Academic Degree Programs Assessment

Northern Illinois University

Submitted to the University Assessment Panel

AY 2022-2023

Part I: Assessment Plan

College of Liberal Arts and Sciences

Department of Earth, Atmosphere and Environment

Meteorology

B.S.

2022-2023

Submitted to the University Assessment Panel by: Mark R. Frank

Mark R. Frank, Chair

1. Introduction

The Northern Illinois University Department of Geographic and Atmospheric Sciences (GAS) formed when the departments of Geology and Geography were separately created from what had previously been known as the Department of Earth Sciences. The Department of Geographic and Atmospheric Sciences merged back with the department of Geology and Environmental Geosciences (GEOL) in December of 2021 to form the department of Earth, Atmosphere and Environment (EAE). As of 2021, the Department of Geographic and Atmospheric Sciences (GAS) comprises 10 faculty, 2 of whom are in the early stages of their career and are therefore untenured. Mark Frank, Chair, did the vast majority of work on this summary assessment. This Meteorology B.S. program is dedicated to: 1) providing quality undergraduate and graduate education in geographic, atmospheric, and environmental sciences; 2) undertaking research that contributes to the knowledge of the scientific community; and 3) serving the University and the Public with the expertise and professional abilities of its faculty. The baccalaureate degree program in meteorology provides an atmospheric science focus for students pursuing a liberal education at Northern Illinois University. The program is designed about two primary objectives: 1) to provide students with a fundamental background in atmospheric science and related earth and environmental sciences; and 2) to provide students with a range of elective course work that qualifies them for designation as a "meteorologist" or "environmental scientist" in a variety of career fields. NIU's program in meteorology is designed to meet baccalaureate degree standards established by the American Meteorological Society.

2. Student Learning Outcomes (SLOs)

Student Learning Outcomes: The goal of the B.S. degree program in meteorology is to provide students with a strong foundation in modern weather and climate science suitable for careers or pursuit of graduate study. The keys to this foundation include a broad understanding of atmospheric science principles and the relationship between the Earth's surface and atmospheric phenomena, the ability to assemble atmospheric information from various sources and generate near-term expected conditions, critically evaluate past weather or climate conditions, convey weather or climate information and understanding to others through oral, graphic and written communications, and recognize the place of meteorology in the broader Earth sciences and its value to human activities. This report documents the state of assessment in the program and readers should consult the Program Assessment Plan for a detailed explanation of the program learning outcomes and assessment procedures. Where possible, the conclusions of this report are drawn from the previous 8 years of data. Note: A new undergraduate program for EAE with six emphases spanning geology to geography will be available until the fall semester of 2023 with a newly revised assessment plan. The B.S. program in Meteorology will remain separate as required by the American Meteorological Society.

1. <u>Understand the basic characteristics of the atmosphere, its structure, and its dynamics and the role of the earth's surface and oceans in forcing and regulating atmospheric processes.</u>
   E.g., Qualify for career positions as "meteorologist" under the federal employment classification system.
   Relate regional climate conditions to major oceanic oscillations: ENSO, PDO and NAO.

2. <u>Synthesize information from maps and other sources to identify current atmospheric processes, explain weather conditions, and hypothesize near-term expected conditions.</u>
   E.g., Demonstrate weather forecasting skill.
   Utilize terrestrial radar and satellite data/imagery in analysis of weather conditions.

3. <u>Analyze meteorological/climatological data by mathematical modeling, quantitative, mapping, remote sensing, and laboratory analyses.</u>
   E.g., Participate in URAP, USOAR or mentored research project.
   Apply numerical and statistical methods to atmospheric science problems.

4. <u>Communicate an understanding of weather and climate through oral, graphic, and written means.</u>
   E.g., Present research poster at department's annual Undergraduate Research Day.
   Provide weather reports/forecasts to campus newspaper.

5. <u>Apply meteorological/climatological knowledge and methods to other earth and environmental sciences and to questions of societal significance.</u>
   E.g., Intern at a research lab or with a corporation in a weather-sensitive industry
   Conduct weather spotter training or serve as community weather spotter.

3. Program-by-Baccalaureate Student Learning Outcomes Matrix

NA

4. Curriculum Map

Course	Program Student Learning Outcomes				
	1. Understand the basic characteristics of the atmosphere, its structure, and its dynamics and the role of the earth's surface and oceans in forcing and regulating atmospheric processes.	2. Synthesize information from maps and other sources to identify current atmospheric processes, explain weather conditions, and hypothesize near-term expected conditions.	3. Analyze meteorological/climatological data by mathematical modeling, quantitative, mapping, remote sensing, and laboratory analyses.	4. Communicate an understanding of weather and climate through oral, graphic, and written means.	5. Apply meteorological/climatological knowledge and methods to other earth and environmental sciences and to questions of societal significance.
GEOG 105/106	B	B			
MET 300	D	B	B	B	B
MET 360 or GEOG 360	D	D	D	B	B
MET 410	F	D	D	D	D
MET 411	F	D	D	D	D
MET 444	F	D	D	D	D
MET 475	F	F	F	F	F
Note. Course supports the outcome at the B=beginning, D=developing, or P=proficient level.					

5. Assessment Methods

EXPLANATION OF ASSESSMENT METHODS TABLE

Assessment Method	**Explanation**					
	Description	Student-Level Achievement [a]	Program-Level Target [b]	When Data Will be Collected	Person Responsible	SLOs Covered
Pre-/post- tests	MET 300 pre-test and MET 411 post-test designed to evaluate content learning and content-based reasoning through series of required MET courses	1 = Does not meet expectation 2 = Partially meets expectation 3 = Meets expectations 4 = Exceeds expectations	75% of students will meet (3) or exceed (4) expectations for this course; at least 75% of students score correct on post- test (3), or there is at least 50% (3) improvement on % correct from pre-test.	Spring semester	Faculty teaching the course will submit report to Assessment Coordinator	1, 2
Course projects	Various types of assignments, including forecasts, weather analysis, literature perspectives, historical analysis etc. in 300- and 400-level courses.	1 = Does not meet expectation 2 = Partially meets expectation 3 = Meets expectations 4 = Exceeds expectations	80% of students will meet (3) or exceed (4) expectations for this course	Every semester	Faculty teaching the course will submit report to Assessment Coordinator	1, 2, 3, 4, 5
Weather forecasting competition	Multi-university weather forecasting contest, deployed in second synoptic MET course (MET 421).	1 = Does not meet expectation 2 = Partially meets expectation 3 = Meets expectations 4 = Exceeds expectations	66% of students will meet (3) or exceed (4) expectations for this course	Fall semester	Scored by faculty on a common rubric; data collected by Assessment Coordinator	1, 2, 3, 4, 5

Assessment Method	Explanation					
	Description	Student-Level Achievement [a]	Program-Level Target [b]	When Data Will be Collected	Person Responsible	SLOs Covered
Independent Research poster or project	Students present a research poster at annual Undergraduate Research Day (URAP), independent research, or honors thesis research project.	1 = Does not meet expectation 2 = Partially meets expectation 3 = Meets expectations 4 = Exceeds expectations	80% of students will meet (3) or exceed (4) expectations for this course	Every semester	Scored by faculty on a common rubric; data collected by Assessment Coordinator	3, 4, 5
Team Research/analysis project	Panel review of team analysis of mesoscale weather scenarios. Panel typically includes an outside professional meteorologist as well as instructor and peers.	1 = Does not meet expectation 2 = Partially meets expectation 3 = Meets expectations 4 = Exceeds expectations	80% of students will meet (3) or exceed (4) expectations for this course	Spring semester	Faculty teaching the course will submit report to Assessment Coordinator	3, 4, 5
Internship student report	Upon completion of internship, students write a report focusing on how their education prepared them for the internship, what specific knowledge or skills were required, and what additional knowledge or skills were lacking.	1 = Does not meet expectation 2 = Partially meets expectation 3 = Meets expectations 4 = Exceeds expectations	80% of students will meet (3) or exceed (4) expectations for this course	Every semester	Student's report evaluated and scored by faculty mentor who will submit report to Assessment Coordinator	1, 2, 3
Internship employer report	Report submitted by internship employer on standard rubric, addressing student's knowledge level, skills, work ethic, ability to learn on the job, and ability to satisfactorily perform assigned responsibilities.	1 = Does not meet expectation 2 = Partially meets expectation 3 = Meets expectations 4 = Exceeds expectations	66% of students will meet (3) or exceed (4) expectations for this course	Every Semester	Employer report reviewed by faculty mentor and submitted to assessment coordinator.	3, 4, 5

Assessment Method	Explanation					
	Description	Student-Level Achievement [a]	Program-Level Target [b]	When Data Will be Collected	Person Responsible	SLOs Covered
Graduate program acceptance	Proportion of undergraduates accepted into an atmospheric sciences or climatology graduate program.	1 = Not accepted 2 = Accepted	66% of applying students will be accepted (2) into graduate school	Spring semester	Information collected from students, compiled by Graduate records clerical staff.	1, 2, 4
Alumni Advisory Committee	Feedback from alumni and employers on types of knowledge and skills necessary for modern workforce.	NA	NA	Spring semester	Comments from alumni discussed at department meeting; faculty propose relevant course or curriculum change.	5
1-year out alumni survey	Self-assessment of atmospheric science understanding and weather analysis skills.	1 = Does not meet expectation 2 = Partially meets expectation 3 = Meets expectations 4 = Exceeds expectations	80% of alumni will meet (3) or exceed expectations (4)	Spring semester	Degree-specific questions added to Assessment Services 1-year out survey. Data compiled and archived by Assessment Coordinator	1, 2, 5

Note. [a] Student-level target is the score or performance an individual student must demonstrate to say the student met the student learning outcome.
[b] Program-level target is the percent of all students that must demonstrate they meet the student learning outcome.

ASSESSMENT METHODS-BY-OUTCOMES MATRIX

Assessment Method	Program Student Learning Outcome				
	1. Understand the basic characteristics of the atmosphere, its structure, and its dynamics and the role of the earth's surface and oceans in forcing and regulating atmospheric processes.	2. Synthesize information from maps and other sources to identify current atmospheric processes, explain weather conditions, and hypothesize near-term expected conditions.	3. Analyze meteorological/climatological data by mathematical modeling, quantitative, mapping, remote sensing, and laboratory analyses.	4. Communicate an understanding of weather and climate through oral, graphic, and written means.	5. Apply meteorological/climatological knowledge and methods to other earth and environmental sciences and to questions of societal significance.
Pre-/post- tests	F/S, D	F/S, D			
Course projects	F, D	F, D	F, D	F, D	F, D
Weather forecasting competition	F, D	F, D	F, D	F, D	F, D
Independent Research poster or project			F/S, D	F/S, D	F/S, D
Team Research/analysis project			F/S, D	F/S, D	F/S, D
Internship student report	S, I	S, I	S, I		
Internship employer report			S, D	S, D	S, D
Graduate program acceptance	S, I	S, I		S, I	
Alumni Advisory Committee					S, I
1-year out alumni survey	S, I	S, I			S, I

Note. F=formative assessment, S=summative assessment, D=direct assessment, and I=indirect assessment. See the paragraph above for an explanation of each type of assessment.