

**Assurance of Student Learning
2019-2020**

Ogden	Earth, Atmospheric & Environmental Sciences
Geosciences 072	
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Use this page to list learning outcomes, measurements, and summarize results for your program. Detailed information must be completed in the subsequent pages.

• **Student Learning Outcome 1:** Students graduating for the geoscience program will develop an applied skillset and breadth of knowledge about the complexity and diversity of local and global human-environmental interactions, as well an appreciation and understanding of geospatial relationships and using technology to study them.

Instrument 1	Direct: Analysis of graduate thesis
Instrument 2	Direct: Analysis of written comprehensive exam
Instrument 3	Indirect: Success in core coursework (GEOS 500, 502, 520)

Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 1.	Met	Not Met
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• **Student Learning Outcome 2:** Using the evidence and argument approach, students who graduate with a geoscience degree will learn how to become critical thinkers with marketable communication, analytical, and problem-solving skills that meet the needs of the citizens of the Commonwealth of Kentucky and the world.

Instrument 1	Direct: Analysis of graduate thesis
Instrument 2	Direct: Analysis of written comprehensive exam
Instrument 3	Indirect: Success in job placement and pursuit/completion of doctoral programs

Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 2.	Met	Not Met
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• **Student Learning Outcome 3:** Students can demonstrate the capacity to apply geospatial, geological, meteorological, and/or environmental knowledge and training to address relevant concerns in community or society.

Instrument 1	Direct: Analysis of graduate thesis
Instrument 2	Indirect: Level of community and regional engagement in research activity and productivity in application to problem solving
Instrument 3	Indirect: Success in job placement and pursuit/completion of doctoral programs and publication of results

Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 3.	Met	Not Met
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Program Summary (Briefly summarize the action and follow up items from your detailed responses on subsequent pages.)

Updated reviews of current SLO's indicate steady progress and success in meeting them through continued adaptation of the program to meet evolving student and market needs. The program's focal areas are constantly being reviewed to ensure they align with employer needs and national trends in the Geosciences; these are obtained through the American Geosciences Institute (AGI) and other related professional organizations (Esri for GIS, Geological Society of America). Faculty maintain contact with program

graduates, often having them return as speakers to the core graduate classes (GEOS 500) to provide insight on future employment opportunities for current students, as well as to consult with faculty on evolving discipline needs. We informally monitor graduates who seek professional designations (Professional Geologist, GIS Professional) after graduation to track their success, with most achieving their goal within 3-5 years of graduation. Doctoral program acceptances since 2014 are 100% for those who applied and are currently in, or have completed, a Ph.D. in the Geosciences. Key areas of professional growth, which are also focal points of our program, include energy, water resources, environment/sustainability, geophysics, and GIS, with a 100% job placement rate in these fields based on alumni data since 2018. Needs for learned skills and cohort interests are gauged in GEOS 500 and used to adapt offerings for the following year for elective courses and for core coursework in GEOS 502 and 520.

The program's faculty constantly interact with potential employers and doctoral program advisees, as well as a broad network of alumni, to seek critical feedback on changing workforce and academic demands. Alumni visit the Department each semester and provide several local and regional linkages to ensure employability and relevant training for students. Each year, we review the program course offerings, continually updating the 5-year rotation to meet the needs for technical skills and academic preparation. For example, we recently adjusted to offer more field-based courses integrating applied technology and software utilization (e.g., water resource management, field techniques using advanced equipment; training with software (i.e. Petra) for future geologists; and using the most advanced version of ArcGIS and applied course themes to bridge discipline-specific training with software skills). Based on feedback from graduates from the 2019 cohort, we restructured the GEOS 502 Research Methods course to be taught in tandem with GOES 500 to better integrate interdisciplinary and method development experiences to prepare students for critical thinking about research design and application, including the collection and analysis of large datasets, which is trending in both the public and private Geoscience sectors to meet project management needs. We have developed a draft exit survey for graduates to collect data on future employment and plans for all alumni. This year, we will attempt a formal exit survey to gauge employment and doctoral program placement and to conduct our first alumni survey for those who graduated one year ago, with whom we'll follow up in 4 years to collect data on program linkages to future employment and graduate school success.

Student Learning Outcome 1

Student Learning Outcome	Students graduating for the geoscience program will develop an applied skillset and breadth of knowledge about the complexity and diversity of local and global human-environmental interactions, as well an appreciation and understanding of geospatial relationships and using technology to study them.		
Measurement Instrument 1	Direct: Analysis of graduate thesis by Committee expert evaluation, which involves producing an original, committee-reviewed and approved body of scientific research that has direct application in the Geosciences and includes a literature review, data report, and interpretation and synthesis of the results with full references. The rigor expected is to produce publishable work based on the thesis research and will be deemed acceptable based on the scientific expertise and evaluation of the graduate faculty comprising the committee and their experience with the thesis topic and in being active researchers in the discipline.		
Criteria for Student Success	At the conclusion of the program, the student must produce a defensible, well-written, fully-referenced, publishable graduate thesis on a topic within the Geosciences that meets the approval of the advisor and faculty committee of experts (minimum of three). Metrics of quality evaluated by the committee (with the potential for input from the entire Graduate Faculty as part of the public review process) for an acceptable thesis include: 1) clear and focused research question(s); 2) synthesized and complete literature review; 3) appropriate methodology as approved by the committee; 4) competent data collection and analysis; 4) demonstrated competency in discussing data and results; and 5) appropriate and thorough references, correct grammar and syntax, and proper formatting as required by the Graduate School. Other specific guidelines for style, formatting, length, and related criteria are provided in the Geoscience Graduate Handbook.		
Program Success Target for this Measurement	100%	Percent of Program Achieving Target	100%
Methods	Sampled population includes all full-time students enrolled in GEOS 599 and to graduate from the program during the assessment period (7 with rolling enrollment) and degrees conferred during that period (4).		
Measurement Instrument 2	Direct: Analysis of written comprehensive exam, which includes closed and open book questions from the entire faculty related to the student's research and graduate coursework through a one-day process.		
Criteria for Student Success	Successfully answering all the questions provided on the written exam based on evaluation by the advisor and faculty participating in the process.		
Program Success Target for this Measurement	100%	Percent of Program Achieving Target	100%
Methods	Written exam answers for each student are evaluated using a Pass/Fail criteria and students must successfully pass all questions in order to continue in the program. No student has failed his or her comprehensive exam during the period of assessment.		
Measurement Instrument 3	Indirect: Success in core coursework (GEOS 500, 502, 520)		
Criteria for Student Success	Successfully passing the core courses with required grade of A or B		
Program Success Target for this Measurement	100%	Percent of Program Achieving Target	100%
Methods	Evaluation of student grades based on students enrolled in the core courses (n=14). Students met all criteria in the courses and their individual SLO's in order to achieve passing grades.		

Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 1.	Met	Not Met
Actions (Describe the decision-making process and actions planned for program improvement. The actions should include a timeline.)		
Program improvements included revision of core courses to include additional spatial analysis and applied methodology development. Coordination of the program by the Graduate Coordinator helped with program offering continuity and on-time graduation. Overall, the program achieved a maintain during program review and had continues to have positive graduation rates.		
Follow-Up (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)		
Follow up will include implementation of the exit and alumni surveys for program and content development will start at the end of Fall 2020 due to pandemic delays. All other SLOs are currently being met and will be reviewed as needed based on graduation success and survey results.		
Next Assessment Cycle Plan (Please describe your assessment plan timetable for this outcome)		
This program will be assessed again in 2021 after the next cohort of 2-year students will complete their cycle. It will include the exit surveys, course content surveys for core courses (GEOS 500, 502, 520), and ancillary data collected from evaluations and other student success metrics (thesis completion time and quality, recruiting efforts, etc.).		

Student Learning Outcome 2			
Student Learning Outcome	Using the evidence and argument approach, students who graduate with a geoscience degree will learn how to become critical thinkers with marketable communication, analytical, and problem-solving skills that meet the needs of the citizens of the Commonwealth of Kentucky and the world.		
Measurement Instrument 1	Direct: Analysis of graduate thesis by Committee expert evaluation, which involves producing an original, committee-reviewed and approved body of scientific research that has direct application in the Geosciences and includes a literature review, data report, and interpretation and synthesis of the results with full references. The rigor expected is to produce publishable work based on the thesis research and will be deemed acceptable based on the scientific expertise and evaluation of the graduate faculty comprising the committee and their experience with the thesis topic and in being active researchers in the discipline.		
Criteria for Student Success	At the conclusion of the program, the student must produce a defensible, well-written, fully-referenced, publishable graduate thesis on a topic within the Geosciences that meets the approval of the advisor and faculty committee of experts (minimum of three). Metrics of quality evaluated by the committee (with the potential for input from the entire Graduate Faculty as part of the public review process) for an acceptable thesis include: 1) clear and focused research question(s); 2) synthesized and complete literature review; 3) appropriate methodology as approved by the committee; 4) competent data collection and analysis; 4) demonstrated competency in discussing data and results; and 5) appropriate and thorough references, correct grammar and syntax, and proper formatting as required by the Graduate School. Other specific guidelines for style, formatting, length, and related criteria are provided in the Geoscience Graduate Handbook.		
Program Success Target for this Measurement	100%	Percent of Program Achieving Target	100%
Methods	Sampled population includes all full-time students enrolled in GEOS 599 and to graduate from the program during the assessment period (7) with rolling enrollment) and degrees conferred during that period (4).		
Measurement Instrument 2	Direct: Analysis of written comprehensive exam, which includes closed and open book questions from the entire faculty related to the student's research and graduate coursework through a one-day process.		
Criteria for Student Success	Successfully answering all the questions provided on the written exam based on evaluation by the advisor and faculty participating in the process.		

Program Success Target for this Measurement	100%	Percent of Program Achieving Target	100%
Methods	Written exam answers for each student are evaluated using a Pass/Fail criteria and students must successfully pass all questions in order to continue in the program. No student has failed his or her comprehensive exam during the period of assessment.		
Measurement Instrument 3	Indirect: Success in job placement and pursuit/completion of doctoral programs		
Criteria for Student Success	Successful placement in a career or doctoral program related to the degree earned.		
Program Success Target for this Measurement	100%	Percent of Program Achieving Target	100%
Methods	Informal tracking of student job placement (n=4) and doctoral program acceptance (n=ND), of which a 100% success rate was achieved typically within 0-3 months of graduation.		
Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 2.			Met
Not Met			
Actions (Describe the decision-making process and actions planned for program improvement. The actions should include a timeline.)			
Planned improvement included revised course content for core courses, which led to increased success (higher grades) and continued success in job placement based on learned skills and successfully completed theses on relevant topics to the field.			
Follow-Up (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)			
Follow up will include implementation of the exit and alumni surveys for program and content development starting at the end of Fall 2020 due to pandemic delays to obtain quantitative data on these parameters. All other SLOs are currently being met and will be reviewed as needed based on graduation success and survey results.			
Next Assessment Cycle Plan (Please describe your assessment plan timetable for this outcome)			
This program will be assessed again in 2021 after the next cohort of 2-year students will complete their cycle. It will include the exit surveys, course content surveys for core courses (GEOS 500, 502, 520), and ancillary data collected from evaluations and other student success metrics (thesis completion time and quality, recruiting efforts, etc.).			

Student Learning Outcome 3	
Student Learning Outcome	Students can demonstrate the capacity to apply geospatial, geological, meteorological, and/or environmental knowledge and training to address relevant concerns in community or society.
Measurement Instrument 1	Direct: Analysis of graduate thesis by Committee expert evaluation, which involves producing an original, committee-reviewed and approved body of scientific research that has direct application in the Geosciences and includes a literature review, data report, and interpretation and synthesis of the results with full references. The rigor expected is to produce publishable work based on the thesis research and will be deemed acceptable based on the scientific expertise and evaluation of the graduate faculty comprising the committee and their experience with the thesis topic and in being active researchers in the discipline.
Criteria for Student Success	At the conclusion of the program, the student must produce a defensible, well-written, fully-referenced, publishable graduate thesis on a topic within the Geosciences that meets the approval of the advisor and faculty committee of experts (minimum of three). Metrics of quality evaluated by the committee (with the potential for input from the entire Graduate Faculty as part of the public review process) for an

	acceptable thesis include: 1) clear and focused research question(s); 2) synthesized and complete literature review; 3) appropriate methodology as approved by the committee; 4) competent data collection and analysis; 4) demonstrated competency in discussing data and results; and 5) appropriate and thorough references, correct grammar and syntax, and proper formatting as required by the Graduate School. Other specific guidelines for style, formatting, length, and related criteria are provided in the Geoscience Graduate Handbook.		
Program Success Target for this Measurement	100%	Percent of Program Achieving Target	100%
Methods	Sampled population includes all full-time students enrolled in GEOS 599 and to graduate from the program during the assessment period (7) with rolling enrollment) and degrees conferred during that period (4).		
Measurement Instrument 2	Indirect: Level of community and regional engagement in research activity and productivity in application to problem solving		
Criteria for Student Success	Successfully application of thesis topics to student's field and applicability to community and regional needs.		
Program Success Target for this Measurement	100%	Percent of Program Achieving Target	100%
Methods	Each thesis is developed to provide students with topics and training that are directly relatable to the field of Geoscience and targeted at applied problem solving through rigorous data collection, analysis, and application to the field. All thesis completed during this period included an applied component and many involved direct partnerships or collaboration with outside entities.		
Measurement Instrument 3	Indirect: Success in job placement and pursuit/completion of doctoral programs and publication of results		
Criteria for Student Success	Successful placement in a career or doctoral program related to the degree earned; successful publication of student thesis.		
Program Success Target for this Measurement	100%	Percent of Program Achieving Target	100%
Methods	Informal tracking of student job placement (n=4) and doctoral program acceptance (n=ND), of which a 100% success rate was achieved typically within 0-3 months of graduation; tracking of student publications after completion of thesis (n=5).		
Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 3.			Met Not Met
Actions (Describe the decision-making process and actions planned for program improvement. The actions should include a timeline.)			
Planned improvement included revised course content for core courses, which led to increased success (higher grades) and continued success in job placement based on learned skills and successfully completed theses on relevant topics to the field.			
Follow-Up (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.)			
Follow up will include implementation of the exit and alumni surveys for program and content development starting at the end of Fall 2020 due to pandemic delays to obtain quantitative data on these parameters. All other SLOs are currently being met and will be reviewed as needed based on graduation success and survey results.			
Next Assessment Cycle Plan (Please describe your assessment plan timetable for this outcome)			
This program will be assessed again in 2021 after the next cohort of 2-year students will complete their cycle. It will include the exit surveys, course content surveys for core courses (GEOS 500, 502, 520), and ancillary data collected from evaluations and other student success metrics (thesis completion time and quality, recruiting efforts, etc.).			