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| **Assurance of Student Learning Report****2022-2023** |
| *Ogden College of Science and Engineering* | *Department of Earth, Environmental, and Atmospheric Sciences* |
| *Meteorology #578* |
| *Greg Goodrich* |
| ***Is this an online program***? [ ]  Yes **[x]**  No | Please make sure the Program Learning Outcomes listed match those in CourseLeaf . Indicate verification here **[x]**  Yes, they match! (If they don’t match, explain on this page under **Assessment Cycle)** |

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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. Add more Outcomes as needed.*** |
| **Program Student Learning Outcome 1:**  Students completing the Meteorology program will be able to demonstrate understanding of the theoretical principles surrounding the basic equations and conservation laws that govern atmospheric motion and energy transfer. (*Theoretical Meteorology*) |
| **Instrument 1** | A comprehensive exam is given during the final senior semester to all students completing the Meteorology program. The exam partly consists of four questions that represent key concepts from the each of the six theoretical upper-division courses in the B.S. degree in Meteorology curriculum. The average grade on the 24-question theoretical portion of the exam will be no less than 75%. For no individual course will the average score be less than 60%. |
| **Based on your results, check whether the program met the goal Student Learning Outcome 1.** | **[ ]  Met** | **[x]  Not Met** |
| **Program Student Learning Outcome 2:**  Students completing the Meteorology program will be able to demonstrate understanding of the technical principles surrounding the fundamentals of remote sensing and in situ weather instrumentation as well as weather forecasting. (*Technical Meteorology*) |
| **Instrument 1** | A comprehensive exam is given during the final senior semester to all students completing the Meteorology program. The exam partly consists of four questions that represent key concepts from each of the three technical upper-division courses in the B.S. degree in Meteorology curriculum. The average grade on the 12-question technical portion of the exam will be no less than 80%. For no individual course will the average score be less than 60%. |
| **Based on your results, check whether the program met the goal Student Learning Outcome 2.** | **[x]  Met** | **[ ]  Not Met** |
| **Program Student Learning Outcome 3:**  Sophomore Meteorology students will be able to quickly and accurately analyze a surface map and present a weather forecast discussion based on their analysis (*Applied Meteorology*) |
| **Instrument 1** | As part of Weather Analysis and Forecasting (METR 324), sophomore-level students will be given a surface map for analysis. Each week a different student will be responsible for leading a map discussion of current and future weather conditions. Both the map analysis and map discussion will be scored on a rubric. The average score of METR 324 students on the map analysis and map discussion will be no less than 80%. On no individual rubric category will the average score be less than 70% of the possible points. |
| **Based on your results, check whether the program met the goal Student Learning Outcome 3.** | **[x]  Met** | **[ ]  Not Met** |
| **Assessment Cycle Plan:** These three learning outcomes are assessed each year. |

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| **Program Student Learning Outcome 1** |
| **Program Student Learning Outcome**  | Students completing the Meteorology program will be able to demonstrate understanding of the theoretical principles surrounding the basic equations and conservation laws that govern atmospheric motion and energy transfer. (*Theoretical Meteorology*) |
| **Measurement Instrument 1**  | A comprehensive exam is given during the final senior semester to all students completing the Meteorology program. The exam partly consists of four questions that represent key concepts from the each of the six theoretical upper-division courses in the B.S. degree in Meteorology curriculum.  |
| **Criteria for Student Success** | The average grade on the 24-question theoretical portion of the exam will be no less than 75%. For no individual course will the average score be less than 60%. |
| **Program Success Target for this Measurement** | The goal is for the class average to be 75% or more on the assessment. No individual course will be less than 60% | **Percent of Program Achieving Target** | The class average was 78.0%. The lowest individual course was 53.5% |
| **Methods**  | * **Overall score 75.4% N = 7**
	+ *Theoretical Meteorology sequence*
		- Physical Meteorology 76.0%
		- Dynamic Meteorology I 85.7%
		- Dynamic Meteorology II 53.5%
		- Synoptic Meteorology 85.7%
		- Mesoscale Meteorology 64.0%
		- Physical Climatology 87.5%
 |
| **Based on your results, highlight whether the program met the goal Student Learning Outcome 1.** | **[ ]  Met** | **[x]  Not Met** |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** |
| Results: While the average on the theoretical portion of the exam was just above the goal threshold of 75%, one of the courses (Dynamic Meteorology II) was below 60% for the first time. Dynamic Meteorology II traditionally has the lowest score in this assessment since it is universally considered the most challenging meteorology course and the students took it one year ago in Spring 2022. All of the other courses were close to historic averages for this assessment and are considered acceptable. In addition, after a one-year absence from the assessment, Physical Climatology returned since the course was taught in Spring 2023 for the first time in a few years. Follow up: Since this is the first time scores for Dynamic Meteorology II have fallen below the 60% threshold, we will not make any changes to the curriculum at this time. However, if a trend of sub 60% performance continues in subsequent years we will revisit that decision. Since Dynamic Meteorology II will be taught in Spring 2024 when the next senior exam is given, we expect scores to improve. Next Assessment Cycle plan: The comprehensive Meteorology exam for seniors is given every year and will occur again in Spring 2024. The assessment will be taken by the 9 students expected to graduate in May 2024. |

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| **Program Student Learning Outcome 2** |
| **Program Student Learning Outcome**  | Students completing the Meteorology program will be able to demonstrate understanding of the technical principles surrounding the fundamentals of remote sensing and in situ weather instrumentation as well as weather forecasting. (*Technical Meteorology*) |
| **Measurement Instrument 1** | A comprehensive exam is given during the final senior semester to all students completing the Meteorology program. The exam partly consists of four questions that represent key concepts from each of the three technical upper-division courses in the B.S. degree in Meteorology curriculum. |
| **Criteria for Student Success** | The average grade on the 12-question exam will be no less than 80%. For no individual course will the average score be less than 60%. |
| **Program Success Target for this Measurement** | The goal is for the class average to be 80% or more on the assessment. No individual course will be less than 60% | **Percent of Program Achieving Target** | The class average was 88.6%. The lowest individual course was 83.5% |
| **Methods**  | * **Overall score 88.6% N = 7**
	+ *Technical Meteorology sequence*
		- Weather Analysis and Forecasting 96.5%
		- Meteorological Instruments 83.5%
		- Satellite/Radar Meteorology 85.7%
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| **Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 2.** | **[x]  Met** | **[ ]  Not Met** |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** |
| Results: Since all goals were met for this learning outcome, we will not make any major changes to the curriculum at this time. The curriculum for the B.S. in Meteorology degree is essentially standardized across all Universities and taken from guidelines set forth by both the National Oceanic and Atmospheric Administration (NOAA) and the American Meteorological Society (AMS), there is no real reason to make dramatic changes to the curriculum. Follow up: No follow up is needed at this timeNext Assessment Cycle plan: The comprehensive Meteorology exam for seniors is given every year and will occur again in Spring 2024. The assessment will be taken by the 9 students expected to graduate in May 2024. |

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| **Program Student Learning Outcome 3** |
| **Program Student Learning Outcome**  | Sophomore Meteorology students will be able to quickly and accurately analyze a surface map and present a weather forecast discussion based on their analysis (*Applied Meteorology*) |
| **Measurement Instrument 1** | As part of Weather Analysis and Forecasting (METR 324), sophomore-level students will be given a surface map for analysis. Each week a different student will be responsible for leading a map discussion of current and future weather conditions. Both the map analysis and map discussion will be scored on a rubric. |
| **Criteria for Student Success** | The average score of students completing the Meteorology program on the map analysis and map discussion will be no less than 80%. On no individual rubric category will the average score be less than 70% of the possible points. |
| **Program Success Target for this Measurement** | The average score will be no less than 80% | **Percent of Program Achieving Target** | The average score for the class was 91.95%. No category was less than 70% |
| **Methods**  | The rubrics for the map discussion and map analysis contain the following categories: Map discussion: **94.9%*** Current surface conditions
* Current upper air conditions
* Model forecast discussion
* Surface predictions
* Correct use of terminology

Map analysis: **89.0%*** Smooth contour lines
* Proper labels and units
* Pressure analysis
* Temperature analysis
* Dew point analysis
* Frontal analysis
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| **Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 3.** | **[x]  Met** | **[ ]  Not Met** |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** |
| Results: This years group of sophomore meteorology majors did an exceptional job with the map discussion and analysis. Meteorology students do map discussion in every semester starting with the spring semester of sophomore year and they do map analysis every semester starting with spring semester of freshman year. We also offer students opportunities to enhance these skills by working with White Squirrel Weather, the WKU Campus Weather Service each semester.Follow up: No follow up is needed at this timeNext Assessment Cycle plan: The Applied Meteorology map discussion and map analysis will occur again in Spring 2024 when our rising sophomore students take METR 324. The assessment will be taken by the 15-20 students expected to be in that class in Spring 2024. |

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| **Program name:** | Meteorology |  |  |
| **Department:** | Earth, Environmental, and Atmospheric Sciences |  |  |
| **College:** | Ogden College of Science and Engineering |  |  |
| **Contact person:** | Greg Goodrich |  |  |
| **Email:** | gregory.goodrich@wku.edu  |  |  |
| **KEY:** |  |  |  |  |
| **I = Introduced** |  |  |  |  |
| **R = Reinforced/Developed** |  |  |  |  |
| **M = Mastered** |  |  |  |  |
| **A = Assessed** |  |  |  |  |
|  |  |  | **Learning Outcomes** |  |  |
|  |  |  | **LO1:** | **LO2:** | **LO3:** |
|   |  |  | Demonstrate understanding of the theoretical principles surrounding the basic equations of motion and conservation laws | Demonstrate understanding of the technical principles surrounding weather instrumentation and forecasting | Be able to quickly and accurately analyze a surface map and present a weather forecast discussion  |
| **Course Subject** | **Number** | **Course Title** |   |   |   |
| METR | 121 | Meteorology | I | I |   |
| METR | 122 | Aviation Meteorology | R | R | I |
| METR  | 324 | Weather Analysis and Forecasting | R | R | R/A |
| METR | 325 | Meteorological Instruments |   | M/A |   |
| METR | 335 | Satellite/Radar Meteorology |   | M/A |   |
| METR | 431 | Dynamic Meteorology I | R |   |   |
| METR | 432 | Synoptic Meteorology | R |   | R |
| METR | 433 | Dynamic Meteorology II | M/A |   |   |
| METR | 437 | Mesoscale Meteorology | M/A |   | M/A |
| METR | 438 | Physical Meteorology | M/A |   |   |
| METR | 460 | Climate Teleconnections | M  |   |   |