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| **Assurance of Student Learning Report****2020-2021** |
| *Ogden College of Science and Engineering* | *Department of Earth, Environmental, and Atmospheric Sciences* |
| *Meteorology #578* |
| *Greg Goodrich* |

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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 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 consists of four questions that represent key concepts from each of the eight upper-division courses in the B.S. degree in Meteorology curriculum. The average grade on the 32-question exam will be no less than 80%. For no individual course will the four-question 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** |
| **Student Learning Outcome 2:**  Students completing the Meteorology program 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 Mesoscale Meteorology (METR 437), the capstone course in the weather analysis sequence in the meteorology program, 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 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. |
| **Based on your results, check whether the program met the goal Student Learning Outcome 2.** | **[x]  Met** | **[ ]  Not Met** |
| **Student Learning Outcome 3:**  Students completing the Meteorology program who complete a summer/semester internship will demonstrate that they can gather and utilize meteorological information to enhance knowledge and can communicate that knowledge effectively and accurately. |
| **Instrument 1** | Students will receive a written evaluation from the internship supervisor that will include a four-level rating scale (below average, average, above average, outstanding) that describes the performance of the student in various categories. On no individual category will more than 20% of students receive a rating of average or below.  |
| **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.)**  |
| The goals of all three student learning outcomes were met during the 2020-21 academic year. Despite the obstacles of online learning due to the COVID-19 pandemic, the Meteorology majors performed at a similar level when compared to past cohorts. With regards to the assessment of the theoretical principles of Meteorology, the graduating class of 2021 achieved an average score of 80.9% and no individual class that was assessed had a score that was less than 60%. These outcomes are similar to other graduating classes of the past five years. With regards to the assessment of map analysis and map discussion, the average score was 93%, which is actually higher than recent years. We connect this increased performance in the applied aspect of meteorology to the creation of White Squirrel Weather, the WKU Campus Weather Service in 2018. Many of the juniors and seniors who took METR 437 (Mesoscale Meteorology) in spring 2021 have had the opportunity to hone their map analysis and map discussion skills over the years while working for White Squirrel Weather. With regards to the internship assessment, the only student that completed an internship during this COVID plagued year received the highest marks during her internship and was ultimately hired to a full-time position by that company upon graduation. Since the goals of all three assessment were achieved, there is no specific follow up to report. With regards to the theoretical assessment, we are replacing one of the eight upper division classes from the assessment (Physical Climatology) with a new course (Satellite/Radar Meteorology) since the Physical Climatology professor is no longer employed by WKU. Finally, Meteorology faculty remain in close contact with the top employers in the field to collect necessary feedback regarding employable students. This information is brought directly into the classroom via assignments, activities, and initiatives. Further, faculty and students in the Meteorology Program routinely invite and host these employers (multiple times each semester) to give workshops, presentations, and network. In April 2021 the Tennessee Air National Guard requested the opportunity to meet with and recruit our students based upon favorable feedback from other employers. Faculty and students in the program have also developed strong alumni relations for additional feedback and advice. We feel it is important for the students to hear the advice not only from their professors and mentors, but especially directly from employers and alumni for a well-rounded perspective on how to be successful upon graduation. The WKU Meteorology Advisory Board (14 members) continues to guide the WKU Meteorology Program into the future. |

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| **Student Learning Outcome 1** |
| **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 consists of four questions that represent key concepts from each of the eight upper-division courses in the B.S. degree in Meteorology curriculum. |
| **Criteria for Student Success** | The average grade on the 32-question exam will be no less than 80%. For no individual course will the four-question average score be less than 60%. |
| **Program Success Target for this Measurement** | The goal is for the class average to be 80% on the assessment. No individual course will be less than 60% | **Percent of Program Achieving Target** | The class average was 80.9%. The lowest individual course was 63.9% |
| **Methods**  | * **Overall score 80.9% N = 9**
	+ *Theoretical Meteorology sequence*
		- Physical Meteorology 83.3%
		- Physical Climatology 100%
		- Dynamic Meteorology I 63.9%
		- Dynamic Meteorology II 63.9%
	+ *Weather Analysis sequence*
		- Weather Analysis and Forecasting 77.8%
		- Synoptic Meteorology 88.9%
		- Mesoscale Meteorology 83.3%
	+ *Weather Instrumentation sequence*
		- Meteorological Instruments 88.9%
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| **Based on your results, highlight whether the program met the goal Student Learning Outcome 1.** | **[x]  Met** | **[ ]  Not Met** |
| **Actions** (Describe the decision-making process and actions for program improvement. The actions should include a timeline.) |
| These results are consistent with past cohorts dating back to 2010 when this means of assessment was first used. Since the 2020-21 cohort met the program student learning outcome goals, we will not be making 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. The two courses that had the lowest scores (Dynamic Meteorology I and II) always have the lowest scores in this assessment since those courses are taken during junior year. We did not notice any difference in scores for courses that were taught online during COVID-19 compared to years when those courses were taught in person.  |
| **Follow-Up** (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.) |
| Since the program goals were met no follow up is needed. However, since the instructor of Physical Climatology has left WKU, that course will be replaced by Satellite/Radar Meteorology in the assessment starting in 2021-22.  |
| **Next Assessment Cycle Plan** (Please describe your assessment plan timetable for this outcome) |
| The Theoretical Meteorology 32 question assessment is given every year and will occur again in Spring 2022. The assessment will be taken by the 5 students expected to graduate in May 2022.  |

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| **Student Learning Outcome 2** |
| **Student Learning Outcome**  | Students completing the Meteorology program 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 Mesoscale Meteorology (METR 437), the capstone course in the weather analysis sequence in the meteorology program, 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 93%. 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
* IDV model analysis

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 2.** | **[x]  Met** | **[ ]  Not Met** |
| **Actions** (Describe the decision-making process and actions planned for program improvement. The actions should include a timeline.) |
| 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** (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.) |
| No follow up is needed at this time |
| **Next Assessment Cycle Plan** (Please describe your assessment plan timetable for this outcome) |
| The Applied Meteorology map discussion and map analysis will occur again in Spring 2023 when METR 437 is offered again. The assessment will be taken by the 15-20 students expected to be in that class in Spring 2023. |

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| **Student Learning Outcome 3** |
| **Student Learning Outcome**  | Students completing the Meteorology program who complete a summer/semester internship will demonstrate that they can gather and utilize meteorological information to enhance knowledge and can communicate that knowledge effectively and accurately. |
| **Measurement Instrument 1** | Students will receive a written evaluation from the internship supervisor that will include a four-level rating scale (below average, average, above average, outstanding) that describes the performance of the student in various categories. |
| **Criteria for Student Success** | On no individual category will more than 20% of students receive a rating of average or below.  |
| **Program Success Target for this Measurement** | <20% average or below | **Percent of Program Achieving Target** | 0% were average or below |
| **Methods**  | The evaluation form for the internship includes the following categories ranked on a four-level rating scale (below average, average, above average, outstanding).* Personality
* Attitude
* Dependability
* Attendance and Punctuality
* Knowledge of Job
* Production
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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** |
| **Actions** (Describe the decision-making process and actions for program improvement. The actions should include a timeline.) |
| Only one student completed an internship during the 2020-21 academic year and she received all “outstanding” marks on her evaluation form. In fact, the student performed so well she was offered a full-time job upon graduation. |
| **Follow-Up** (Provide your timeline for follow-up. If follow-up has occurred, describe how the actions above have resulted in program improvement.) |
| No follow up is needed at this time |
| **Next Assessment Cycle Plan** (Please describe your assessment plan timetable for this outcome) |
| The internship assessment will be completed again in Spring 2022 (providing we have students who completed an internship) |