Major Revision Package:

Proposing a modification to the Bachelor of Science in Atmospheric Science

Proposed by the Department of Geography
Dr. Jana Houser: Director of Undergraduate Studies

and

Dr. Mat Coleman: Chair

with the support of

the Atmospheric Science and Geography Faculty

Proposed to the College of Arts and Sciences

At

The Ohio State University

To Be Implemented in Fall, 2026

I. General Information:

Name and Degree Conferral of Revised Major: Bachelor of Sciences in Atmospheric Sciences

Proposed Date of Implementation: AU2026

Academic Unit: College of Arts and Sciences, Department of Geography, Atmospheric Sciences Program

II. Terminology

In what follows we refer to both the Atmospheric Sciences Program (ASP) and our Atmospheric Sciences Bachelor of Science degree program. We refer to the latter as the ATMOSSC major or degree rather than the ASP degree or major. This is because the program—ASP—includes graduate courses and degrees.

III. Brief program history and characteristics

ASP's roots extend back to the International Geophysical Year (1957-58) and the emerging NASA space program. These events revealed the need for more research on the atmosphere and a need for more trained atmospheric scientists. In 1961 Dr. Jerome B. Wiesner, science advisor to President Kennedy, requested that the Committee on Atmospheric Sciences of the National Academy of Sciences (NAS) study the nation's resources for the education of atmospheric scientists. The NAS Committee recommended that appropriate institutions be encouraged to "increase the annual output of doctorates in the atmospheric sciences by a factor of four to five within the next decade." Ultimately, in 1963 Ohio State's then Vice President for Research, Alfred B. Garrett, took the preliminary steps to establish a program of study in Atmospheric Sciences at Ohio State. A task force was formed and recommended that what would become ASP begin in 1967 and be fully operational by 1970. Ultimately the program was established in 1971 with a budget of $55,000. Dr. Thomas Seliga, an electrical engineering professor, was selected as the program's first director, meaning that ASP was initially housed in the Department of Electrical Engineering. When Professor Seliga left Ohio State, ASP moved to Geography in 1985 under the leadership and vision of Professor John Rayner. Rayner was also chair of the Department as well as the first State Climatologist of the state of Ohio.

In 1987, Professor Jay Hobgood was hired to teach thermodynamics—and that year a new undergraduate degree program in Atmospheric Sciences was launched in the Department of Geography. Our ATMOSSC degree is now nearly 40 years old.

The B.S. in Atmospheric Sciences is now our premier degree in meteorology- and climate- related training. The degree provides a focused exploration of the systems influencing weather and climate. Majors delve into the intricate interactions between Earth's surface and the atmosphere, gaining insights

into phenomena such as severe storms, droughts, floods, and global climate change. The degree provides training essential for aspiring meteorologists seeking positions within the National Weather Service and other branches of the National Oceanic and Atmospheric Administration (NOAA), the private sector (industry), broadcast meteorology, graduate school, etc.

Our ATMOSSC degree is unique in comparison to our other degree cohorts insofar as it attracts majors in their first year at Ohio State; in other words, this is the only major in our department mostly characterized by true four-year cohorts. Moreover, our ATMOSSC majors are tightly knit and active beyond the classroom—which reflects their cohort-building over four years. For example, they participate in the Scarlet and Gray Weather Forecasting Team, which meets three times weekly to practice forecasting. They also run Ohio State's Meteorology Club, which is active in community engagement, promotes meteorology to non-major seekers, and organizes the annual Severe Weather Symposium—a day of programming featuring speakers from across the country on climate- and weather-related topics. The symposium has been held for 27 consecutive years.

Our ATMOSSC major is a small- to medium- sized but consistent cohort. Our average full cohort size over the past ten years has been roughly 70 majors, with between 15-20 students graduating each year. For FY2013 through FY2025 our ATMOSSC majors have enrolled in some 2,300 credit hours of ATMOSSC-designated coursework at an average of 90 CHs of coursework per semester. However, as we explain below, our ATMOSSC majors currently enroll in a mix of ATMOSSC- and GEOG- designated courses—meaning that this CH count is not representative of all the coursework done by our majors.

IV. Revision rationale

The Department of Geography, under the direction of Dr. Mat Coleman (Department Chair, DC) and Dr. Jana Houser (Director of Undergraduate Studies, DUS), in consultation with faculty in ASP, are pursuing modifications to the Atmospheric Sciences Bachelor of Science degree program. We intend for these changes to go into effect at the start of AU2026.

We are undertaking this revision for three core reasons.

First, our ASP faculty ranks have changed significantly over the past decade. Since 2015, we have processed two termed departures (Box, Lin) and four retirements (Bromwich, Hobgood, Mosley-Thompson, Rogers) for a total of six ASP faculty departures. Moreover, of our current roster of six active ASP faculty (Chan, Houser, Liu, Mark, Montenegro, Quiring), four have been hired since 2016—Quiring (2016), Liu (2017), Houser (2022), and Chan (2024). Because our ATMOSSC curriculum has not been updated since at least 2005, there is a gap between what we are teaching in the classroom and the teaching and research expertise we currently have on hand. Indeed, our current curriculum reflects teaching and research expertise that is now out of sync with our current pool of faculty. This set of revisions is intended to close this gap and ensure that we are properly leveraging our faculty teaching and research strengths in our classrooms and labs without squeezing their expertise into now outdated course and curricular frameworks. The result will be a more engaging curriculum, more innovative assignments, stronger experiential learning opportunities, and improved mentorship and professionalization for students.

Second, this revision allows us to modernize our curriculum so that it better aligns with the skills and competencies that today's job market demands. Employers in the atmospheric sciences/meteorology and related fields—in the private sector (i.e., industry), academia, research centers and laboratories, the US Armed Forces, and the National Weather Service (NWS), etc.—increasingly expect graduates to be proficient with new data streams, modeling techniques, and analytical tools, as well as to understand the societal dimensions of climate and weather. By weaving these elements into our undergraduate courses with this revision, we are not only keeping pace with changes in the discipline but also giving our students a competitive edge when applying for jobs or graduate programs.

Third, the revisions detailed below will align our current degree with newly updated curricular guidelines for U.S.-based undergraduate programs in atmospheric sciences and meteorology established by the American Meteorological Society (AMS) (Appendix A). The AMS sets widely recognized benchmarks for atmospheric science education. Aligning with their guidelines signals that our program meets the profession's expectations for rigor, breadth, and depth. In turn, this bolsters our reputation with students, employers, graduate schools, and peer institutions.

In the document that follows, we provide an overview of the major and detail our proposed changes. The latter include:

- **Prefix name and number changes** to core courses within the major to reflect more accurately their content and relationship to one another. When the ATMOSSC curriculum was initially designed, it was built from a mix of existing GEOG classes and new ATMOSSC classes. Now that the major is mature, we will reformat all the classes in the major as ATMOSSC for the sake of student legibility, with the exception of courses that serve in the General Education pool. Moreover, the current numbering protocol uses 59XX for all core courses. Although we are retaining the 5000-level designation for our ATMOSSC courses—in order for graduate students in our M.S. and Ph.D. programs to receive credit for taking them—our revision will make use of the full 5000-level numbering system range to better group and sequence classes for student legibility.
- **Changes to the course titles** to better reflect the course content as delivered by current faculty members and to make course offerings more obviously comparable with courses recommended by the AMS.
- **The addition of one new corequisite, four new required courses, two new elective course options, an increase in elective credits from 6 to 9, and the removal of two currently required courses**, to bring our program into compliance with the AMS's recommendations, to leverage the strengths of recent faculty hires, to facilitate cohort development and major-content engagement earlier in students' academic experience, and to provide a broader, more diverse atmospheric science curriculum.
- **Changes to the pre-requisites of some core courses** to allow students to take major core courses earlier in their academic career, to promote enrollments for students seeking a minor in Atmospheric Sciences, and to relax a rigid pipeline of sequenced courses that disadvantaged transfer students and students who have changed majors by delaying entry to major coursework. The latter often resulted in a delay to graduation which extended students' time to completion

beyond four years. This will help us maintain timely graduation for students who come later in their undergraduate careers to our program.

- **A reconfiguration of semester-by-semester course recommendations** to better integrate freshman and sophomore students into the major, to provide a better sense of belonging to a cohort, and to provide greater ease for degree completion for transfer students and major changers.

V. Goals and Objectives of the ATMOSSC Major

The ATMOSSC Major has 4 primary goals, each with its own set of secondary, more-specific learning outcomes. The learning outcomes explicitly follow the language from the AMS's Bachelor's Degree Statement (https://www.ametsoc.org/ams/about-ams/ams-statements/statements-of-the-ams-in-force/bachelors-degree-in-atmospheric-science/).

Students graduating from The Ohio State University with a B.S. in Atmospheric Sciences will:

Major Goal 1: Acquire the theoretical basis for fundamental atmospheric processes and systems.

ELO's:

1.1 Apply and use equations that govern physical atmospheric processes to explain fundamental principles and behaviors of the atmosphere across spatial and temporal scales.
(Courses that will satisfy this goal: ATMOSSC 5202, 5203, 5950, 5501, 5502, 5601, 5602)

1.2 Demonstrate understanding of the integrated Earth system, i.e., the relationships and connections between the atmosphere, ocean, cryosphere, biosphere, and lithosphere
(Courses that will satisfy this goal: GEOG 1900, 4911)

Major Goal 2: Become familiar with and use computational and other forms of technology needed for successful careers in the atmospheric sciences.

ELO's:

2.1 Interpret and use one or more commonly used computer programming languages (e.g., Python, MATLAB, FORTRAN) to investigate problems in the atmospheric sciences, analyze data, and create relevant visualizations
(Courses that will satisfy this goal: ATMOSSC 5301, 5401)

2.2 Utilize diagnostic, prognostic, and technological tools such as surface observations (e.g., Mesonets, Meteorological Aerodrome Reports (METARs) and Terminal Area Forecasts (TAFs)), satellite data, upper-air data, radar data, thermodynamic soundings, hodographs, numerical weather model and climate model output to evaluate atmospheric processes, features, and phenomena across a multitude of spatial and temporal scales
(Courses that will satisfy this goal: ATMOSSC 5201, 5202, 5203, 5302)

Major Goal 3: Communicate atmospheric science concepts and methods orally, visually, and in writing.

ELO's:

3.1 Effectively communicate scientific information and its uncertainties in oral, written, and visual form for audiences having different levels of scientific awareness and understanding, including awareness of hazard communication resources such as National Oceanic and Atmospheric Administration (NOAA) weather radio information
(Courses that will satisfy this goal: ATMOSSC 4981, 5202, 5203, 5302)

3.2 Understand and exercise the principles of proper ethical behavior within the atmospheric sciences regarding professional conduct and be aware of the scientific limits of prediction (see AMS Code of Conduct)
(Courses that will satisfy this goal: ATMOSSC 4981)

Major Goal 4: Solve problems faced by atmospheric scientists.

ELO's:

4.1 Apply critical and analytical thinking to solve relevant scientific problems in both individual and collaborative settings across and related to the atmospheric sciences, including global climate change
(Courses that will satisfy this goal: GEOG 4911, ATMOSSC 5301, 5302)

4.2 Create, synthesize, or apply knowledge within the atmospheric sciences or between the atmospheric sciences and other disciplines, for example, through a capstone experience
(Courses that will satisfy this goal: ATMOSSC 4981)

These goals and their associated ELO's will be met through the systematic inclusion of course topics, materials, activities, and deliverables required for the satisfactory completion of the degree.

a. Programmatic Assessment

To evaluate whether ATMOSSC students are meeting the programmatic goals outlined above, we will have two opportunities for assessment baked into the major.

First, we will disseminate two major-specific surveys: one during the first semester of student entry (either as freshman or in the first semester of attendance as a transfer student) into the Atmospheric Sciences B.S., and the second during their final semester of enrollment. The initial launch survey will ask students to self-assess their knowledge in each of the eight ELO's identified in Section V on a scale of one through five, with one being no knowledge, five being confident understanding, and scores of two through four being intervals in between. The final bookend survey will be identical to the first survey in order to directly compare the self-perceived progress students have made in their understanding over the course of their four-year degree plan. The ASP Program Director will work with the Department of Geography's Undergraduate Academic Advisors to identify first and last-semester students, and to disseminate the surveys via email. The director will tabulate the results and present them to the department's DUS and to the College of Arts and Sciences for programmatic evaluation. Success will be measured by an average value of between four and five for each question over the sum of all graduating students, and an increase

of at least two when comparing the overall averages on each question between the freshman to the graduating student surveys.

Second, students will be individually assessed in their competency of the four programmatic goals specified in section V by the faculty member who teaches the ATMOSSC 4981 capstone course at the end of the student's pen-ultimate semester of enrollment. Assessment will be based upon the completion of their coursework and final deliverable project in that class. Each student will be given a proficiency rating for each overarching programmatic goal (1-4) which will be evaluated as: advanced (score = 3), proficient (score = 2), and non-proficient (score = 1). Herein, proficient (score = 2) means that the student demonstrates the appropriate amount of background knowledge and ability to apply knowledge and tools that would be expected for a senior student graduating the following semester. Students with proficient ratings can solve complex problems, interpret scientific information, use scientific logic to explain the behavior of the atmosphere, and communicate scientific information effectively. An advanced score (score = 3) means that the student demonstrates knowledge, skills and use of tools that are beyond what is expected, and is more in line with the competency of a graduate student. Such students will demonstrate deep and detailed understanding of processes and problems that go beyond basic and expected understanding. A non-proficient score (score = 1) means that the student is failing to demonstrate the basic understanding of what is expected given the nearly complete coursework that has been accomplished. Such students demonstrate an inability to solve basic problems, process and/or communicate scientific information, do not understand basic processes or have foundational knowledge in the areas identified. The program will be deemed successful if 90% of students receive an average score of greater than or equal to 2, i.e., are proficient, over the four major goals. The proficiency metrics are averaged by the number of students in the capstone class, and the overall achievement for all students across each programmatic goal. Individual averages for students are not computed and proficiency scores do NOT count towards students' semester grades. The instructor for ATMOSSC 4981 will report the results to both the ASP Director and the DUS.

Assessment will occur annually for both the first semester and last semester surveys, as well as for the instructor evaluation in the ATMOSSC 4981 class. This strategy offers two unique perspectives of assessment: one is through student self-perception of learning and the second is through instructor evaluation of learning.

VI. Relationships to Other Programming

There are currently no other programs that are in competition with the Atmospheric Sciences B.S. at Ohio State. There is slight curricular overlap with the Physical Geography B.S. in the Department of Geography and with the B.S. in Earth Sciences offered by the School of Earth Sciences. However, this content overlap is less than 10% and is complimentary. Furthermore, as an existing major, we have a well-established track record of success for the students going through the program which includes students going on to pursue graduate studies, and careers in the National Weather Service, private industry, and the Armed Forces.

VII. Enrollment and Graduation Rates within Atmospheric Sciences Nationally and at Ohio State

According to a recent study by Knox (2023)[1], the number of students graduating per year with B.S. degrees in Meteorology or Atmospheric Sciences increased sharply from ~525 students in 2002 to a max value of ~ 750 in 2007, and has since fluctuated between 650 and 670 in the years leading up to the Coronavirus pandemic (Figure 1).

In the context of the national landscape, Ohio State typically graduates ~15 students per year (13 over the timeframe of the Knox 2023 study), a trend that has been maintained since 2019. Overall semester enrollment rates in the major at Ohio State have seen some variability, but have remained relatively constant from 2014-2023, averaging around 70 students (Figure 2). These numbers place Ohio State in the top 20 programs in the U.S. (Figure 3). In a regional context, Ohio University also offers a Meteorology major, as does Penn State, Purdue, and the University of Indiana. However, Ohio University and the University of Indiana are both experiencing enrollment declines and their majors are being merged with other physical geography majors. The loss of these two programs provides an opportunity for Ohio State to capture students who would otherwise have attended one of these two schools, and consequently to increase our enrollment numbers. Bringing our program into AMS compliance and making it more attractive and competitive will help us capitalize on this opportunity.

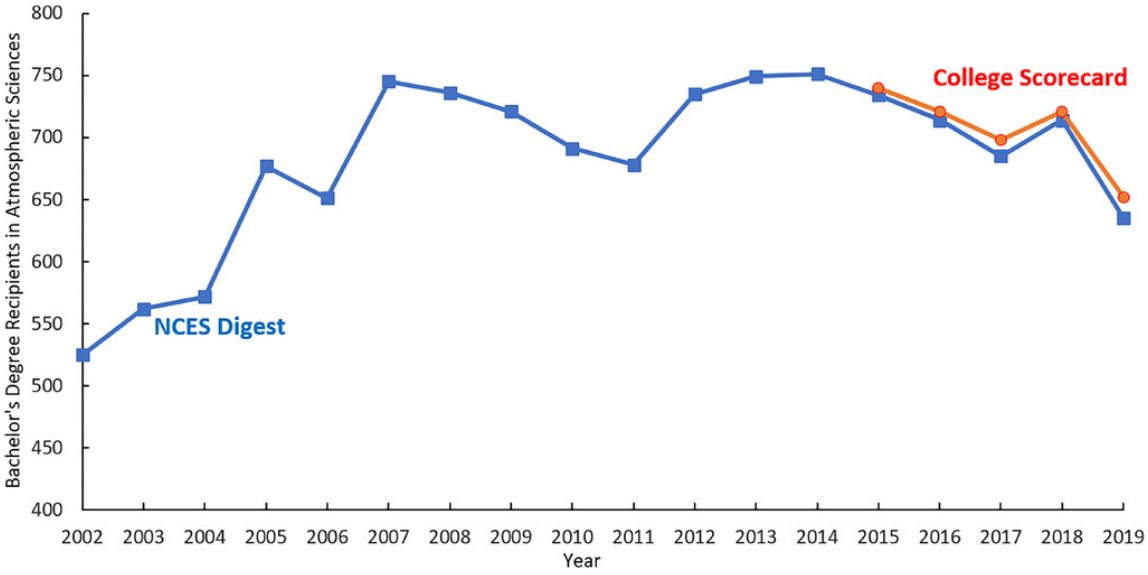

Figure 1: The number of students graduating each year from meteorology or atmospheric sciences programs across the U.S. from 2002 through 2019. (Source: Knox 2023; Data from The National Center for Education Statistics (NCES) Digest (2002–2019) and the College Scorecard (2015–19).

[1] Knox, J. 2023: Atmospheric Sciences Bachelor's Degree Recipients: Trends, Early Career Earnings, and Student Debt, 2015–19. Bulletin of the American Meteorological Society, Volume 104, Pages 99-106.

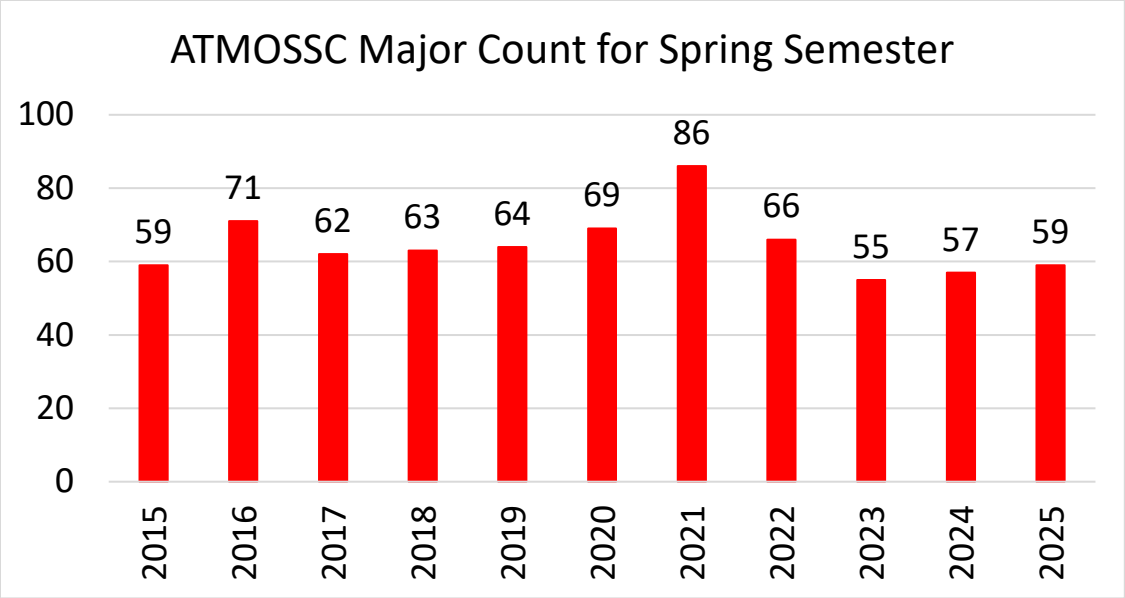

Figure 2: Enrollment numbers for The Ohio State University Atmospheric Sciences BS Majors per spring semester from 2015 through 2025.

Rank	College or university	Average number of B.S. recipients in atmospheric sciences, 2015–19
1	Pennsylvania State University—Main Campus	41.2
2	University of Oklahoma—Norman Campus	37
3	University of Missouri—Columbia	30.6
4	Virginia Polytechnic Institute and State University	27.4
5	Texas A&M University—College Station	26.2
6	Valparaiso University	23.4
7	Florida State University	20.4
8	University of Washington—Seattle Campus	20.4
9	University of Illinois at Urbana–Champaign	19.6
10	Millersville University of Pennsylvania	19.2
11	North Carolina State University at Raleigh	17
12	Lyndon State College/Northern Vermont University	15.6
13	Iowa State University	15.4
14	Northern Illinois University	15
15 (tie)	Embry–Riddle Aeronautical University—Daytona Beach	14.4
(tie)	University of Wisconsin–Madison	14.4
17	SUNY Maritime College	14
18	University of California, Los Angeles	13.8
19	Ohio State University—Main Campus	13
20	State University of New York at Oswego	12.4
21 (tie)	Rutgers, The State University of New Jersey—New Brunswick	12.2
(tie)	University of North Dakota	12.2
23	University at Albany, State University of New York	11
24	Stony Brook University, State University of New York	10.6
25 (tie)	Saint Cloud State University	10.4
(tie)	University of North Carolina at Charlotte	10.4
27 (tie)	Central Michigan University	10.2
(tie)	Purdue University—Main Campus	10.2
29	University of South Alabama	10

Figure 3: 5-year (2015-2019) average annual graduation rates of top universities offering meteorology/atmospheric science B. S. programs across the US. (Knox 2023)

VIII. Curricular Requirements

The total minimum number of credits hours required for graduation from the proposed major is 121, which is consistent with the legacy major. We note that 70 of these credit hours are major specific as either core or pre-requisite courses. However, there is limited ability to reduce this number as we must conform to the expectations of coursework and content as specified by the AMS. There are some credit allotments/course changes which have been reworked in this proposed version of the major compared to the legacy version, as outlined below. Students should be able to complete the degree with the minimum 121 credit hour expectation. No additional credit hours are necessary for graduation.

a. Programmatic Pre- and Co-Requisite Courses

As noted by the American Meteorological Society, studying atmospheric sciences involves application of the principles and techniques of physical science to the atmosphere. As such, a strong background in mathematics, physics and computer programming is required. For students to be prepared for the academic rigor required in the core courses within the major, the following subjects or courses are required topics that should be completed prior to enrollment in advanced level atmospheric science coursework. According to the AMS, some mathematical, physics and computer programming disciplinary-specific material may be incorporated into atmospheric science courses. The AMS requires that prerequisite mathematics, physics, and chemistry course work should be consistent with that required for other physical science and engineering majors. The physics coursework must be calculus-based.

Pre-requisite coursework includes:

<u>Mathematics</u>

- Differential and integral calculus
- Vector and multivariable calculus

<u>Physics</u>

- Fundamentals of mechanics
- Thermodynamics (Satisfied in the department of Geography)

<u>Computer Skills*</u>

- Introductory programming and coding course (Will be satisfied in the department of Geography)

<u>Chemistry</u>

- At least one semester of introductory chemistry

**Under the current curriculum, Ohio State is out of compliance with AMS guidelines as there is no coursework that systematically introduces computer skills and coding. Note that Ohio State requires an Atmospheric Sciences specific thermodynamics course (ATMOSSC 5501), and we are proposing to require an atmospheric science specific course to introduce students to computational skills and processing meteorological data (ATMOSSC 5401).*

To comply with the requirements of federal government hiring in organizations such as the National Oceanic and Atmospheric Administration, the National Weather Service, and the Armed Forces, graduates must also complete the requirements specified in the Office of Personnel Management 1340 Series. This list includes an additional requirement of six physics credit hours, which is traditionally met at universities around the country by requiring Physics 2: Electricity and Magnetism. Thus, Physics 1251 is also a required pre-requisite course. The full list of requirements for the OPM 1340 Series can be found in Appendix B.

We propose the following CHANGES to the current list of required prerequisite and supplemental courses:

- The three-credit course **GEOG 3597.03 was recently removed** from the major required prerequisites/supplemental course list in Fall 2025, in congruence with other majors within the Department of Geography. Originally, this class was added as an embedded literacy requirement for advanced writing. However, it was determined that 3597.03 does not adequately satisfy the literacy requirement in an atmospheric sciences domain. Instead, multiple other core courses currently offered satisfy the embedded literacy requirement (ATMOSSC 5202, 5203, 5301, and 5302). Removing this course frees up three credits that will be used for another new course within the core.
- We propose **to add GEOG 1900** to the list of prerequisite courses. GEOG 1900 is a 4-credit course with lab requirement that will serve as an introductory course to be taken before any other core ATMOSSC courses. GEOG 1900 is simultaneously offered as a GE Natural Sciences course and will be listed as the required GE Natural Science Foundations course for ATMOSSC majors. The expectation to enroll in this course as the GE Natural Science course implies that its addition to the curriculum does not add to the total number of credits required for degree completion.

Currently, the ATMOSSC Major has the following requirements:

DEPARTMENT OF
GEOGRAPHY

THE OHIO STATE UNIVERSITY
COLLEGE OF ARTS AND SCIENCES

Atmospheric Sciences (Bachelor of Science)

Requires 121 Minimum Total Credit Hours; 32 Major Credit Hours; GE Legacy Requirements;
Declared major AU22 and beyond. General education requirements for degree completion can be found at
https://artsandsciences.osu.edu/advising/general-education-requirements

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Major Requirements

Required Prerequisite or Supplemental Courses:

Prerequisites are specific to courses within the major. There are no prerequisites that must be completed before declaring the Atmospheric Sciences major. A student may declare a major in Atmospheric Sciences by meeting with an academic advisor in the Department of Geography.

Course	Title	Hours
Math 1151	Calculus I	5
Math 1152	Calculus II	5
Math 2153	Calculus III	4
Math 2255	Differential Equations and Their Applications	3
Physics 1250	Mechanics, Work, Energy, Thermal Physics	5
Physics 1251 >	E&M, Waves, Optics, Modern Physics	5
Chemistry 1210 >	General Chemistry I	5
Statistics 2450 >	Introduction to Statistical Analysis I	3

> Indicates supplemental course not required as a prerequisite to any courses in the major.

Required Courses: (9 courses/ 26 credit hours)

Course	Title	Hours	Required Prerequisite	Semester Offered
ATMOSSC 2940 **OR** GEOG 5900	Basic Meteorology (recommended course) **OR** Weather, Climate and Global Warming	3 3	MATH 1151 & PHYSICS 1250 None	Spring Autumn and Spring
GEOG 5921	Miroclimatology: Boundary Layer Climatology[1]	3	A grade of C- or above in GEOG 5900 or ATMOSSC 2940, or instructor permission; and Physics 1250	Spring Only
GEOG 5922	Microclimatology: Microclimatological Measurements[3]	3	A grade of C- or above in GEOG 5921	Autumn Only
ATMOSSC 5940 **OR** GEOG 5940	Synoptic Meteorology Laboratory	2	GEOG 5900 (520) or ATMOSSC 230 or 2940 (230) or instructor permission and Physics 132 or its successor	Spring Only
GEOG 5941	Synoptic Meteorology: Synoptic Analysis and Forecasting[2]	3	Math 2153, and a grade of C- or above in GEOG 5940 or ATMOSSC 5940	Autumn Only
GEOG 5942	Severe Storm Forecasting	3	A grade of C- or above in GEOG 5941	Spring Only
ATMOSSC 5950	Atmospheric Thermodynamics	3	MATH 1152 (153)	Autumn Only
ATMOSSC 5951	Dynamic Meteorology I	3	MATH 2153. Prereq or concur: ATMOSSC 5950	Autumn Only
ATMOSSC 5952	Dynamic Meteorology II	3	Math 2255, and a grade of C- or above in ATMOSSC 5951 or AEROENG 2405	Spring Only

[1] Indicates a Data Analysis EL Course
[3] Indicates a Technology EL Course
[2] Indicates an Advanced Writing EL Course

Elective Courses: Choose two of the following courses (6 credit hours).

Course	Title	Hours	Required Prerequisite
ATMOSSC 5901	Climate System Modeling: Basics and Applications	3	A grade of C- or above in ATMOSSC 2940 or GEOG 5900, or instructor permission
GEOG 3900.01 **OR** GEOG 3900.02 **OR** GEOG 3901H	Global Climate Change: Causes and Consequences **OR** Global Climate and Environmental Change	3/4 3 3	None None Honors Standing
GEOG 3597.02	Integrated Earth Systems: Confronting Global Change	3	None
GEOG 4911	Paleoclimatology	3	None
GEOG 5200	Cartography and Map Design	3	None
GEOG 5210	Fundamentals of Geographic Information Systems	3	None
GEOG 5225	Geographic Applications of Remote Sensing	3	None
EARTHSCI 2206	Principles of Oceanography	3	None
CIVILEN 5130	Applied Hydrology	3	CIVILEN 3160 (516) or EnvEng 516.
CIVILEN 5420	Remote Sensing of Environment	3	CIVILEN 2410 (400), or instructor permission

Major Requirement Notations

The following requirements for the major apply to all Arts and Sciences degrees.

Major requirements comprise at least 30 semester hours and can be substantially higher. Major courses must be at the 2000 level or above.

Students must earn at least a C- in a course for the course to apply to the major. However, students must receive a 2.0 cumulative grade point average (GPA) for all major course work. If a D+, D, or an E is earned in a course needed for the major, the course cannot be counted on the major. The major advisor will decide if the course should be repeated or if another course should be substituted. Courses taken on a pass/non-pass basis cannot be used on the major.

The department must approve all courses in the major. Some departments require a "major program form," a document that must be signed by the academic advisor and submitted with the graduation application. Some departments do not require such a form because the academic advisors use an automated version on the degree audit report. Some departments require both. In any case, students should meet with the academic advisor early to plan the major; during your meeting, it can be determined whether the department requires a paper major program form. Any changes or adjustments to the major should be made in consultation with the academic advisor.

If a student transferred from another institution, no more than half of the credit hours on the major program may consist of transfer credit. The academic advisor, the chairperson of the department, and the appropriate assistant dean must approve any request for a variation in this policy.

For Honors students, the GE curriculum and major must be approved by the assigned Honors advisor. Information about the honors curriculum and requirements and how to schedule an appointment with an honors advisor is available on the College of Arts and Sciences Honors Program website: http://aschonors.osu.edu/advising. Students will also be assigned a faculty advisor in the department of study to help the student choose courses and co-curricular opportunities that align with academic and professional goals.

For more information about internship and career opportunities, visit the College of Arts and Sciences Career Services Office. Their website is http://asccareerservices.osu.edu/ .

Figure 4: Current requirements of the B.S. in Atmospheric Sciences Degree as of Spring, 2025.

b. Changes to Major Core Courses

In order to address gaps in subject material and core topics that the AMS recommends for undergraduate atmospheric science programs, core course requirements have been modified. The proposed changes to specific courses within the core of the major are outlined as follows:

- In conjunction with requiring GEOG 1900 as indicated above, we propose to **remove ATMOSSC 2940** which is the currently required three-credit introductory course. This course no longer fulfills its original purpose. Much of the content was inappropriate for introductory material and

moreover was redundant with other coursework. The content that was not redundant has been redistributed and expanded upon in new courses that have been developed for the core as specified in subsequent bullets. Students will no longer be offered the option of taking GEOG 5900 as the introductory course either, as this course is to primarily serve students majoring in Air Transportation and other flight majors.

- We propose to **add ATMOSSC 5502 (3 credits)**, Physical Meteorology, which will address current gaps in our curriculum including various topics of atmospheric chemistry, atmospheric radiation, and cloud microphysics. Under the legacy curriculum, these topics have not been taught in appropriate depth according to AMS expectations. *The credits for this course replace the three credits that were previously used for ATMOSSC 2940*. ATMOSSC 5502 was approved by ASCC in Spring 2025.
- We propose to **add ATMOSSC 5401 (3 credits),** Practical Data Processing and Analysis for Atmospheric Sciences, to satisfy the multiple AMS requirements of student preparation in and exposure to the areas of data analysis and visualization, numerical and statistical methods, and exposure to commonly used programming tools in the atmospheric sciences. *These three credits replace the three credits opened by dropping GEOG 3597.03.*
- We propose to **add GEOG 4911 (3 credits)**, a climate change course, to address the climate science points and expectations from the AMS. *This course will add three credits to the major core curriculum.*
- We propose to **add ATMOSSC 4981 (2 credits),** which is a new capstone course to be taken during the final fall semester prior to graduation. It serves as one of two assessment mechanisms for the major, and as the mechanism to teach and evaluate the communication ELOs in major goal 3, as stated in Section V. Its purpose is to equip students with professional development skills including topics such as: an overview of career options in atmospheric sciences, tips for job or graduate school application success, the development of a resume/CV, interview skills, ethical considerations, etc. Through a series of reflective assignments and a final project, it is further designed to showcase students' mastery of atmospheric science skills through the completion of a deliverable at the end of the semester that is expected to be relevant to the student's interests and desired career path. Examples of deliverables include a research paper, a mobile app, a sample weathercast—either simulated or real—including both a calm weather day and an active day, a formal publication, etc. All students will participate in an end-of-semester showcase of their deliverable including an oral presentation explaining what they chose for their deliverable. *This course will add two credits to the major core curriculum.*
- NOTE: While reviewing the current/legacy version of the major, we noted the five credits from the Math 1151 requirement are already specified for the GE Mathematical and Quantitative Reasoning Foundations course. As such, the total number of credits for the current version of the major was coming up short of 121 prior to the curricular remapping. Thus, between the two credits for the capstone course, and the three additional credits added by requiring GEOG 4911, the five-credit hour deficit that is currently in our academic plan is filled with new course work.

c. Major elective courses:

- We propose to increase elective credit requirements from 6 to 9 to add breadth to students' experiences in the major, and to allow students to tailor their major experience towards a specific set of skills they are interested in obtaining for their future career.
- We propose to **remove** the following courses from our electives list:
  CIVILEN 5420 Remote Sensing of the Environment. This option is being replaced with the in-house ATMOSSC 5450: Introduction to Meteorological Radar systems, which is a major-specific course focusing on atmospheric remote sensing associated with weather radar systems.
  GEOG 3901 H: The instructor for this course retired and we do not intend to offer it in the future.
- We propose to **add** several new elective course options:
  ATMOSSC 2193, 4193: Individual Studies in Atmospheric Sciences (1-9 credits). Adding these courses will enable students who complete an individualized plan of study to receive elective credits. The double number designation allows a student to enroll in more than one individual studies course in a given semester.
  ATMOSSC 2194, 4104: Group Studies in Atmospheric Sciences (1-9 credits) Adding these courses will enable students to complete an specific academic experience completed in a group environment. The double number designation allows a student to enroll in more than one group studies course in a given semester.
  ATMOSSC 4191: Internship in Atmospheric Sciences (1-9 credits). Adding this course to our electives list will enable students who have professional, on-site work experiences to secure academic credit. Students are required to complete multiple check-ins and written assignments with a faculty member sponsor over the course of the semester to ensure that academic credit is warranted. This course may also be repeated for more than one semester, and up to 9 credits can be applied to their graduation requirements.
  ATMOSSC 4998: Research in Atmospheric Sciences (1-9 credits). Adding this course to our electives list will enable students who are completing research projects with faculty members to complete their experiences for credit. Many times, students either do such research on the side, without formal credit, or they must petition the department to get credit. Students may repeat this course for several semesters and up to 9 credits can be applied to their graduation requirements.
  ATMOSSC 4999 and 4999H: Thesis Research and Honors Thesis Research (1-9 credits). Adding these courses enables students to receive elective credits for research related to the completion of a departmental or honors thesis project.
  ATMOSSC 5450: Introduction to Meteorological Radar Systems, Observations and Techniques, (3 credits), approved by ASCC Spring 2025. This course teaches fundamental, technical and analytical skills associated with weather radar data acquisition and interpretation and will leverage the new Skyler 3 radar that OSU is purchasing for Spring, 2026.
  ATMOSSC 5701: Field Observations of Convection, (3 credits), approved by ASCC in Fall 2024. This class is the only instructor-led experiential learning course in the major. Students learn about the structure, dynamics, and prediction of severe thunderstorms through a field experience to the

Central Plains states.

EARTHSCI 5206: Advanced Oceanography. (3 credits) We are choosing to add this course to our electives list as some students wish to pursue an oceanography emphasis to their studies. Furthermore, several ASP faculty (Liu and Montenegro) have research endeavors for which an advanced understanding of oceanography is beneficial for students pursuing undergraduate research opportunities with these individuals.

d. Additional Programmatic Notes:

- While we removed the requirement or option for GEOG 5900 from the course work for the major, we have retained the course as a pre-requisite *option* for some of our course work. This is to facilitate an increase in the number of students minoring in atmospheric sciences. We will be revisiting our ATMOSSC minor soon, with the intention of making it more accessible to students from a variety of major disciplines, but particularly physics, engineering, and air transportation. Since GEOG 5900 is a requirement of the air transportation major, we anticipate students who take that class will be among those interested in pursuing the minor. However, we want students who are majoring in atmospheric sciences to enroll in 1900 and not 5900 and are therefore not allowing the majors to have the option to take 5900.
- As indicated above, we will be changing nearly all core course prefixes from GEOG to ATMOSSC to make the distinction between core course work in atmospheric science clearer when students enroll. Currently, the required courses for the major are a combination of GEOG and ATMOSSC prefixes, with several classes cross-listed. GEOG 1900 and GEOG 4911 will retain GEOG prefixes.
- We will be changing course numbers across the entire curriculum, to better utilize the 5000-level numbering system. In general, the numbering system is based upon the extent of pre-requisite courses required for the class, in combination with the timing of when students are expected to complete the courses over their four-year academic career. There is an approximate increase in numbering from 52XX to 53XX etc., with lower numbers correlating to earlier courses. Furthermore, we have opted to annotate courses that are within a series to retain the same first two numbers (e.g., 52XX), and a sequential 01, 02, 03 to indicate where in the sequence the course is to be taken. There are some exceptions to this strategy, namely if a course is established as a GE course in any capacity, we did not change the prefix or the number.
- Lastly, we revisited the pre-requisites for our core and elective courses and have changed some of the courses required as pre- or co-requisites. This effort will result in a better reflection of the skills students need to have prior to enrolling in the courses as they are currently taught, and to alleviate barriers some students experience when transferring to the major, or when pre-requisites for the required co-requisite courses are not met as an incoming freshmen. Furthermore, removing the Math and Physics pre-requisites for some courses taken early in the degree progression enables students to have more flexibility in scheduling their courses, preventing scheduling bottlenecks that can delay graduation.

The curricular modifications outlined above are represented in table format in the following. Pink highlights indicate courses removed from the curriculum. Green highlights indicate courses added to the curriculum:

New Course Number (Old course number, if changing)	New Course Name (Legacy course name, if being changed)	Course Type (Pre-req, Core or elective)	Legacy Pre-reqs	Revised Course Prerequisities)	Course Description (400 Character Limit)	Intended Rank
CIVILEN 5420	*Remote Sensing of the Environment*	*Elective*	*Prereq: 2410 (400), or permission of instructor.*	*REMOVE COURSE*		
GEOG 1900	Twisters and Tempests: Exploring Extreme Weather and Climate	Pre-req	Prereq: None	Prereqs: None	Surveys characteristics and processes of Earth's atmosphere and how it interacts with the planet's surface, oceans, and human activity. The course focuses on how these interactions work to produce extreme weather events and climate extremes and how they affect people.	Freshman, Sophomore
GEOG 1900 (Distance Learning Version Approval)	Twisters and Tempests: Exploring Extreme Weather and Climate	Pre-req	Prereq: None	Prereqs: None	Surveys characteristics and processes of Earth's atmosphere and how it interacts with the planet's surface, oceans, and human activity. The course focuses on how these interactions work to produce extreme weather events and climate extremes and how they affect people.	Freshman, Sophomore
GEOG 3597.02	*Combatting Global Climate Change*	*Elective*	*Prereq: None*	*REMOVE COURSE*		
GEOG 3597.03	*Environmental Citizenship*	*Pre-req*	*Prereq: None*	*REMOVE COURSE*		
GEOG 3900.01	Global Climate Change: Consequences and Consequences	Elective *Add to list	Prereq: None	Prereq: None	An advanced overview of causes and consequences of Earth's changing climate, evaluating natural from human influenced forcings. Students engage the fundamentals of climate dynamics and energy within broader dimensions of sustainability.	Freshman, Sophomore, Junior, Senior
GEOG 3900.02	Global Climate Change: Consequences and Consequences	Elective *Add to list	Prereq: None	Prereq: None	An advanced overview of causes and consequences of Earth's changing climate, evaluating natural from human influenced forcings and the fundamentals of climate dynamics and energy within broader dimensions of sustainability. Student research investigates the nature and extent of a particular climate change consequence	Freshman, Sophomore, Junior, Senior

					for society and critically evaluates strategies for mitigation and adaptation.	
GEOG 4911	Earth's Climate: Past, Present, and Future	Core	None	None	This class will examine the controls of Earth's physcial climate, its natural development over time discerned from the geologic record, and likely future development under ongoing human modifications.	Sophomore, Junior, Senior
ATMOSSC 2940 OR GEOG 5900	*Basic Meteorology OR Weather, Climate, and Global Warming*	*Core*	*Prereq: Math 1151 and Physics 1250.*	*REMOVE COURSE*		
ATMOSSC 2193	Individual Studies	Elective* Add to list	Prereq: Permission of instructor.	Prereq: Permission of instructor.	Independent studies on selected atmospheric sciences related topics.	Freshman, Sophomore, Junior, and Senior
ATMOSSC 2194	Group Studies	Elective* Add to list	None	Prereq: None	Special studies on topics directly related to the atmospheric sciences.	Freshman, Sophomore, Junior, and Senior
ATMOSSC 4191	Internship in Atmospheric Sceinces	Elective *Add to list	Prereq: Completion of 12 cr hrs in major program and permission of instructor.	Prereq: Completion of 12 cr hrs in major program; and CPHR 3.00 or above; and permission of instructor.		Junior, Senior
ATMOSSC 4193	Individual Studies	Elective* Add to list	Prereq: Permission of instructor.	Prereq: Permission of Instructor.	A program of research that includes individual conferences and culminates in a thesis.	Junior, Senior
ATMOSSC 4194	Group Studies	Elective* Add to list	Prereq: None	Prereq: None	Independent studies on selected atmospheric science-related topics.	Freshman, Sophomore, Junior, and Senior

ATMOSSC 4981	Capstone in Atmospheric Sciences	Core	No old Prereqs - New Course	Prereq: Sr standing or above and enrolled in the Atmospheric Sciences major program.	This senior-level capstone course combines soft-skills and career readiness topics with the development of a final project representative of scientific inquiry and synthesis of knowledge acquired over the student's academic career. To be taken the fall semester prior to graduation	Senior
ATMOSSC 4998	Research in Atmospheric Sciences	Elective *Add to list	Prereq: Permission of instructor.	Prereq: Permission of Instructor.	Undergraduate research on topics in Atmospheric Sciences.	Sophomore, Junior, Senior
ATMOSSC 4999	Thesis Research	Elective *Add to list	Prereq: Permission of instructor.	Prereq: Permission of Instructor.	Undergraduate thesis research	Junior, Senior
ATMOSSC 5193	Individual Studies	Remove course from electives	Prereq: Permission of instructor.	*REMOVE COURSE*		
ATMOSSC 5194	Group Studies	Remove course from electives	Prereq: None	REMOVE COURSE		
ATMOSSC 5201 (Formerly GEOG 5940)	Weather Observations, Analysis and Forecasting (Formerly Synoptic Meteorology Lab)	Core	Prereq: 5900 (520) or AtmosSc 230 or 2940 (230) or permission of instructor; and Physics 132 or its successor.	Prereq: A grade of C- or above in Geog 1900 or Geog 5900.	Introduction to observations, forecasting, and analysis of the atmosphere including weather maps, radar, and satellite, introductory numerical weather prediction models, and synthesis of data from a variety of sources.	Freshman, Sophomore, Masters, Doctoral
ATMOSSC 5202 (Formerly GEOG 5941)	Synoptic Meteorology (Formerly Synoptic Analysis and Forecasting)	Core	Prereq: Math 2153, and a grade of C- or above in Geog 5940 or AtmosSci 5940.	Prereq: A grade of C- or above in 5201, Math 1151, and Physics 1250.	Introduction to fundamental atmospheric forces and equations and their conceptual interpretation, quasi-geostrophic theory, and application to the development, evolution, and prediction of large-scale atmospheric systems including midlatitude cyclones, frontal development and positive feedback loops with the upper atmosphere.	Junior, Senior, Masters, Doctoral
ATMOSSC 5203 (Formerly GEOG 5942)	Mesoscale Meteorology (Formerly Severe Storm Forecasting)	Core	Prereq: A grade of C- or above in 5941.	Prereq: A grade of C- or above in 5202.	Study of regional and local atmospheric processes that influence a wide range of atmospheric phenomena including localized winter weather, atmospheric stablity, the low-level jet, the dryline, and convective storms, with an emphasis on dynamics and prediction. A review of tools needed for analysis such as Skew-T's, hodographs, and radar is included.	Junior, Senior, Masters, Doctoral

ATMOSSC 5301 (Formerly GEOG 5921)	Boundary Layer Meteorology (Formerly Microclimatology: Boundary Layer Climatology)	Core	Prereq: A grade of C- or above in 5900 or AtmosSc 2940, or permission of instructor; and Physics 1250.	Prereq: A grade of C- or above in 5201 and Math 1151.	Fundamentals of surface-atmosphere interactions. Focus on radiation, turbulent heat, moisture, and momentum fluxes, and subsurface conductive fluxes.	Sophomore, Junior, Senior, Masters, Doctoral
ATMOSSC 5302 (Formerly GEOG 5922)	Measurements in Atmospheric Sciences (Formerly Microclimatology: Microclimatological Measurements)	Core	Prereq: A grade of C- or above in Geog 5921.	Prereq: A grade of C- or above in 5301.	Practical experience with fabrication and deployment of instruments systems in the field, and measurement of atmospheric conditions.	Sophomore, Junior, Senior, Masters, Doctoral
ATMOSSC 5401	Practical Data Processing and Analysis for Atmospheric Sciences	Core	Prereq: 2940 or Geog 5900, and Math 1151; or Grad standing.	Prereq: A grade of C- or above in GEOG 1900 or GEOG 5900.	Hands-on, skills-centric course on data processing and analysis for Atmospheric Science. Students will successfully distill large volumes of raw atmospheric science data, extract meaningful relationships from the distillate, diagnose what information is needed to solve problems, and communicate their processing and analysis techniques to other atmospheric scientists.	Sophomore, Junior, Senior, Masters, Doctoral
ATMOSSC 5450	Introduction to Meteorological Radar Systems, Observations, and Techniques	Elective *Add to list	Prereq: Geog 5940 and AtmosSc 5401	Prereq: A grade of C- or above in 5201, 5401, and Physics 1250.	Radars remotely observe and monitor conditions in the atmosphere. This class will provide an overview of how radars are constructed, how they operate, the types of atmospheric phenomena they observe, radar characteristics and interpretation of radar data for various meteorological/atmospheric phenomena, and ways that radar data can be utilized operationally and for research purposes.	Junior, Senior, Masters, Doctoral
ATMOSSC 5501 (Formerly ATMOSSC 5950)	Atmospheric Thermodynamics	Core	Prereq: Math 1152 (153).	Prereq: A grade of C- or above in 5201, Math 1152, and Physics 1250.	An analysis of the fundamentals of atmospheric thermodynamics and their application to meteorological problems.	Sophomore, Junior, Senior, Masters, Doctoral
ATMOSSC 5502	Physical Meteorology	Core	Prereq: 5950 or equivalent, and Math 2153 or equivalent; or Grad standing.	Prereq: A grade of C- or above in 5501 or equivalent and Math 2153.	Introduce students to the fundamental principles underlying radiation physics, cloud physics and atmospheric chemistry. Student will understand underlying phase changes, radiation processes, and chemical reaction rates and how they influence weather.	Junior, Senior, Masters, Doctoral

ATMOSSC 5601 (Formerly ATMOSSC 5951)	Dynamic Meteorology I	Core	Prereq: Math 2153. Prereq or concur: AtmosSc 5950.	Prereq: A grade of C- or above in 5501, Math 2153, and Physics 1250.	Fundamental problems in dynamic meteorology; components of the equations of atmospheric motion are derived, and vorticity and divergence in the development of meteorological systems.	Junior, Senior, Masters, Doctoral
ATMOSSC 5602 (Formerly ATMOSSC 5952)	Dynamic Meteorology II	Core	Prereq: Math 2255, and a grade of C- or above in AtmosSc 5951 or AeroEng 2405.	Prereq: A grade of C- or above in 5601 and Math 2255 or 2174.	Advanced problems in dynamic meteorology; use of the equations of motion in numerical models of the atmosphere, especially those used by the National Weather Service.	Junior, Senior, Masters, Doctoral
ATMOSSC 5701	Field Observations of Severe Convective Storms	Elective *Add to list	Prereq: 2940 or Geog 5900; and AtmosSc 5940; and permission of instructor.	Prereq: A grade of C- or above in 5201 and permission of instructor.	This off-campus, experiential learning field course allows students to directly observe deep, moist atmospheric convection (thunderstorms) and associated phenomena through a 10-day field trip to the U.S. Central Plains, including daily morning and evening weather forecast discussions, identifying radar-based storm characteristics, and use observations to determine likelihood of server weather.	Junior, Senior, Masters, Doctoral
ATMOSSC 5901	Climate System Modeling:Basics and Applications	Elective	Prereq: A grade of C- or above 2940 or Geog 5900, or permission of instructor.	Prereq: A grade of C- or higher in Geog 1900 or 5900 and 4911.	An examination of climate system modeling, including their component atmospheric, oceanic, sea ice and land surface models, and their coupling, and their applications.	Junior, Senior, Masters, Doctoral

The new curriculum sheet is provided below:

DEPARTMENT OF
GEOGRAPHY

THE OHIO STATE UNIVERSITY
COLLEGE OF ARTS AND SCIENCES

Atmospheric Sciences (Bachelor of Science)

Requires 121 Minimum Total Credit Hours; 43 Major Credit Hours; GE New Requirements;
Declared major AU26 and beyond. General education requirements for degree completion can be found at https://artsandsciences.osu.edu/advising/general-education-requirements

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Major Requirements

Several major courses are offered only one term per year. Careful schedule planning is required to complete course sequences in a timely manner.

Required Prerequisite or Supplemental Courses:

Prerequisites are specific to courses within the major. There are no prerequisites that must be completed before declaring the Atmospheric Sciences major. A student may declare a major in Atmospheric Sciences by meeting with an academic advisor in the Department of Geography.

Course	Title	Hours
GEOG 1900	Twisters and Tempests: Exploring Extreme Weather and Climate	4
MATH 1151	Calculus I	5
MATH 1152	Calculus II	5
MATH 2153	Calculus III	4
MATH 2255	Differential Equations and Their Applications	3
PHYSICS 1250	Mechanics, Work, Energy, Thermal Physics	5
PHYISICS 1251 >	E&M, Waves, Optics, Modern Physics	5
CHEM 1210 >	General Chemistry I	5
STAT 2450.01 >	Introduction to Statistical Analysis I	3

> Indicates supplemental courses not required as a prerequisite to any courses in the major.

Required Courses: (12 courses/ 34 credit hours)

Course	Title	Hours	Required Prerequisite
GEOG 4911	Earth's Climate: Past, Present and Future	3	None
ATMOSSC 5201	Weather Observations, Analysis and Forecasting	2	A grade of C- or above in GEOG 1900 or GEOG 5900
ATMOSSC 5202	Synoptic Meteorology	3	A grade of C- or above in ATMOSSC 5201, MATH 1151, and PHYSICS 1250.
ATMOSSC 5203	Mesoscale Meteorology	3	A grade of C- or above in ATMOSSC 5202
ATMOSSC 5301	Boundary Layer Meteorology	3	A grade of C- or above in ATMOSSC 5201 and MATH 1151
ATMOSSC 5302	Measurements in Atmospheric Sciences	3	A grade of C- or above in ATMOSSC 5301
ATMOSSC 5401	Practical Data Processing and Analysis for Atmospheric Sciences	3	A grade of C- or above in GEOG 1900 or GEOG 5900
ATMOSSC 5501	Atmospheric Thermodynamics	3	A grade of C- or above in ATMOSSC 5201, MATH 1152, and PHYSICS 1250
ATMOSSC 5502	Physical Meteorology	3	A grade of C- or above in ATMOSSC 5501 or equivilant and MATH 2153
ATMOSSC 5601	Dynamic Meteorology I	3	A grade of C- or above in ATMOSSC 5501, MATH 2153, and PHYSICS 1250
ATMOSSC 5602	Dynamic Meteorology II	3	A grade of C- or above in ATMOSSC 5601 and MATH 2255 or 2174
ATMOSSC 4981	Atmospheric Sciences Capstone	2	Senior Standing and enrolled in Atmospheric Sciences major program

Elective Courses: Choose three of the following courses (3 courses / 9 credit hours).

Course	Title	Hours	Required Prerequisite
ATMOSSC 2193	Individual Studies in Atmospheric Sciences	1-9	Instructor permission
ATMOSSC 2194	Group Studies in Atmospheric Sciences	1-3	None
ATMOSSC 4191	Internship in Atmospheric Sciences	1-5	Completion of 12 cr hrs in major program; and CPHR 3.00 or above; and instructor permission
ATMOSSC 4193	Individual Studies in Atmospheric Sciences	1-9	Instructor permission
ATMOSSC 4194	Group Studies in Atmospheric Sciences	1-3	None
ATMOSSC 4998	Research in Atmospheric Sciences	1-9	Instructor permission
ATMOSSC 4999	Thesis Research	1-9	Instructor permission
ATMOSSC 4999H	Honors Thesis Research	1-9	Honors Standing & Instructor permission
ATMOSSC 5450	Introduction to Meteorological Radar Systems, Observations, and Techniques	3	Prereq: A grade of C- or above in ATMOSSC 5201, ATMOSSC 5401, and PHYSICS 1250
ATMOSSC 5701	Field Observations of Severe Convection Storms	2	A grade of C- or above in ATMOSSC 5201 and permission of instructor.
ATMOSSC 5901	Climate System Modeling: Basics and Applications	3	A grade of C- or higher in GEOG 1900 or 5900 and GEOG 4911.
GEOG 3900.01 **OR** GEOG 3900.02	Global Climate Change: Causes and Consequences Global Climate Change: Causes and Consequences	3 4	None None
GEOG 5200	Cartography and Map Design	3	None
GEOG 5210	Fundamentals of Geographic Information Systems	3	None
GEOG 5225	Geographic Applications of Remote Sensing	3	None
EARTHSCI 2206	Principles of Oceanography	3	None
EARTHSCI 5206	Advanced Oceanography	3	Jr standing or above, and enrollment in any STEM major; or Grad standing; or permission of instructor.
CIVILEN 5130	Applied Hydrology	3	CIVILEN 3160

General Education (NEW) Requirements

Requirement	Course Options	Hours
GE Launch Seminar	GENED 1201	1
Foundations: Writing and Information Literacy	Student Choice	3
Foundations: Mathematical & Quantitative Reasoning/Data Analysis	MATH 1151	5
Foundations: Literary, Visual and Performing Arts	Student Choice	3
Foundations: Historical & Cultural Studies	Student Choice	3
Foundations: Natural Sciences	GEOG 1900	4
Foundations: Social & Behavioral Sciences	Student Choice	3
Foundations: Race, Ethnicity and Gender Diversity	Student Choice	3
Theme: Citizenship for a Diverse & Just World	Student Choice	4-6
Second Theme: Student Choice (*Sustainability Recommended*)	Student Choice	4-6
GE Reflection Seminar	GENED 4001	1
TOTAL GE CREDIT HOURS		**34-38**

College Requirements

Requirement	Course Options	Hours
University Survey	ARTSSCI 1100.14	1
World Language Foundation: 1101-1103 in any language	Student Choice	12
TOTAL COLLEGE CREDIT HOURS		**13**

Major Requirement Notations

The following requirements for the major apply to all Arts and Sciences degrees.

Major requirements comprise at least 30 semester hours and can be substantially higher. Major courses must be at the 2000 level or above. At least 20 hours of the major must be in courses offered by the department of the major. Note: Some interdisciplinary majors are excluded from the 20-hour rule.

Students must earn at least a C- in a course for the course to apply to the major. However, students must receive a 2.0 cumulative grade point average (GPA) for all major course work. If a D+, D, or an E is earned in a course needed for the major, the course cannot be counted on the major.

The major advisor will decide if the course should be repeated or if another course should be substituted. Courses taken on a pass/non-pass basis cannot be used on the major.

The department must approve all courses in the major. Some departments require a "major program form," a document that must be signed by the academic advisor and submitted with the graduation application. Some departments do not require such a form because the academic advisors use an automated version on the degree audit report. Some departments require both. In any case, students should meet with the academic advisor early to plan the major; during your meeting, it can be determined whether the department requires a paper major program form. Any changes or adjustments to the major should be made in consultation with the academic advisor.

If a student transferred from another institution, no more than half of the credit hours on the major program may consist of transfer credit. The academic advisor, the chairperson of the department, and the appropriate assistant dean must approve any request for a variation in this policy.

For Honors students, the GE curriculum and major must be approved by the assigned Honors advisor. Information about the honors curriculum and requirements and how to schedule an appointment with an honors advisor is available on the College of Arts and Sciences Honors Program website: http://aschonors.osu.edu/advising. Students will also be assigned a faculty advisor in the department of study to help the student choose courses and co-curricular opportunities that align with academic and professional goals.

For more information about internship and career opportunities, visit the College of Arts and Sciences Career Services Office. Their website is http://asccareerservices.osu.edu/ .

Example 4-year plan for the major is as follows:

(Note: pre-requisites outside the department are not indicated here. All departmental pre-req courses must be completed with a grade of C- or better.)

4-Year Plan:			
Semester	**Class**	**Course Pre-reqs**	**Credits**
Fresh Fall	GEOG 1900 (Twisters & Tempests) (Fulfills GE Foundation Natural Science Requirement)	None	4
	Math 1151 (Calc 1) (Fulfills the GE Foundation MQRDA)		5
	Chem 1210		5
	GENED 1201 (GE)		1
	ASC 1100.04		1
Semester TOTAL			**16**
Fresh Sp	ATMOSSC 5201 (Obs & Forecast)	GEOG 1900 or GEOG 5900	2
	Math 1152 (Calc 2)		5
	Phys 1250 (Phys 1)		5
	GE Writing		3
Semester TOTAL			**15**
Soph Fall	Math 2153 (Calc 3)		4
	Phys 1251 (Phys 2)		5
	Stats 2450.01		3
	ATMOSSC 5401 (Data Analysis)	GEOG 1900 or GEOG 5900	3
Semester TOTAL			**15**
Soph Sp	Math 2255 (Diff Eq)		3
	ATMOSSC 5501 (Thermodynamics)	Math 1152, Physics 1250, ATMOSSCI 5201	3
	ATMOSSC 5301 (Boundary Layer)	Math 1151, ATMOSSC 5201	3
	GEOG 4911	None	3
	Theme: Citizenship		4
Semester TOTAL			**16**
Junior Fall	ATMOSSC 5302 (Measurements)	ATMOSSC 5301	3
	ATMOSSC 5601 (Dyn 1)	Math 2153, PHYSICS 1250, and ATMOSSC 5501	3
	ATMOSSC 5202 (Synoptic)	Math 1151, Physics 1250, and ATMOSSC 5201	3
	GE Foundations: Historical and Cultural Studies		3
	GE Theme (student choice)		3-4
Semester TOTAL			**15-16**
Junior Sp	ATMOSSC 5203 (Mesoscale)	ATMOSSC 5202	3
	ATMOSSC 5602 (Dyn 2)	ATMOSSC 5601 AND Math 2255 or Math 2174	3
	GE Foundations: REGD		3
	GE Foundations: SBS		3

	Language 1		4	
Semester TOTAL			**16**	
Senior Fall	GE LVPA		3	
	ATMOSSC Elective 1	Course Specific	3	
	ATMOSSC 5502 (Phys Met)	ATMOSSC 5501 AND Math 2153	3	
	ATMOSSC 4981 (Capstone)	Senior Standing	2	
	Language 2		4	
Semester TOTAL			**15**	
Senior Sp	ATMOSSC Elective 2	Course Specific	3	
	GE Theme (if needed)		3	
	Language 3		4	
	ATMOSSC Elective 3	Course Specific	3	
	GENED 4001 (GE Reflection)		1	
Semester TOTAL			**14**	
Major Pre-reqs	39			
Major Core	34			
Major Elec	9			
GE/ASC Founds	20	Unique courses only, not those that double dip.		
GE/ASC Themes	7			
Language	12			
DEGREE TOTAL	**121**		**121**	**121**

Curriculum Map: Bachelor of Science in Atmospheric Sciences

Curriculum map, indicating how program goals are accomplished via specific courses

KEY:	*1=Beginner*	*2= Intermediate*	*3 = Advanced*	

	Learning Outcome 1	**Learning Outcome** 2	**Learning Outcome** 3	**Learning Outcome** 4
Prerequisites or Corequisites:				
MATH 1151				1
MATH 1152				1
MATH 2153				1
MATH 2255				2
PHYSICS 1250	1	1		
PHYSICS 1251	2	1		
CHEM 1210	1	1		
STATS 2450				1
GEOG 1900	1			
Required Core:				
ATMOSSC 5201 (Formerly GEOG 5940)	2	1		2
ATMOSSC 5202 (Formerly GEOG 5941)	3	2	3	2
ATMOSSC 5203 (Formerly GEOG 5942)	3	2	3	3
ATMOSSC 5301 (Formerly GEOG 5921)	1	2	3	2
ATMOSSC 5302 (Formerly GEOG 5922)	2	2	2	2
ATMOSSC 5401 (Data Processing)		3	2	1
ATMOSSC 5501 (Formerly 5950)	3	2	2	2
ATMOSSC 5502 (Physical Met)	3	2	2	3
ATMOSSC 5601 (Formerly 5951)	3	2	2	2
ATMOSSC 5602 (Formerlv 5952)	3	2	2	3
ATMOSSC 4981 (Capstone)		2	3	
GEOG 4911	2			2
Electives:				
ATMOSSC 2193, 4193 (Ind Studies)	1-3	1-3	1-3	1-3
ATMOSSC 2194, 4194 (Grp Studies)	1-3	1-3	1-3	1-3
ATMOSSC 4191 (Internship)		1-3	1-3	1-3
ATMOSSC 4998 (Research)	1-3	1-3	1-3	1-3
ATMOSSC 4999, 4999H (Thesis Research)		1-3	1-3	1-3
ATMOSSC 5450 (Radar)	2	3	2	3
ATMOSSC 5701 (Field Obs)	2	2	3	
ATMOSSC 5901 (Climate Modeling)	2	3	2	
GEOG 3900.01 OR GEOG 3900.02	2		3	
GEOG 5200	1	1	2	1
GEOG 5210	1	1		
GEOG 5225	2	2		2
EARTHSC 2206	1		1	

EARTHSC 5206	2	3		3
CIVILEN 5130	2	3		2

Learning Outcome 1: Students acquire the theoretical basis for fundamental atmospheric processes and systems.
Learning Outcome 2: Students become familiar with and use computational and other forms of technology needed for successful careers in the atmospheric sciences.
Learning Outcome 3: Students communicate atmospheric science concepts and methods orally, visually, and in writing.
Learning Outcome4: Students solve problems faced by atmospheric scientists.

IX. Appendix A: Topic Specifications of the AMS for undergraduate degree programs in Atmospheric Sciences and Meteorology:

The following is an inclusive list of skills, competencies, and topics that the AMS specifies students graduating with a degree in atmospheric science or meteorology should acquire over the course of their undergraduate career. The OSU course or courses that teach(es) the skill identified is provided. Refer to Section 4 at: https://www.ametsoc.org/ams/about-ams/ams-statements/statements-of-the-ams-in-force/bachelors-degree-in-atmospheric-science/

Skill	**Course**
Data analysis, modeling and visualization	5401, 5302
Numerical and statistical methods to ATM problems	5401
Scientific software development	5401, 5302
Exposure to programming tools and scientific programming languages	5401, 5301
Effective communication (oral, written, social media)	4981, 5302
Discussion and interpretation of weather and climate processes (Oral, written, video)	5202,5203, 5301
Create and deliver a scientific presentation and report	4981, 5301
Governing Eq's	5941, 5601
Time and space scales	5941, 5942, 5301, 5602
Dynamical balances	5202, 5601
Atmospheric Waves	5602
Atmospheric Instabilities	5203, 5602
Polar, tropical and mid-latitude weather systems - structure and evolution	1900, 5202
Apply physical principles to understand and predict atmospheric systems	5202, 5203, 5601, 5602,
Clouds and storms	1900, 5201, 5203
Synoptic and mesoscale systems	5201, 5202, 5203, 5601, 5602
General circulation	4911, 5602
Climate processes of varying time and space scales	4911, 5602
Energy Transfers	4911, 5502, 5301, 5601, 5602
Radiation	5502, 5301
Convection	5942, 5601, 5602

Turbulence	5301
Advection	5201, 5202, 5601, 5602
Cloud and precip processes	5502
Air pollution and dispersion	5301
Chemical composition, distribution and evolution	5502?
Natural and anthropogenic sources of gaseous constituents	4911
Global energy balance	4911
General circulation of Atm and Oceans	4911, 5602
Teleconnections/climate drivers (ENSO, Gulfstream, monsoons)	4911, 5602
Anthropogenic and natural causes of climate change	4911
Hydrological cycle	4911, 5301
Biogeochemical cycle	4911
Principles of measurement	5302
Uncertainty of measurement	5302
In situ observation tools	5302
Satellite observations	5201
Radar observations	5201, 5203
Statistical analysis from observations	5401?, 5302
Emerging technologies for data acquisition	5302
Making weather forecasts	5202, 5602
Principles of NWP	5201, 5202, 5601, 5602
Climate predictions and projections (process to make)	4911
Communication of forecasts and forecast uncertainty	5201, 5202
Weather and climate impacts	1900, 4911

X. Appendix B: Specifications of the U.S. Federal Government for requisite coursework to be completed by all federally held Atmospheric Sciences and Meteorology positions (i.e. Federal 1340 positions)

Reference: https://www.opm.gov/policy-data-oversight/classification-qualifications/general-schedule-qualification-standards/1300/meteorology-series-1340/

Meteorology Series 1340

Individual Occupational Requirements

Basic Requirements:

A. Degree: meteorology, atmospheric science, or other natural science major that included:

1. At least 24 semester (36 quarter) hours of credit in meteorology/atmospheric science including a minimum of:

   a. Six semester hours of atmospheric dynamics and thermodynamics;
   OSU satisfies this through: ATMOSSC 5501, 5601, 5602

   b. Six semester hours of analysis and prediction of weather systems (synoptic/mesoscale);
   OSU satisfies this through: ATMOSSC 5201, 5202, 5203

   c. Three semester hours of physical meteorology; and
   OSU satisfies this through: ATMOSSC 5502

   d. Two semester hours of remote sensing of the atmosphere and/or instrumentation.
   OSU satisfies this through ATMOSSC 5302

2. Six semester hours of physics, with at least one course that includes laboratory sessions.
   OSU satisfies this through PHYS 1250 and 1251

3. Three semester hours of ordinary differential equations.
   OSU satisfies this through MATH 2255

4. At least nine semester hours of course work appropriate for a physical science major in any combination of three or more of the following: physical hydrology, statistics, chemistry, physical oceanography, physical climatology, radiative transfer, aeronomy, advanced thermodynamics, advanced electricity and magnetism, light and optics, and computer science.
   OSU satisfies this through ATMOSSC 4911, STAT 2450.01, ATMOSSC 5501, and our elective options.

** There is a prerequisite or corequisite of calculus for course work in atmospheric dynamics and thermodynamics, physics, and differential equations. Calculus courses must be appropriate for a physical science major.*

or

B. Combination of education and experience -- course work as shown in A above, plus appropriate experience or additional education.