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| **Assurance of Student Learning Report****2020-2021** |
| *Ogden* | *Earth, Environmental & Atmospheric Sciences* |
| *Geosciences 072* |
| *Jason Polk* |

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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 from 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 understanding their geospatial relationships. |
| **Instrument 1** | Direct: Analysis of written comprehensive exam |
| **Instrument 2** | Indirect: Success in core coursework (GEOS 500, 502, 520) |
| **Based on your results, check whether the program met the goal Student Learning Outcome 1.** | **[x]  Met** | **[ ]  Not Met** |
| **Student Learning Outcome 2:** Using the evidence and argument approach, students who graduate with a geoscience degree will demonstrate marketable communication, analytical/research, and problem-solving skills as evidenced through written and oral demonstration of their theses. |
| **Instrument 1** | Direct: Analysis of written graduate thesis |
| **Instrument 2** | Direct: Analysis of oral graduate defense performance |
| **Based on your results, check whether the program met the goal Student Learning Outcome 2.** | **[x]  Met** | **[ ]  Not Met** |
| **Student Learning Outcome 3:** Students can demonstrate the capacity to fit comprehensive geospatial, geological, meteorological, and/or environmental knowledge and training within broader contexts (broader impacts) relevant in communities or societies.  |
| **Instrument 1** | Direct: Analysis of research thesis applicability to field and broader impacts. |
| **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/or admission/completion of doctoral programs. |
| **Based on your results, check whether the program met the goal Student Learning Outcome 3.** | **[x]  Met** | **[ ]  Not Met** |
| **Program Summary (Briefly summarize the action and follow up items from your detailed responses on subsequent pages.)**  |
| All SLO goals were not only met but exceeded expectations for the review period. As such, no specific follow-up actions are required. 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. Based on feedback from graduates from the 2019 and 2020 cohort, we are currently revamping the GEOS 520 content to broaden its focus on time series and applied statistical methods, in addition to spatial stats, as these areas have been identified as critical for job placement based on the last few years of graduates the job placement. We will implement a draft exit survey for graduates to collect data on future employment and plans for all alumni. As COVID eases, we will also 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. |

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| **Student Learning Outcome 1** |
| **Student Learning Outcome**  | Students graduating from 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 understanding their geospatial relationships. |
| **Measurement Instrument 1**  | 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. Grading is on a Pass/Conditional Pass/Fail basis. Pass indicates a full and complete answer, with demonstrated mastery of the subject and clear, concise written evidence of this knowledge. Conditional Pass indicates familiarity with the subject and addressing of the question but lacking a sufficient level of detail or completeness to earn a Pass. Fail indicates an incomplete or unsatisfactory answer that does not address the question in enough detail or depth of knowledge. |
| **Program Success Target for this Measurement** | 90% Pass Rating | **Percent of Program Achieving Target** | 100%  |
| **Methods**  | Written exam answers for each student are evaluated using a Pass/Conditional Pass/Fail criteria and students must successfully pass all questions in order to continue in the program. All comprehensive exams completed in AY21 were evaluated to measure this SLO.  |
| **Measurement Instrument 2** | 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** | 90% Pass Rating | **Percent of Program Achieving Target** | 100% |
| **Methods** | All student grades based on students enrolled in the core courses (n=7) were evaluated. Students met all criteria in the courses and their individual SLO’s in order to achieve passing grades |
| **Based on your results, highlight whether the program met the goal Student Learning Outcome 1.** | **[x]  Met** | **[ ]  Not Met** |
| **Actions**  |
| Program improvements included continual revisions of core courses to include additional statistical analysis and applied methodology development. Coordination of the program by the Graduate Coordinator helps with program offering continuity and on-time graduation.  |
| **Follow-Up**  |
| Follow up will include implementation of the exit and alumni surveys for program and content development will start in Spring 2022 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**  |
| This program will be assessed again in Spring 2022 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.).  |

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| **Student Learning Outcome 2** |
| **Student Learning Outcome**  | Using the evidence and argument approach, students who graduate with a geoscience degree will demonstrate marketable communication, analytical/research, and problem-solving skills as evidenced through written and oral demonstration of their theses. |
| **Measurement Instrument 1** | Direct: Analysis of graduate thesis, which involves producing an original, written 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. Students must demonstrate depth of knowledge on the subject. The rigor expected is to produce publishable work and is deemed acceptable based on the scientific expertise and evaluation of the graduate faculty committee. |
| **Criteria for Student Success** | Criteria for evaluation include an effective written original research thesis. At the conclusion of the program, the student must produce a defendable, 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** | 90% | **Percent of Program Achieving Target** | 100% |
| **Methods**  | 100% of full-time student written thesis during the assessment period were assessed. All students produced a passing thesis and completed the oral defense successful during the review period.  |
| **Measurement Instrument 2** | Direct: Analysis of graduate thesis oral defense, which involves orally defending an original, committee-reviewed and approved body of scientific research that has direct application in the geosciences. Students must demonstrate depth of knowledge on the subject by addressing questions from committee members after presenting their research.  |
| **Criteria for Student Success** | Oral thesis evaluation rubric includes the following metrics: 1) Quality of oral presentation based on visual appeal, succinctness, and clarity; 2) quality of information included (organization, content relevance and accuracy, evidence-based methods justification); 3) quality of oral presentation (flow, clarity, delivery); 4) adherence to scientific method; 5) ability to answer questions accurately. Students must demonstrate knowledge of research application to the field, be able to argue strengths and weaknesses of results, and successfully defend against questions regarding the thesis by committee. The committee of 3-4 faculty evaluate criteria on a Pass/Conditional Pass/Fail scoring system. |
| **Program Success Target for this Measurement** | 100% | **Percent of Program Achieving Target** | 100% |
| **Methods** | 100% of full-time student oral defenses during the assessment period were assessed. All students produced a passing thesis and completed the oral defense successful during the review period. |
| **Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 2.** | **[x]  Met** | **[ ]  Not Met** |
| **Actions**  |
| As all measurements met targets, no actions are required. Nonetheless we have planned improvement included revised course content for core courses, particularly the Research Methods and Geostats courses, and continued success in job placement based on learned skills and successfully completed theses on relevant topics to the field.  |
| **Follow-Up**  |
| Follow up will include implementation of the exit and alumni surveys for program and content development starting at the end of Spring 2022 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**  |
| This program will be assessed again in Spring 2022 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.).  |

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| **Student Learning Outcome 3** |
| **Student Learning Outcome**  | Students can demonstrate the capacity to fit comprehensive geospatial, geological, meteorological, and/or environmental knowledge and training within broader contexts (broader impacts) relevant in communities or societies. |
| **Measurement Instrument 1** | Direct: Analysis of broader applicability of thesis. Theses must include a clear, comprehensive, and defendable broader impacts discussion of the applicability of the outcomes to the subject and/or society. The material must clearly describe how the narrow student research topic fits within the broader contexts of the geoscience discipline and how it is directly applicable to communities and societies not directly related to the completed study. Evaluation of the broader impact is completed by committee or 3-4 gradate faculty and is scored as Pass/Fail. |
| **Criteria for Student Success** | Written thesis will be evaluated for content to ensure they are relevant to the Geosciences and meet the approval of the advisor and faculty committee of experts (minimum of three) as a novel and expert level contribution to the field of research. Metrics of quality evaluated by the committee include the broader impacts and relevance to society/subject field, which will be approved as Pass/Fail.  |
| **Program Success Target for this Measurement** | 90% | **Percent of Program Achieving Target** | 100% |
| **Methods**  | 100% of full-time student written thesis during the assessment period were assessed. All students produced a passing thesis and completed the oral defense successful during the review period. |
| **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** | 80% | **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** | 80% | **Percent of Program Achieving Target** | 100% |
| **Methods** | Informal tracking of student job placement and doctoral program acceptance, of which a 100% success rate was achieved typically within 0-3 months of graduation; tracking of student publications after completion of thesis. |
| **Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 3.** | **[x]  Met** | **[ ]  Not Met** |
| **Actions** (Describe the decision-making process and actions for program improvement. The actions should include a timeline.) |
| As all measurement targets were met, no actions are required. Nonetheless, we have planned improvements for 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 Spring 2022 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 Spring 2022 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.).  |