

Undergraduate Programs Academic Assessment Plan

Department of Geosciences

OVERVIEW: GRADUATE PROGRAM IN GEOSCIENCES

The undergraduate programs in Geosciences (B.S. Geology, B.S. Earth Science, B.A. Geography) offer the opportunity for study to produce graduates who are competent in a wide range of techniques and are familiar with key concepts in each field of study. The programs also familiarize students with a wide variety of sub disciplines in the field while encouraging them to pursue a degree track that fulfills contemporary disciplinary standards for theoretical and technical knowledge in the field. Electives are designed to further develop skills and competencies within sub-disciplines represented by faculty expertise. Students graduating with the B.S. or B.A. degree should be prepared to enter and M.A. or M.S. program at Arkansas or any peer institution with no deficiencies. For students intending to enter the job market, the degree should provide sufficiently solid foundation in basic skills and techniques for employment.

Assessment plans for undergraduate programs in Geosciences are given below:

- I. B.S. Geology
- II. B.S. Earth Science
- III. B.A. Geography
- IV. Certificate of Proficiency in Geospatial Technologies

I. DEGREE PROGRAM: BS GEOLOGY

A. Learning Outcomes: B.S. Geology

- Have an appreciation for the environmental aspects of earth systems and potential impacts and hazards associated with human occupation.
- Understand the mineralogy and petrology of the earth.
- Be able to conceptualize the stratigraphic character of rocks in outcrop and from subsurface data.
- Recognize and understand the structural features of the earth in outcrop and in the subsurface.
- Have the ability to map these features and prepare cross-sections of the earth, and interpret the forces that caused the deformation of the rocks.
- Understand the geomorphic characteristics of the earth's surface and the mechanisms forming the earth's surface features.
- Understand the concepts of geologic time, the succession of life on earth through geologic time, and the tectonic forces acting on earth through geologic time.
- Have sufficient mathematical, chemistry and physics knowledge to be able to apply these fields to geologic settings and problems, as well as resource identification, development and management.
- Have the ability to communicate results of their efforts in written reports and orally to diverse audiences.

B. Assessment Techniques: B.S. Geology

- GEOS 4686 is a 6-credit hour required field course conducted in the northern Rocky Mountains, southwestern Montana, northern Montana, and Wyoming.

This six-week capstone course is project based and incorporates all aspects of geology that the students have learned throughout their program of study. Projects include rock and mineral identification, stratigraphic and structural mapping, preparation of detailed geologic maps and cross-sections, identification of mineral and ore emplacement, mapping and evaluation of geomorphic features resulting from glacial and stream erosion and deposition, and environmental investigation of acid mine drainage impacts associated with ore mineral development. Written reports presenting the data collected and detailing the students findings and interpretations are required for several of the field based projects throughout the six-week period. Some of these are individual written reports and others are team reports, exposing the students to working in diverse teams such as they will encounter when they join the workforce.

- Score gains from pre and post tests are used as a primary assessment mechanism for students in GEOS 1113 – introductory geology and for GEOS 1133 – earth science.
- Course grades – standard routine method used in each course in our program.
- Admission rates into graduate programs and quality of the graduate program accepting our students.
- Placement rates of graduates into appropriate career positions and starting salaries.
- Student/alumni satisfaction with learning, collected through surveys, exit interviews, or focus groups – track our students to the extent possible. We also have an external advisory board that provides feedback annually on our curriculum and the quality of the students graduating from our program.
- Student participation rates in faculty research, publications and conference presentations.
- Honors, awards, and scholarships earned by students and alumni.

C. Timelines for Data Collection and Analysis: B.S. Geology

- Assessment data for our introductory courses are collected each academic semester. These data are compiled annually and reviewed by the B.S. Geology Coordinator.
- Assessment of the Capstone field course in geology (GEOS 4686) occurs annually. Successes and issues for the course are reviewed each year and modifications are implemented to resolve issues and ultimately enhance overall student learning.
- Our external advisory committee, which is composed of representatives from industry and local, state and federal government representatives, meets annually and provides feedback on our curriculum relative to their needs, as well as the quality of the students graduating from our program.

D. Use of Results: B.S. Geology

- Results of data analysis are reviewed and discussed by faculty annually.
- Assessment, analysis and review will be ongoing. Combined with implementation of course and program modifications, assessments are critical to maintaining a healthy viable program to meet our student learning goals, objectives and outcomes.

II. DEGREE PROGRAM: B.S. EARTH SCIENCE

A. Learning Outcomes: B.S. Earth Science

- Have an appreciation for the environmental aspects of earth systems and potential impacts and hazards associated with human occupation.
- Understand the mineralogy and petrology of the earth.
- Understand meteorology and climatology of earth
- Be able to articulate processes of climate change and global change
- Understand need for and mechanisms of resource sustainability
- Understand the concepts of geologic time, the succession of life on earth through geologic time, and the tectonic forces acting on earth through geologic time.
- Have sufficient mathematics, physics and/or chemistry skills to be able to apply concepts to Earth Science problems
- Have the ability to communicate results of their efforts in written reports and orally to diverse audiences.

B. Assessment Techniques: B.S. Earth Science

- Score gains from pre and post tests are used as a primary assessment mechanism for students in GEOS 1113 – introductory geology and for GEOS 1133 – earth science.
- Course grades – standard routine method used in each course in our program.
- Admission rates into graduate programs and quality of the graduate program accepting our students.
- Placement rates of graduates into appropriate career positions and starting salaries.
- Student/alumni satisfaction with learning, collected through surveys, exit interviews, or focus groups – track our students to the extent possible. We also have an external advisory board that provides feedback annually on our curriculum and the quality of the students graduating from our program.
- Student participation rates in faculty research, publications and conference presentations.
- Honors, awards, and scholarships earned by students and alumni.

C. Timelines for Data Collection and Analysis: B.S. Earth Science

- Assessment data for our introductory courses are collected each academic semester. These data are compiled annually and reviewed by the B.S. Earth Science Coordinator.
- Assessment of the Capstone field course in geology (GEOS 4686) occurs annually. Successes and issues for the course are reviewed each year and modifications are implemented to resolve issues and ultimately enhance overall student learning.
- Our external advisory committee, which is composed of representatives from industry and local, state and federal government representatives, meets annually and provides feedback on our curriculum relative to their needs, as well as the quality of the students graduating from our program.

D. Use of Results: B.S. Earth Science

- Results of data analysis are reviewed and discussed by faculty annually.
- Assessment, analysis and review will be ongoing. Combined with implementation of course and program modifications, assessments are critical to maintaining a healthy viable program to meet our student learning goals, objectives and outcomes.

III. DEGREE PROGRAM: B.A. Geography

B. Learning Outcomes: B.A. Geography

- Understand the concept of globalization as it relates to human activity and environmental change.
- Have an appreciation for human-environment interactions and understand human impacts on earth systems as well as the potential changes and risks associated with human activities.
- Understand the spatial components of the contemporary demographic, socio-economic and political structures of the world in the 21st century.
- Understand the fundamentals of landscape change, both natural and human-induced.
- Develop competence in the use of geographic tools including Geographic Information Systems, Spatial Statistics and Remote Sensing.
- Be able to communicate spatial information in a clear fashion through the development of sophisticated cartographic design skills.
- Understand the concepts of place (spatial attributes); pattern (spatial distribution), diffusion (spatial dispersion), movement (spatial interaction) and scale.
- Have the ability to communicate results of their efforts in written reports and orally to diverse audiences.

B. Assessment Techniques: B.A. Geography

- GEOS 4xx3 is a new class that has been proposed to act as a capstone class for graduating geography majors. The introduction of a capstone class was recommended in the report for the External Review in 2014 and the class will be submitted to Courseleaf this summer in preparation for Spring 2019. The class has been delayed in order to integrate the class into the faculty teaching load. In the 2018-2019 academic year the Research Methods/History of Geography required courses for the MS program will be switched so that History of Geography is taught in the Fall semester, that will free up the faculty member who has been teaching that class in the Spring, to teach the Capstone class. The class will include a history of the discipline as well as a survey of geographic research methods and will be structured around two field assignments where students can engage in a variety of field-based projects. Assessment will include traditional paper and project-based grades as well as an individual semester long research project. Designed to be taken the semester a student graduates exit interviews will also be administered at the end of this class.
- Score gains from pre and post tests are used as a primary assessment mechanism for students in GEOS 1123 – Human Geography and for GEOS 2013 – World Regional Geography.
- Admission rates into graduate programs and quality of the graduate program accepting our students.
- Placement rates of graduates into appropriate career positions and starting salaries. Assessed through exit interviews and post-graduate tracking.
- Student/alumni satisfaction with learning, collected through social media surveys, exit interviews, and post-graduate focus groups. Geosciences also has an

external advisory board that provides feedback annually on our curriculum and the quality of the students graduating from our programs.

- Student participation rates in faculty research, publications and conference presentations.
- Honors, awards, and scholarships earned by students and alumni.

C. Timelines for Data Collection and Analysis: B.A. Geography

- Assessment data for our introductory courses are collected each academic semester. These data are compiled annually and reviewed by a faculty committee.
- Assessment of the capstone course in geography (GEOS 4xx3) will occur annually at the end of the Spring semester. Multiple faculty will be involved in teaching the class, through guest lectures and participation in the field sections of the course. These faculty will collectively review the outcomes of the course each year and modifications will be implemented to resolve issues and improve course outcomes in order to enhance overall student learning.
- The Geosciences external advisory committee, which is composed of representatives from industry and local, state and federal government representatives, meets annually and provides feedback on our curriculum relative to their needs, as well as the quality of the students graduating from our program.

D. Use of Results: B.A. Geography

- Results of data analysis are reviewed and discussed by faculty annually.
- Assessment, analysis and review will be ongoing. Combined with implementation of course and program modifications, assessments are critical to maintaining a healthy viable program to meet our student learning goals, objectives and outcomes.

IV. DEGREE PROGRAM: CERTIFICATE OF PROFICIENCY IN GEOSPATIAL TECHNOLOGIES (GISTCP)

A. Learning Outcomes: GISTCP

- Understand broadly the impact of geospatial technology and data
- Understand fundamental 2D computational geometry and interaction with GIS entities
- Key elements of Python programming relevant to current trends in GIS
- Spatial analysis using mainstream GIS software
- Statistics and geospatial data
- Detailed experience with the database systems capacity in GIS

B. Assessment Techniques: GISTCP

- As of Jun 2018, the GISTCP is a relatively new program with a limited number of graduates so far. Given this fact and the high complexity of the technology presented to the student, care must be taken not to make the assessment process too complex. (This certificate will naturally evolve with changes in the technology, and that flexibility to adapt is a key component.) Therefore, the assessment methods indicated below are clear and easy to implement in the real world.

Table 1. Learning outcomes and corresponding methods of direct and indirect assessment.

Learning outcome	Assessment	
	Direct	Indirect
Understand broadly the impact of geospatial technology and data	Score gains between pre and post tests administered by instructor	GEOS 3543 grade
Understand fundamental 2D computational geometry and interaction with GIS		GEOS 3013 grade
Key elements of Python programming relevant to current trends in GIS		GEOS 3103 grade
Spatial analysis using mainstream GIS software		GEOS 3553 grade
Statistics and geospatial data		GEOS 3563 grade
Detailed experience with the database systems capacity in GIS		GEOS 3593 grade

C. Timelines for Data Collection and Analysis: GISTCP

- The GISTCP was approved by ADHE in 2014 with the first successful graduate of the program in Spring 2016. Since the initial plan for assessment is being created in Jun 2018, initial certificate program assessment/analysis will commence during the Spring 2019 semester and repeat at the end of each spring semester throughout the lifecycle of the program. The assessment will be conducted by the GISTCP/GISTGC certificate program director with the assistance of the GISTCP coordinator (if a different individual), and with cooperation from all faculty participating in the GISTCP.

D. Use of Results: GISTCP

- Results of the assessment will be communicated using a spreadsheet in Office 365 (campus platform). Planned recipients of results include participating GISTCP/GISTGC faculty, coordinator(s), and director, participating University of Arkansas Global Campus staff, geography curriculum committee, Geosciences chair, CAST director, and Fulbright College of Arts and Sciences dean.
- On the basis of the metrics examined, the geography curriculum committee will coordinate making appropriate recommendations for changes to the program.