for previous work and/or ideas are used in the text as necessary. Secondary reference materials are rarely used.

Acceptable: Basic knowledge of primary source reference materials and proper citations for previous work and/or ideas are used in the text as necessary. Limited use of secondary reference materials.

Not Acceptable: Use of secondary reference materials is extensive. Citations for previous work and/or ideas are not used in the text when necessary.

Indicator 2: Doctoral dissertation.

Primary Trait: Knowledge of professional ethics.

Superior: Extensive knowledge of primary source reference materials and proper citations for previous work and/or ideas are used in the text as necessary. Secondary reference materials are not used.

Acceptable: Extensive knowledge of primary source reference materials and proper citations for previous work and/or ideas are used in the text as necessary. Secondary reference materials are rarely used.

Not Acceptable: Secondary reference materials are commonly used. Citations for previous work and/or ideas are not used in the text when necessary.

Indicator 3: Oral defense of dissertation.

Primary Trait: Knowledge of professional ethics.

Superior: Gives appropriate credit to others for previous research conducted in specialization area. Acknowledges all support from others.

Acceptable: Gives appropriate credit to others for previous research conducted in specialization area. Acknowledges support from others.

Not Acceptable: Does not give appropriate credit to others for previous research conducted in specialization area. Does not acknowledge support from others.

Student Objective 5: Student will demonstrate self-confidence in geological judgments.

Indicator 1: Oral defense of dissertation.

Primary Trait: Demonstrate self-confidence in geological judgments.

Superior: The ability to orally defend the results of original research in front of peers. The student remains calm and thought processes are logical.

Acceptable: The ability to orally defend the results of original research in front of peers. The student's thought processes remain logical.

Not Acceptable: Upon questioning by peers the student's defense of original research results becomes illogical. The student is not able to defend results of original research.

Impact of Student Performance on Program

The Graduate Program Director in the Department of Geology coordinates student assessment in the Geosciences doctoral program. Dissertation advisors will submit to the Graduate Coordinator pertinent assessment information on each graduate student whom they advise. This information will consist of the results of the written comprehensive examination questions, the assessment of the comprehensive exams as well as completed assessment forms for the dissertation proposal, the written dissertation and the oral defense of the dissertation. At the beginning of each Fall term, the Graduate Program Director will synthesize the assessment information to determine if student outcomes are being achieved and report this information to a committee composed of faculty involved in the doctoral program in Geosciences. If unacceptable achievement of outcomes are identified, the committee will recommend changes in the program.

A student exit questionnaire will be developed to identify strengths and/or weaknesses in the program and to solicit ideas and suggestions. An alumni survey will be developed and distributed to graduates from 1, 5, and 10 years after graduation to solicit ideas to improve the program. An employer questionnaire will be developed to identify strengths and/or weaknesses in the program and to solicit ideas to improve the program.

b. Identify measures to be used to assess and improve student learning, curriculum, and instruction. Evidence of success may include such specific outcomes as:

- Percent pass rate of graduates on end-of-program certification/licensure examinations;
- Enrollment of graduates in graduate and/or professional programs or other subsequent education;
- Percent of graduates employed in the field;
- Career advancement achieved by program graduates;
- Graduate/employer satisfaction with the program;
- Retention and graduation rates and time-to-degree completion;
- Percent of students involved in faculty research or other projects; and
- Percent of graduate students presenting or publishing papers.

We expect that by only selecting the best applicants that most students will pass the comprehensive exams and continue on to complete the program in an average of four years. Most students will choose to produce three articles in peer-reviewed journals to bind together as their dissertation. Publication of their research after peer-review is a measure of program success.

As shown earlier, employment opportunities for geology graduates are excellent, and expected to grow substantially over the next decade. We expect that graduates of the program will be able to find employment at colleges and universities, industry, or government agencies seeking individuals with highly developed research skills. Some may also seek a career in secondary education. The best indicator of any program's success is satisfaction by the employer with the student and a willingness to continue to hire graduates from the program. If the program fails to meet expectations, the faculty involved will take action as described in Program Assessment.