Viewing: **ATMS 315 : Meteorological Instrumentation**

Last approved: 12/15/18 3:22 am

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History

1. Dec 15, 2018 by Tammy Warf (warf)

General Information

Effective Term:

College: Liberal Arts & Sciences

Department/Unit Name (ORG Code): Atmospheric Sciences (1253)

Course Subject: Atmospheric Sciences (ATMS)

Course Number: 315

Course Title:

Abbreviated Title: Meteorological Instrumentation

Course Description:

A survey of the meteorological instrumentation used to document and investigate weather and climate. Students will gain hands-on experience with a variety of instrumentation integrated with the data analysis techniques and scientific communication formats used professionally within the field of atmospheric sciences. The focus is to explore modern methods of weather observation used in research, governmental, and industrial settings while training each student to gather, assess, interpret and communicate weather data. Students will gain hands-on experience with a variety of instrumentation integrated with data analysis techniques and intensive scientific writing exercises. Each writing exercise has been designed to teach the variety of writing techniques employed in Atmospheric Sciences.

Justification

Justification for change:

Please Note: a syllabus is required for General Education review:

Course Information

Course Credit

Course credit:

Undergraduate: 3

Graduate:

Professional:

Registrar Use Only:

Banner Credit: 3

Billable Hours: 3

Grading Type

Grading type: Letter Grade

Alternate Grading Type (optional):

Available for DFR: No

Repeatability

May this course be repeated? No

Credit Restrictions

Credit Restrictions:

Advisory Statements

Prerequisites:
ATMS 201.

Concurrent Enrollment Statement:
Concurrent enrollment in ATMS 305 is encouraged.

Restricted Audience Statement:
Restricted to Atmospheric Sciences Majors. Additional seats may be available for Atmospheric Sciences Minors.

Cross-listing

Cross Listed Courses:

Class Schedule Information

Class Schedule Information:

Fees

Is a fee requested for this course? No

Course Description in the Catalog Entry

This is how the above information will be represented in the Catalog:

A survey of the meteorological instrumentation used to document and investigate weather and climate. Students will gain hands-on experience with a variety of instrumentation integrated with the data analysis techniques and scientific communication formats used professionally within the field of atmospheric sciences. The focus is to explore modern methods of weather observation used in research, governmental, and industrial settings while training each student to gather, assess, interpret and communicate weather data. Students will gain hands-on experience with a variety of instrumentation integrated with data analysis techniques and intensive scientific writing exercises. Each writing exercise has been designed to teach the variety of writing techniques employed in Atmospheric Sciences. Course Information: Prerequisite: ATMS 201. Concurrent enrollment in ATMS 305 is encouraged. Restricted to Atmospheric Sciences Majors. Additional seats may be available for Atmospheric Sciences Minors.

Additional Course Notes

Enter any other course information details to be included in the catalog:

Course Detail

Frequency of course:
Every Spring

Duration of the course: Full

Anticipated Enrollment: 22

Expected distribution of student registration:	Freshman:	Sophomore:	Junior:	Senior:
	0 %	45 %	35 %	20 %

General Education

General Education Category: Advanced Composition

General Information

Is the course required for a major concentration? No

Is the course part of a sequence? No

What is the frequency with which the course will be offered?:
(For Example: every semester, once a year)

Once a year

Briefly describe how the course fulfills the General Education objectives:

Meteorological Instrumentation surveys the instrumentation and writing techniques used by atmospheric scientists in the public and private sectors. Students will learn to operate, calibrate and repair several types of instrumentation and will apply a variety of data analysis techniques in 10 laboratory practicums throughout the semester. Since communication of results is an indispensable component of the scientific method, students will synthesize their results for one or more practicum(s) into one of four types of scientific documentation. Students will keep lab notebooks, will write four types of scientific documentation: a research report, a standard operating procedure, a white paper, and an academic manuscript, and will write and orally present a proposal to test an original hypothesis. Additionally, this course also covers the philosophy behind scientific inquiry and the scientific method, laboratory safety, measurement and uncertainty, and scientific ethics.

We believe this course is appropriate as a general education course because it will provide our students with fundamental writing and inquiry skills on which they will build throughout their careers. While the writing tasks are focused on scientific technical writing, the tasks represent a diverse cross section of technical writing formats in the atmospheric sciences that students may encounter in a variety of potential future jobs anchored in national labs (SOPs, research reports), private companies (white papers, research reports, technical manuals somewhat like SOPs), the National Weather Service (white papers, research reports) and academic institutions (white papers and manuscripts). Further, the course is a first course in Meteorological Instrumentation with a broad coverage of instrumentation types used in the field. While one introductory meteorology course is required as a prerequisite, we intend this to be for a broad audience comprised mostly of Atmospheric Sciences Majors, but we will accommodate the occasional interested minor student as well.

In our course we will strive to acknowledge the difficult history of women in science. As part of our discourse on scientific ethics, we will cover the numerous cases of women not receiving adequate credit for their contribution to salient work in scientific fields. The field of meteorology, as with many scientific fields, has been dominated by white men over the centuries. One example of the contributions of women to the field of atmospheric sciences is Antoine Lavoisier’s wife, Marie-Anne Pierrette Paulze. Madame Lavosier documented much of Lavosier’s work in sketches, etches and memoirs and worked as a collaborator. Her contributions are frequently marginalized by the label of “lab assistant”. Much of Antione Lavosier’s work would not have been possible without Madame Lavosier’s work to further establish the scientific method and to carefully document the experiments conducted in their lab. Together the Lavosiers represent a whole scientist by today’s standards, since the documentation and communication of results is an integral aspect of scientific experimentation. This is one of many examples we can highlight and discuss in class. Also, there is a growing body of research demonstrating that female students tend to defer to male colleagues in laboratory settings; tend to decline professional advancement as undesirable; tend to be less frequently employed by elite male scientists; and tend to face microaggressions in the form of inappropriate comments or being overlooked for their achievements or contributions, etc. The now famous comments of Nobel Laureate Tim Hunt in 2015 sum up this latter point, “Let me tell you about my trouble with girls … three things happen when they are in the lab … You fall in love with them, they fall in love with you and when you criticise them, they cry.” Male and female students need to be aware of these gender dynamics to maintain an inclusive, educational and congenial laboratory environment where everyone has equal access to learning.

Describe the instructional format and provide special justification, if necessary:

Our course will meet twice weekly and will be restricted to 22 students. Previous versions of the course were opened to accommodate up to 35 students; however, as an advanced composition course we will restrict enrollment to a maximum of 22 students.

A 50-minute period will be allocated for a lecture, practicum overview and pre-lab quizzes. A second 170-minute period will be reserved for instrumentation explorations, experiments, analysis and in-depth discussions. Each week, students will be assigned readings, a pre-lab quiz, and a lab experiment. The course has been designed such that students will be revising previous work while composing new original documentation either on their own or within groups. Group coordination will be organized and streamlined using the online communication tool Slack.com.

Lab Notebook: Each student will maintain a lab notebook with 1 – 2 pages of written material per week. The lab notebook will document notes and research that will be used in writing each of the four major papers and research proposal. Result: 16 – 32 pages of unrefined writing and notes serving as the basis of more polished works.

Individual Lab Report: 11 – 14 pages of final text (not including the bibliography) and 3 – 4 figures, from a process involving 3 drafts. The first draft will be completed in stages producing each major section. In the second draft, the student will stitch together each individual piece into a comprehensive document, which will undergo a second round of revision based on instructor comments.

White Paper: 2 – 4 pages of finalized text and 1 – 2 illustrative figures per student. This is a team project with specified writing assignments. Each student will be assigned 2 – 4 pages of writing, and the students will work in teams of 2 or 3 students to create a document between 6 – 9 pages in length. The first draft the students will submit their own version of their assigned section. In the second draft, students will submit a refined complete version drafted as a team.

Standard Operating Procedure: 2 – 4 pages of finalized text and 1 – 2 illustrative figures per student. Again, the SOP will be written will feature individual writing assignments, and the students will work together to integrate the writing into a whole document with a unified voice.

Academic Manuscript: 4 – 6 pages of final text and 1 – 2 illustrative figures per student. This assignment is similar in structure to the individual lab report, and it will include one rough draft, where students are assigned particular components of the paper, and one further round of revision. The manuscript will be more involved than the research paper, as students will incorporate several types of data and results and compose a letter to the editor describing the relevance of their work and suggesting appropriate reviewers. The final document will be between 12 – 16 pages not including the bibliography.

Research Proposal: 3 – 4 pages of final text with 3 – 4 illustrative figures. The research proposal will serve as the basis of an oral presentation to be given at the end of class.

Total Writing per Student: 22 – 32 pages of polished text per student, 16-32 pages of notes that will serve as the basis of the polished text, and 11 – 14 figures with

captions.

Describe the means by which the Communication Skills goal will be achieved:

• Individually, students will maintain a laboratory notebook with at least 2 entries per week. These will be graded every two weeks with comments as necessary to improve the entries.
• Individually, Students will compare two methods of their choice for measuring temperature or humidity and will incrementally write a research report organized around a hypothesis that they determine prior to the experiment. They will hand in each component for comments, and then will combine the pieces into a rough draft for one further round of revision with the instructors.
• In groups of 3, students will write a white paper proposing a safe spot on the Illinois Quad for the placement of a charcoal barbeque to limit public exposure to the particulates and aerosols. This document will undergo one round of revision with the instructors.
• In groups of 3, students will write a standard operating procedure outline a precise method for the safe deployment of a radiosonde. This document will undergo one round of revision with the instructors.
• In groups of 3, students will write a more formal academic paper combining results from measurements of precipitation by rain gauges, a parsivel disdrometer and a radar. As part of this exercise, the students will compose a letter introducing their work to an editor and suggest potential reviewers. This document will undergo one round of revision with the instructors.
• Individually, each student will write a proposal for an experiment that tests an original hypothesis and will pitch their proposal in an oral presentation to the class.

Describe how evaluation and adherence to General Education guidelines will be monitored:
Please indicate the timeline for such evaluations

The Department of Atmospheric Sciences Curriculum Committee regularly reviews the general education courses taught in the department for their adherence to the general education guidelines, level of presentation and course quality. In the review, the committee will examine the course syllabi, student evaluations and examples of student work. Student evaluations will be collected each time the course is offered, and courses in the Department of Atmospheric Sciences are reviewed on a yearly basis.

Indicate those who will teach the course and describe procedures for training & supervising teaching assistants:

This the course lectures will be split between Prof. Stephen Nesbitt (Associate Professor in the Department of Atmospheric Sciences), and Prof. Anna Nesbitt (Teaching Assistant Professor in the Department of Atmospheric Sciences). Steve has more expertise in the instrumentation and will be available to demonstrate techniques and lecture on deployment of several types of instrumentation with emphasis on the precipitation and radar measurements. Anna will cover the technical writing instruction,

error and data analysis and the earlier measurement techniques for temperature, humidity and winds. No teaching assistants will be assigned to this class.

Advanced Composition

Into which of the following categories does this course fall?

(c) a required or elective course in a major or minor field of study

Please explain:

ATMS 315 is an elective course for the Atmospheric Sciences Major and Minor.

How does this course use writing assignments to facilitate analysis and synthesis of the subject matter of the course, or in the case of writing courses in the rhetoric and communication disciplines, application of the principles under study?

This course is structured around writing assignments that require analysis and synthesis of the subject material. As stated above in Question 4, these writing styles are actual styles employed by career scientists in the Atmospheric Scientists, and this is intended as a course that will prepare students to write in the disciplines of the Atmospheric Sciences. For example, students will write a white paper arguing for a particular citing of a weber grill on the quad that reduces the environmental and human health impacts of the aerosols and particulates produced by burning charcoal. In this exercise, students will combine the results from two different laboratory experiments to construct an argument based on the meteorological conditions on the quad, the foot traffic patterns of pedestrians on the quad, and the types of aerosols and their dispersion patterns produced by burning. Along the way, students will learn about the instrumentation behind these measurements, about the physical and chemical processes of aerosol formation and dispersion, the application of appropriate analytical techniques and synthesize their research and discoveries into a white paper that advocates a position on an environmental question in critical terms.

What strategies does the course use to require substantial original composition over the course of the semester, including directed rewriting following careful evaluation?

The first assignment has been devised to walk each student through the process of composing a scientific report. Each student will first write the Background, receive feedback, and then move on to writing the Methodology, followed by the Results, Conclusion and Abstract. The students will each receive feedback on every component before stringing them together in a rough draft of the entire document (to include a references section). This complete document will undergo another round of revision,

such that the student develops a fundamental skillset for scientific writing. The ability to compose a cohesive, concise and technically sound document as a team is a significant part of the technical writing skillset we wish to cultivate in our students. To this end, the second, third and fourth writing assignments are developed for teams of writers. In this instance, the reports will be broken down with highly specific assignments for the team members. The team members will be graded on their own individual contributions to the work, their comments and revisions once the contributions are united, and on the final product. These assignments will each undergo at least one round of revision (more rounds as necessary.) The final assignment is a research proposal and oral presentation, which will be completed on an individual basis.

Show that the course is taught in section sizes consistent with the goals of students' receiving thoughtful appraisal of their writing and a substantial portion of the course grade being based upon evaluation of written work.

A class size of 22 students (and 33% instructor appointment) is generally accepted as consistent with thoughtful appraisal of writing and individual attention to student work in progress.

Additional Course Information

Does this course replace an existing course?	No
Does this course impact other courses?	No
Does the addition of this course impact the departmental curriculum?	No
Has this course been offered as a special topics or other type of experimental course?	No
Will this course be offered on-line?	Face-to-Face

Faculty members
who will teach
this course:
Professor Anna Nesbitt, Teaching Assistant Professor and Professor Stephen Nesbitt, Associate Professor

Course ID: 1010659

Comments to
Reviewers:
Please see the attached Proposal for General Education Certification and the Syllabus.

Course Edits
Proposed by:

Key: 1406