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| **Assurance of Student Learning Report****2023-2024** |
| *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)** |

**\*\*\* Please include Curriculum Map as part of this document (at the end), NOT as a separate file.**

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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.**  | **[x]  Met** | **[ ]  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.**  | **[ ]  Met** | **[x]  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 77.2%. The lowest individual course was 66.7% |
| **Methods**  | * **Overall score 77.2% N = 9**
	+ *Theoretical Meteorology sequence*
		- Physical Meteorology 77.8%
		- Dynamic Meteorology I 80.8%
		- Dynamic Meteorology II 66.7%
		- Synoptic Meteorology 85.3%
		- Mesoscale Meteorology 77.8%
		- Physical Climatology 75.0%
 |
| **Based on your results, highlight whether the program met the goal Student Learning Outcome 1.** | **[x]  Met** | **[ ]  Not Met** |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** |
| Results: The average on the theoretical portion of the exam was just above the goal threshold of 75% and was consistent with results from the last few years. The lowest course, Dynamic Meteorology II was 66.7% which is an improvement over the 53.5% that last year’s graduating seniors scored. Dynamic Meteorology II traditionally has the lowest score in this assessment since it is universally considered the most challenging meteorology course. This year’s seniors took Dynamic Meteorology II in Spring 2024 which is part of the reason why their score was higher than last year’s graduates, which took Dynamic Meteorology II during Spring 2022 during their junior year. All of the other courses were close to historic averages for this assessment and are considered acceptable. Follow up: No follow up is needed at this time.Next Assessment Cycle plan: The comprehensive Meteorology exam for seniors is given every year and will occur again in Spring 2025. The assessment will be taken by the 6 students expected to graduate in May 2025. |

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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 79.7%. The lowest individual course was 75.0% |
| **Methods**  | * **Overall score 79.7% N = 9**
	+ *Technical Meteorology sequence*
		- Weather Analysis and Forecasting 77.8%
		- Meteorological Instruments 86.3%
		- Satellite/Radar Meteorology 75.0%
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| **Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 2.** | **[ ]  Met** | **[x]  Not Met** |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** |
| Results: The average on the technical portion of the exam was a rounding error (0.3%) below the goal threshold of 80%. The lowest course, Satellite/Radar Meteorology (75%) was well above the goal threshold of 60%. 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 2025. The assessment will be taken by the 6 students expected to graduate in May 2025. |

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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 87.9%. No category was less than 70% |
| **Methods**  | The rubrics for the map discussion and map analysis contain the following categories: Map discussion: * Current surface conditions
* Current upper air conditions
* Model forecast discussion
* Surface predictions
* Correct use of terminology

Map analysis: * 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 group of sophomore meteorology majors did a great job with the map discussion and analysis. The map discussion and map analysis is always our highest scored assessment since nearly all of our students pursue careers in applied meteorology where weather forecast analysis is an integral part of the skill set. 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 2025 when our rising sophomore students take METR 324. The assessment will be taken by the 20-25 students expected to be in that class in Spring 2025. |

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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  |   |   |