



Program Assessment Report (PAR)

Earth Sciences (ES) Masters Degree

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ACADEMIC YEAR COVERED BY THIS REPORT: [AcademicYear]

I. PROGRAM LEARNING OUTCOMES

Earth & Environmental Sciences Master of Science in Teaching (Earth Science) program graduates will develop essential skills leading to more effective classroom teaching. These include:

- Using their content and pedagogical knowledge of Earth Science to develop engaging Earth science lesson plans for their students.
- Employing effective classroom action research for use in their own classrooms
- Enhancing their confidence in sharing their classroom action research results with stakeholders, including school district teachers, administrators, parents and with other teachers at local and regional educational conferences

Learning Outcomes

1. Through the Master of Science in Teaching (Earth Science) program our students will acquire the Earth science content knowledge consistent with the National and Ohio Science Education Standards and Ohio Learning Standards needed to teach students in k-12 settings.
2. Through the Master of Science in Teaching (Earth Science) program our students will display the ability to write educational research proposals.
3. Through the Master of Science in Teaching (Earth Science) program our students will be able to engage in classroom based educational research to better understand their students' educational needs and the effectiveness of their teaching methods

The program does not have professional accreditation.

II. PROCEDURES USED FOR ASSESSMENT

A. Direct Assessment

1. Through the Master of Science in Teaching (Earth Science) program students will acquire the Earth science content knowledge consistent with the National and Ohio Science Education Standards and Ohio Learning Standards needed to teach students in k-12 settings. The required academic year Earth science content courses in the Master of Science in Teaching (Earth Science) program are aligned with the National Science Teachers Association recommended courses for preparation of middle and high school science teachers. The courses are intended

to provide program participants with the content knowledge (assessed by homework, written exam questions, laboratory and field experience reports) they need to effectively teach k-12 students scientifically accurate, and pedagogically engaging Earth science content in areas such as Plate Tectonics, Astronomy, Oceanography, and Earth Systems. Earth science content is also the backbone of the required summer session field-based courses. These courses provide participants to see and experience Earth science in the field, for example studying first-hand the coastal processes of the New Jersey coastline, the geology and natural history of Ohio, the glacial history of the northeastern United States and the caves and rivers of the Mississippi river basin. Evaluation in the summer field courses is accomplished by faculty evaluation of field reports including data analysis, and interpretation of the data collected in the field.

2. Through the Master of Science in Teaching (Earth Science) program students will display the ability to write educational research proposals. In addition to understanding Earth science content, teachers in the Master of Science in Teaching (Earth Science) program learn to develop their own classroom educational research in order to better meet the needs of their students. Through classwork, independent study and the support of a faculty committee, Master of Science in Teaching (Earth Science) participants learn how to develop a proposal for classroom educational research and then individually choose a classroom research topic, research appropriate educational literature on the topic, choose their method of data collection, collect data from their students, analyze the data and draw conclusions regarding the effectiveness of classroom activities with respect to the population of students they serve. Master of Science in Teaching (Earth Science) students take a course in Educational Statistics that enables them to use statistical approaches to data interpretation. The direct evaluation in this course is by instructor using class participation, quizzes, web-based assignments, exam grades and a final research paper. In the MST Project development class students work closely with their instructor to develop a research proposal. This usually requires instructor and students working together to revise the multiple sections of their proposal.

3. Through the Master of Science in Teaching (Earth Science) program students will be able to engage in classroom based educational research to better understand their students' educational needs and the effectiveness of their teaching methods. Using the educational research proposal they developed as their template, Master of Science in Teaching (Earth Science) students complete their capstone classroom educational research project. Under the guidance of a faculty committee, the student collects data, analyzes the data, and then draws conclusions regarding the research hypothesis of their study. The student writes a research report and submits the report to their faculty committee members for their review. Usually, several manuscript revisions are needed before the research project report is accepted as final by all the faculty committee members. The student is then required to present their findings to the faculty committee and interested students with an accompanying powerpoint presentation. This project presentation has traditionally been done in a face to face setting at WSU with faculty and interested students attending the presentation. However due to the COVID-19 situation in 2020 the presentations have moved to a remote format using Collaborate Ultra as the presentation platform.

B. Scoring of Student Work

1) Through the Master of Science in Teaching (Earth Science) program students will acquire the Earth science content knowledge consistent with the National and Ohio Science Education Standards and Ohio Learning Standards needed to teach students in k-12 settings. Data used for scoring of student work for required academic year courses are collected from the homework and written exams containing both multiple choice and essay questions. These course evaluations are scored with an answer key for objective questions and essays by subjective analysis of conceptual knowledge. In addition to these some academic year courses may require term papers or field reports. Evaluation of these instruments are based on faculty evaluation of the quality of the scientific content and completeness. Evaluations for summer field courses are scored on the basis of student field notes and the development of field reports and k-12 classroom applications. 2) Through the Master of Science in Teaching (Earth Science) program students will display the ability to write educational research proposals and educational research reports. Scoring of student work in this outcome is from both the quality of the independent work of the student in writing sections of their research proposals, getting feedback from faculty committee members and revising their project proposals. their project reports and their capstone power point presentation of educational research results. 3) Through the Master of Science in Teaching (Earth Science) program students will be able to engage in classroom based educational research to better understand their students' educational needs and the effectiveness of their teaching methods. Scoring is based on the student's faculty committee assessment of their work in collecting data, analyzing that data and then developing their project report. The faculty committee also evaluates the quality and completeness of their capstone presentation.

C. Indirect Assessment

An important method to indirectly assess the Master of Science in Teaching (Earth Science) program is the professional success of our students after graduation. The combination of academic year content courses, summer field courses and the confidence gained by engaging and presenting an educational research project of their own design and implementation builds the confidence of our graduates to become teacher leaders in their schools and in their communities. Our graduates have "taken learning outside the box" as one graduate explains, to do a community study of streams to determine water quality. Another graduate was nominated for the honor of Ohio Teacher of the year for 2020. Another has recently applied to the Stanford University Ph.D. program in Education with a cross area specialization in that university's Race, Inequality and Language program. Other graduates of our Master of Science in Teaching (Earth Science) program have gone on to get Ph.D. degrees in science education. Two graduates of our program currently teach in Ohio universities, one right here at Wright State University and the other at the University of Cincinnati. Other graduates of the Master of Science in Teaching (Earth Science) program are

serving as school district superintendents and others work for the Ohio Department of Education as science specialists helping to determine the content of our State's k-12 science curriculum. However, by far the greatest number of our Master of Science in Teaching (Earth Science) program graduates (>95%) are teaching in k-12 schools all across Ohio. Many of these teachers are active participants and presenters in local and regional educational conferences such as the annual Wright State University National Network for Educational Renewal conference and regional National Science Teacher Association and Science Education Council of Ohio meetings. These leadership activities have a significant multiplier effect in the number of k-12 students in Ohio that have been impacted by Master of Science in Teaching (Earth Science) teacher graduates.

III. ASSESSMENT RESULTS/INFORMATION:

a) Graduation rate b) Grade point earned in courses preparing students to develop educational projects. Calculated as average (0-4, where A = 4, etc.). Grade point earned in EES7810 MST Project Calculated as average (0-4, where A = 4, etc.) c) Curriculum

a) All MST students entering the program in 2018 graduated in 2020 b) Averaged 4.0 for students taking EES7810 in the reporting period, c) Current curriculum needs to include a new online Oceanography course as Dr. Paul Wolfe, EES Professor Emeritus is no longer teaching the course for the MST program. The Astronomy for Teachers course is currently being taught by Professor Doyle Watts, He is retiring but will continue to teach the course for the next three years after retirement. An MST program faculty meeting will be held in the Spring 2021 semester to discuss our options for the curriculum of the Master of Science in Teaching (Earth Science) program.

a) Integrated measure of all three Learning Outcomes b) Grade was consensus of judgements of all faculty committee members supervising the work of students graduating in 2020. Learning Outcome #3 c) Learning Outcome #1

IV. ACTIONS TO IMPROVE STUDENT LEARNING

An MST program faculty meeting will be held in the Spring 2021 semester to discuss our options for the continuation or replacement of the Oceanography and Astronomy for Teachers academic year courses in the curriculum of the Master of Science in Teaching (Earth Science) program.

V. SUPPORTING DOCUMENTS

Additional documentation, when provided, is stored in the internal Academic Program Assessment of Student Learning SharePoint site.