

Geology BS - Assessment Plan
Summary

Geology BS

Goal 1: Basic skills for geology majors

Goal Description:

Deliver basic skills that geology majors will need to be successful in their subsequent coursework.

RELATED ITEMS/ELEMENTS -----

RELATED ITEM LEVEL 1

Goal 1 Objective 1: Apply Basic Skills Required of a Geology Major

Learning Objective Description:

Students completing the introductory geology courses will demonstrate an understanding of the basic skills required of a geology major to succeed in subsequent coursework.

RELATED ITEM LEVEL 2

ICF Goal 1 Objective 1: Basic Geology Skills Evaluation

Indicator Description:

All students enrolled in Physical Geology complete two practical exams that measure their ability to apply basic geological skills such as observing mineral properties necessary for mineral identification and being able to read maps and make geological interpretations based on map observations. Certain embedded questions, samples, or problems will be evaluated to measure student performance on specific basic skills.

Criterion Description:

At least 70% of the students will be able to perform 70% of the required skills in the embedded questions, samples, or problems. The remaining 30% of the students will be able to perform 50% of the required skills.

Findings Description:

On the rock and mineral practical we embedded samples where students had to determine mineral cleavage, a basic skill for identifying minerals. We did this again this year to see if there has been any change compared to last year. This is a physical property that students have difficulty observing. 50% of the students were able to determine the mineral cleavage correctly 70% of the time or better. But 25% of the students were able to determine the mineral cleavage less than 50% of the time.

On the rock and mineral practical we also embedded questions where students had to determine the texture of an igneous rock, a basic skill for classifying igneous rocks. We had noticed students having issues with this concept, but wanted to get a quantitative measure of student skill levels. Only 40% of the students were able to determine the appropriate texture correctly 70% of the time or better. But 53% were only able to determine the appropriate texture correctly 50% of the time.

On the map skills practical we embedded questions regarding the use of basic coordinate systems. We had observed that students seem to be having difficulty stating locations using various coordinate systems. Only 26% of the students were able to determine location coordinates correctly 70% of the time or better. 37% were only able to determine the correct coordinates 50% of the time.

On the map skills practical we also embedded questions where students had to make a geological interpretation based on map observations. Students always seem to struggle with this, but we had not previously quantified their struggle. Only 26% of the students were able to make the correct geological interpretation based on map observations 70% of the time or better. 37% were only capable of making the correct geological interpretation 50% of the time.

RELATED ITEM LEVEL 3

Action Goal 1 Objective 1: Basic Geology Skills Evaluation

Action Description:

We will continue with the embedded question format of evaluating specific basic geology skills in the introductory courses. We will act upon the information obtained from the results to develop better methods of teaching these basic skills. For example, the findings indicate that we may be doing a satisfactory job of communicating the concept of mineral cleavage, but there may be room for improvement. On the other hand we definitely need to develop better means of teaching igneous rock textures and geological

interpretations based of map observations. This is a good outcome because we are getting very specific information about what needs to be improved.

Goal 2: Development Of A Geologic Knowledge Base

Goal Description:

Each student is required to have developed a level of knowledge above and beyond the basic skills in various areas of geology prior to attending the capstone geology field course.

RELATED ITEMS/ELEMENTS -----

RELATED ITEM LEVEL 1

Goal 2 Objective 1: Mineral Recognition

Learning Objective Description:

After completing Geology 3404, students will be able to recognize minerals. Every geology student must take Geology 3404, Mineralogy. One of the objectives of this course is to be able to recognize minerals, which is a skill that will be needed when they take the capstone geology field course. This requires that the students be familiar with the physical properties of minerals.

RELATED ITEM LEVEL 2

ICF Goal 2 Objective 1: Final Mineral Practical Exam

Indicator Description:

Students completing Geology 3404, Mineralogy, must take a final practical exam that requires the recognition of minerals. The recognition process requires an understanding of the physical properties of minerals.

Criterion Description:

60 percent of the students will be able to recognize 15 or more of the 30 minerals presented to them on the final mineral practical. This year's exam will serve as a baseline for measuring student success in regard to using the physical properties of minerals in order to identify the mineral correctly.

Findings Description:

Overall practical exam results: 52% of the students (12 out of 23) were able to recognize 15 or more of the 30 minerals presented to them on the final mineral practical. Compared to: 2015 = 79%, 2014 = 90%, 2013 = 70%, 2012 = 57%.

We embedded 8 questions on the final mineralogy practical where students had to determine mineral cleavage, a basic skill for identifying minerals. The students correctly determined the cleavage 58.5% of the time on average. Individual minerals ranged from 30% to 87% correctly determined cleavages.

We embedded questions on the final mineralogy practical where students had to provide the mineral formula for the sample they were observing. Knowing the composition of the mineral is useful information when trying to determine the minerals in a rock sample since many minerals in a rock sample will have similar compositions. The students provided the correct formula 55% of the time on average.

RELATED ITEM LEVEL 3

Action Goal 2 Objective 1: Final Mineral Practical Exam

Action Description:

We will continue to use a similar approach used in the introductory courses to evaluate very specific skills by using embedded questions in the practical exams. This will help us understand which specific mineral recognition skills are causing the most problems and then we can develop teaching methods to address those problem areas.

Goal 3: Sufficient Knowledge Of Geology To Qualify For A Bachelor Of Science

Goal Description:

Students will acquire a comprehensive knowledge of the discipline that encompasses both theoretical and field-based practical skills.

RELATED ITEMS/ELEMENTS -----

RELATED ITEM LEVEL 1

Goal 3 Objective 1: Successful Completion Of An Externally Evaluated Geology Field Camp

Learning Objective Description:

All SHSU Geology majors must attend a six credit, externally evaluated capstone Field Camp as a required component of their degree program. Such field camps are typically open to suitably qualified upper level students from geology programs situated anywhere in the country. They are conventionally evaluated using a letter grade system which the Department of Geography and Geology converted to a ranking system.

SHSU Geology students must be nationally competitive at this capstone task as indicated by at least 60% of our participants achieving at least a Limited Mastery ranking.

RELATED ITEM LEVEL 2

ICF Goal 3 Objective 1: Successful Completion Of Field Camp

Indicator Description:

All students must attend a six credit hour Field Camp that is externally evaluated on the following basis: Mastery, Limited Master, Adequate Comprehension, Limited Comprehension, and Very Low Comprehension. Students are free to choose from a very wide range of

applicable courses, each of which offers slightly different emphases in terms of geographical location and course structure. ALL courses offer a capstone-like review with Mastery reflecting mastery of taught and examined modules as well as high levels of precision in final field review stand-alone projects. A ranking of Limited Mastery reflects mastery of one or more modules but with some imprecision; a ranking of Adequate Comprehension reflects broad comprehension but demonstrates a lack of sophistication in the use of basic course material; rankings of Low Comprehension and Very Low Comprehension reflect low levels of understanding and effort and indicate inappropriate general preparation prior to field camp participation.

Criterion Description:

60% of students will achieve at least a limited mastery ranking or better by the external evaluator of the Field Camp.

Findings Description:

This year we had 6 students attending the University of Missouri Branson Field Camp. The feedback from the Director of the field camp was that as a group our students were well prepared and as a group did not have any particular weaknesses.

RELATED ITEM LEVEL 3

Action Goal 3 Objective 1: Successful Completion of Field Camp

Action Description:

Our response to the feedback from students and field camp directors over the past number of years was to develop our own introductory field methods course. That course has now been offered five times, with the most recent three offerings including two faculty members. The feedback from students and field camp directors regarding this course has been extremely positive. There is not much more we can do to improve the introductory field methods course. However, now we are looking at ways to improve student preparation for the introductory field methods course. So far we have only focused on a few basic geology skills in the introductory geology courses and mineral recognition in the mineralogy course. We plan on expanding on this type of assessment.

Update to Previous Cycle's Plan for Continuous Improvement

Previous Cycle's Plan For Continuous Improvement (Do Not Modify):

Student performance of important geology skills during summer field camp will continue to be monitored since the field camp course is the capstone course for Geology majors. The introductory field methods course will again be offered during the May minimester, and hopefully with two faculty members again (this was very helpful to students in 2015 and 2016). The new approach to assessing student ability to apply basic geology skills in the introductory courses is providing useful information for improving our instruction of those skills, so we will expand our efforts in that area. In fact, this process of assessing specific skills will be used in GEOL 3404 (Mineralogy) and GEOL 3405 (Petrology) because it is much more informative than just looking at the grade distribution on the final practical. The grade distribution only indicates that we need to improve what we are doing, but there is no indication of how to improve what we are doing. The specific skill results give us an indication of exact areas of weakness so that we know what explanations and/or demonstrations must be improved.

Update of Progress to the Previous Cycle's PCI:

Student performance of important geology skills during summer field camp will continue to be monitored since the field camp course is the capstone course for Geology majors. The introductory field methods course will again be offered during the May minimester, and hopefully with two faculty members again (this was very helpful to students in 2015, 2016, and 2017). The new approach to assessing student ability to apply basic geology skills in the introductory courses is providing useful information for improving our instruction of those skills, so we will expand our efforts in that area. In fact, this process of assessing specific skills will be used in GEOL 3404 (Mineralogy) and GEOL 3405 (Petrology) because it is much more informative than just looking at the grade distribution on the final practical. The grade distribution only indicates that we need to improve what we are doing, but there is no indication of how to improve what we are doing. The specific skill results give us an indication of exact areas of weakness so that we know what explanations and/or demonstrations must be improved. This latter part, changes in instruction, is still a work in progress as we try to refine our embedded questions so that they provide a more precise picture of what problems exist in student learning of these basic geology skills.

Plan for Continuous Improvement

Closing Summary:

We will continue with the embedded question format of evaluating specific basic geology skills in the introductory courses. We will act upon the information obtained from the results to develop better methods of teaching these basic skills. For example, the findings indicate that we may be doing a satisfactory job of communicating the concept of mineral cleavage, but there may be room for improvement. On the other hand we definitely need to develop better means of teaching igneous rock textures and geological interpretations based of map observations. This is a good outcome because we are getting very specific information about what needs to be improved. With regard to our advanced courses, we will continue to use a similar approach used in the introductory courses to evaluate very specific skills by using embedded questions in the practical exams. This will help us understand which specific mineral recognition skills are causing the most problems and then we can develop teaching methods to address those problem areas.

Our response to the feedback from students and field camp directors over the past number of years was to develop our own introductory field methods course. That course has now been offered five times, with the most recent three offerings including two faculty members. The feedback from students and field camp directors regarding this course has been extremely positive. There is not much more we can do to improve the introductory field methods course. However, now we are looking at ways to improve student preparation for the introductory field methods course. So far we have only focused on a few basic geology skills in the introductory geology courses and mineral recognition in the mineralogy course. We plan on expanding on this type of assessment.

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