TEXAS TECH UNIVERSITY
GRADUATE STUDY
IN
ATMOSPHERIC SCIENCE

"REDBOOK"

Revised August 2025

TEXAS TECH UNIVERSITY
GRADUATE STUDY IN ATMOSPHERIC SCIENCE

Atmospheric Science is an academic area within the Department of Geosciences of the College of Arts and Sciences. For information concerning graduate study and assistantships in Atmospheric Science, write or call:

Dr. Christopher Weiss, Graduate Advisor
Atmospheric Science Group
Texas Tech University
Box 41053 PHONE: 806-834-3113
Lubbock, Texas 79409-1053 E-MAIL: chris.weiss@ttu.edu

or visit our web site at http://www.depts.ttu.edu/geosciences/atmo/index.php

GRADUATE FACULTY

Brian Ancell, Professor, Ph.D. University of Washington, 2006
Karin Ardon-Dryer, Associate Professor, Ph.D. Tel Aviv University, 2012
Eric Bruning, Professor, Ph.D. University of Oklahoma, 2008
Johannes Dahl, Associate Professor, Ph.D. Ludwig Maximilian University, 2010
Jennifer Henderson, Assistant Professor, Ph. D. Virginia Tech, 2016
Faiaz Khaled, Assistant Professor, Ph.D. Louisiana State University, 2022
Sandip Pal, Associate Professor, Ph. D. University of Hohenheim, 2009
John L. Schroeder, Professor, Ph.D. Texas Tech University, 2001
Christopher C. Weiss, Professor, Ph. D. University of Oklahoma, 2004

STATEMENT OF PHILOSOPHY

Graduate study in Atmospheric Science at Texas Tech is a rigorous program designed to provide instruction in the science of meteorology for professionals in research, operational activities, and education. The ultimate objective of this program is to produce graduates whose understanding of problems and solutions in meteorology makes them uniquely qualified to apply their expertise for the betterment of society. To accomplish this goal, a program focused on convective processes is offered. Areas of research include: precipitation structure of mesoscale convective systems including analysis of dual-Doppler weather radar data; the nature of severe storms such as hailstorms, hurricanes, tornadoes, and dust storms initiating mechanisms for convection (fronts, drylines, outflow boundaries); boundary layer meteorology and turbulence modeling, land-atmosphere interactions; aerosols in climate and human heath; wind engineering and wind energy applications; and regional and mesoscale numerical weather prediction and data assimilation; societal risk and uncertainty amid decision-making processes in weather and climate extremes. Within this general objective, each student may pursue individualized educational objectives and professional goals.

The graduate program is a vital area of growth for both faculty and students. To insure healthy growth, students are encouraged to advance new ideas and to participate in the academic and professional activities provided by the area and the discipline. The faculty firmly believes that Texas Tech provides the challenges and opportunities necessary for successful study in Atmospheric Science.

Texas Tech is committed to the principle that in no aspect of its program shall there be differences in the treatment of persons because of race, creed, national origin, age, sex or disability and that equal opportunity and access to facilities shall be available to all.

Persons with disabilities who may need auxiliary aids or services are requested to contact Matt Saldana at 806-742-3113, preferably several weeks in advance of participation so that appropriate arrangements can be made.

RESEARCH ASSISTANTSHIPS

Half-time research assistantships are available to qualified applicants. These appointments allow students to participate in research projects within the Department, which are administered by the project directors. A student must be enrolled full time (at least twelve semester hours) each fall and spring semester to hold a research assistantship. The University requires that a student maintain continuous enrollment throughout (including summers), normally at least three hours during the semester of completion. See Registration/Enrollment Requirements section in this book for more details. Out-of-state tuition and fees are waived.

Research assistants should be in the office at the beginning of the semester. They are expected to work the equivalent of twenty hours per week (for a half-time appointment), including times when classes are not in session and during holidays. The specific duties and time arrangements should be worked out with the faculty advisor at the beginning of each semester. There is no paid vacation accrual for part-time employment.

TEACHING ASSISTANTSHIPS

Teaching assistantships are available for qualified applicants. A half-time teaching assistant teaches three laboratory sections each fall and spring semester. The teaching assistantship program provides the opportunity for students to acquire teaching skills as well as gain greater mastery of topics in Atmospheric Science. Both teaching and research assistants will complete a thesis project as part of the degree plan.

A student must be enrolled full time at least twelve semester hours each fall and spring semester to hold a teaching assistantship. The University requires that a student maintain continuous enrollment throughout (including summers), normally at least three hours during the semester of completion. See Registration/Enrollment Requirements section in this book for more details. Teaching appointments are available for the two-year period following admission to the degree program. Out-of-state tuition and fees are waived.

Teaching assistants are generally on the same schedule as faculty and must be in the office one week before the start of classes. They are expected to spend the equivalent of twenty hours per week on their duties (for a half-time appointment). Office hours should amount to at least three hours per week, posted on the office door.

Teaching assistants are free during times when class is not in session and after their grade rolls are submitted and are posted on the university's system at the end of the semester. There is no paid vacation accrual for part-time employment.

ADMISSION TO GRADUATE STUDY

General admission to the Graduate School

Forms for admission and instructions for completing the application process can be found at http://www.depts.ttu.edu/gradschool/admissions/ProspectiveStudents.php. In addition to the formal application, students should submit transcripts of all previous academic work and scores from the Aptitude Test of the Graduate Record Examination (GRE). These documents should be submitted at least 60 days prior to the proposed enrollment.

Admission to a graduate degree program

Admission to a graduate degree program is granted by the Dean of Graduate School with the recommendation of the program area. Students should contact the Atmospheric Science Group directly to obtain the information and forms necessary for admission into the Atmospheric Science graduate degree program. All students admitted to the program will be considered for available financial aid.

REGISTRATION

Procedures for registration are set by the Registrar who furnishes each enrollee complete instructions for all steps in the procedure. In addition, each student must consult with the Graduate Advisor in Atmospheric Science and receive permission to enroll prior to registration.
The University requires that a student maintain continuous enrollment (including summer) through the semester of graduation; the student must normally enroll for at least three hours during the semester of completion.

MASTER OF SCIENCE DEGREE

Atmospheric Science students may earn a Master of Science degree by developing and carrying out an academic and research program with the assistance of a Thesis Director from the Atmospheric Science faculty.

DEGREE REQUIREMENTS

Requirements of the academic program of study:

1. Students are required to have completed a course in Ordinary Differential Equations at undergraduate level prior to beginning the ATMO M.S. Degree Program. Partial Differential Equations may be similarly required at the discretion of the student's thesis committee, which may be taken concurrently with the ATMO degree coursework.
2. A minimum 31 hours of graduate level course work (5 courses per academic year) plus six (6) hours of ATMO 6000 (Master's Thesis). Seminar counts for one (1) hour total towards the requirement. Total student credit load should be equal to 12 hours for each long semester. Other courses outside of the Atmospheric Science curriculum can be taken with prior departmental approval. Descriptions of the Atmospheric Science graduate courses are located at the end of this brochure.

ATMO 5101 (Atmospheric Science Seminar)
ATMO 5301 (Individual Studies)
ATMO 5302 (Weather, Climate and Applications)
ATMO 5316 (Dynamics of Severe Storms)
ATMO 5319 (Boundary Layer Meteorology)
ATMO 5321 (Cloud and Precipitation Physics)
ATMO 5322 (Atmospheric Electricity)
ATMO 5327 (Radar Meteorology)
ATMO 5328 (Synoptic and Mesoscale Dynamics)
ATMO 5331 (Analysis of Geophysical Data Fields)
ATMO 5332 (Regional Scale Numerical Weather Prediction)
ATMO 5351 (Meteorological Data Acquisition & Instrumentation Systems)
ATMO 5352 (Wind Science and Modeling)
ATMO 5353 (Meteorologic Field Experiments)
ATMO 6000 (Master's Thesis)
ATMO 7000 (Research)
G PH 5310 (Geophysical Fluid Dynamics)
G PH 5324 (Radiative Transfer)
GEOL 8000 (Doctor's Dissertation)

3. Formal degree plans no longer have to be filed with the Graduate School as a default plan is automatically in place for each student. However, a change of degree plan form must be filed with the Graduate School if:

- At least one of the core courses (**in boldface above**) will not be completed, and/or
- Any substitute courses are taken outside of the ATMO curriculum (not including GPH 5310 and GPH 5324). You can find forms at: http://www.depts.ttu.edu/gradschool/academic/FormsResources.php.

4. An oral examination and thesis defense are required of all students.
5. There is no foreign language requirement.
6. All work for the Master's degree must be completed within six years.

Requirements for completing a thesis:

1. In consultation with the Thesis Director, the student will select at least two additional Thesis Committee members.
2. The student will prepare a thesis proposal to be approved by the Thesis Committee which shall contain:
   a. a statement of the objective of the study,
   b. a justification of the study,
   c. a clear and complete statement of the methodology to be followed in completing the study, and
   d. additional material as recommended by the Thesis Director.
3. The student will conduct the research defined in the thesis proposal and approved by the Thesis Committee. The student should work closely with the Thesis Director during this period and meet with the Thesis Committee as often as necessary.
4. The MLA Style Sheet is the approved style guide for Atmospheric Science. The writer should also consult the booklet *Instructions for Preparing and Submitting Theses and Dissertations*, prepared by the Graduate School Staff. The TTU Thesis and Dissertation Manual is available at Barnes and Noble, the campus bookstore or on the Graduate School web site. http://www.depts.ttu.edu/gradschool/academic/FormsResources.php
5. Beginning with the Spring 2005 semester, ETD is the required format for the final copy submission of a thesis or dissertation. The student should visit http://www.depts.ttu.edu/gradschool/academic/FormsResources.php to learn more about this and other requirements for thesis or dissertation submission.
6. A student hoping to complete the degree within two years should plan to:
   a. select a Thesis Director during the first semester,
   b. select and meet with the Thesis Committee during the second semester to outline the thesis problem, and
   c. meet with the Committee early during the second semester of the second year before completing the thesis.

DOCTOR OF PHILOSOPHY DEGREE

Atmospheric Science students may earn a Doctor of Philosophy degree by specializing in the integrated studies in earth and atmospheric sciences program of the Department of Geosciences. Each student develops an academic and research program with the assistance of a Dissertation Director from the Atmospheric Science faculty.

Graduate students whose academic performance and M.S. research are of superior quality are encouraged to submit a written request to the graduate advisor for admission to the Ph.D. program. Admission to the Ph.D. program is contingent upon completing all requirements (including the thesis) for the M.S. degree, identification of a faculty member to supervise the Ph.D. research, and identification of a suitable dissertation topic. The request may be submitted as soon during the M.S. program as the student wishes to express the desire to be considered for the Ph.D. program.

DEGREE REQUIREMENTS

Requirements of the academic program of study:

All requirements for the Ph.D. degree are in accordance with those stipulated by the Graduate School and the Department of Geosciences. Please consult the graduate catalog for details. Conditions specific to the Atmospheric Science program are listed below. Any further requirements are determined by the student's Dissertation Director and Committee.

The preliminary examination is to be taken as early in the doctoral study as possible. The specific requirements of the preliminary examination (oral or written or both) will be determined by the Dissertation Director.

Requirements for completing a dissertation:

1. In consultation with the Dissertation Director, the student will select at least two additional Dissertation Committee members, including one for the minor area, if a minor is declared.
2. The student will prepare a dissertation proposal which shall contain:
   a. a statement of the objective of the study,
   b. a justification of the study,
   c. a clear and complete statement of the methodology to be followed in completing the study, and
   d. additional material as recommended by the Dissertation Director.
3. The student will conduct the research defined in the dissertation proposal and by the Dissertation Committee. The student should work closely with the Dissertation Director during this period and meet with the Dissertation Committee as often as necessary.
4. The MLA Style Sheet is the approved style guide for Atmospheric Science. The writer should also consult the booklet *Instructions for Preparing and Submitting Theses and Dissertations*, prepared by the Graduate School Staff. The TTU Thesis and Dissertation Manual is available at Barnes and Noble, the campus bookstore or on the Graduate School web site. http://www.depts.ttu.edu/gradschool/academic/FormsResources.php
5. Beginning with the Spring 2005 semester, ETD's will be the required format for the final copy submission of a thesis or dissertation. The student should visit http://www.depts.ttu.edu/gradschool/academic/FormsResources.php to learn more about this and other requirements for thesis or dissertation submission.
6. A student hoping to complete the degree within two years should plan to:
   a. select a Thesis Director during the first semester,
   b. select and meet with the Thesis Committee during the second semester to outline the thesis problem, and
   c. meet with the Committee early during the second semester of the second year before completing the thesis.
7. Twelve (12) dissertation hours six (6 tool hours). Please refer to: https://catalog.ttu.edu/preview_program.php?catoid=5&poid=4293

FINAL NOTES

Responsibility for meeting all degree requirements ultimately rests with the individual graduate student. Each student should be thoroughly familiar with the graduate catalog, which is essentially a contract between the student and the University governing degree requirements. Every attempt will be made to ensure that each graduate student receives the opportunity to develop the type of program which will be most beneficial to the student, the University, and the profession of Atmospheric Science.

Though limited substitutions of ATMO courses are permitted with approval of the student's committee ***before*** enrollment in the course, no student seeking a graduate degree in Atmospheric Science is allowed to drop an ATMO course after enrolling.

If a student's cumulative GPA falls below 3.0, he/she is placed on academic probation. At this time, the student has two consecutive semesters to raise his/her cumulative GPA to at least 3.0. If his/her semester GPA drops below 3.0 during this two semester period, the student is subject to suspension. A student placed on suspension will be required to remain out of Graduate School for one semester. If a student is suspended twice he/she will not be allowed to return to Graduate School. Any student who has been suspended must appeal to the Graduate School, according to OP 64.07, Graduate Student Appeals, if reinstatement is desired.
Please refer to the university's Operating Procedure regarding the academic probation and suspension policy for more complete details: https://www.depts.ttu.edu/opmanual/OP64.04.php

GRADUATE COURSES IN ATMOSPHERIC SCIENCE

5101. Atmospheric Science Seminar (1:1:0). Discussions of current research or selected topics of interest. May be repeated for credit.

5301. Individual Studies in Atmospheric Science (3:3:0). Prerequisite: Consent of instructor. A structured independent graduate studies course under the guidance of a faculty member. May be repeated for credit.

5302. Weather, Climate, and Applications (3:3:0). Basic principles of atmospheric science, with particular emphasis on applications, including severe weather, air pollution, and global climate change.

5316. Dynamics of Severe Storms (3:3:0). Observations and theoretical studies of severe storms. Conceptual and numerical models of storm structure and development.

5319. Boundary Layer Meteorology (3:3:0). Boundary-layer turbulent transfer processes are examined, including diffusion, mixing, diabatic modification, low-level jet formation, and moisture discontinuities.

5321. Cloud and Precipitation Physics (3:3:0). Processes of cloud droplet nucleation; initial growth of droplets and cloud droplet size spectra; theories of natural precipitation processes and techniques for precipitation enhancement.

5322. Atmospheric Electricity (3:3:0). Electrical processes in the atmosphere and in weather; ionosphere and global circuit, storm electrification, lightning physics and phenomenology, relationships between lightning and convection, measurement.

5327. Radar Meteorology (3:3:0). Applications of radar to investigation of precipitating weather systems. Emphasis is given to analysis and interpretation of radar data in conjunction with other data sources.

5328. Synoptic and Mesoscale Dynamics (3:2:3). Development of a conceptual and theoretical understanding of quasi- and semigesotrophic theory, omega equations, PV thinking, cyclogenesis, frontogenesis, and gravity waves.

5331. Analysis of Geophysical Data Fields (3:3:0). The application of Fourier analysis, data assimilation, and objectives analysis to geophysical data fields.

5332. Regional Scale Numerical Weather Prediction (3:3:0). Regional scale dynamics, numerical solution of geophysical problems, and numerical prediction of severe weather events such as tornadic storms and flash floods.

5351. Meteorological Data Acquisition and Instrumentation Systems (3:2:3). Exploration, design, integration and application of meteorological data acquisition and instrumentation systems.

5352. Wind Science and Modeling (3:3:0). Introduction of various wind systems and boundary layer aerodynamics, analysis of wind data, and modeling of near-ground wind features using experimental and numerical simulations.

5353. Meteorologic Field Experiments (3:3:0). An overview of designing, planning, and completing atmospheric field experiments.

6000. Master's Thesis (V1-6).

7000. Research (V1-12).

GEOL 8000. Doctor’s Dissertation.

G PH 5310. Geophysical Fluid Dynamics (3:3:0). Survey of dominant modes of wave motion in the atmosphere. Scale analysis for problems in atmospheric dynamics with application to mid-latitude synoptic scale systems.

G PH 5324. Radiative Transfer (3:3:0). Principles of radiation, the radiative transfer equation. Applications to absorption, emission, and scattering processes. Determination of physical properties from satellite measurements.

REGISTRATION/ENROLLMENT REQUIREMENTS

Following is a guideline of the minimum requirements of both the department and the Graduate School.

Supported Students:

Fall & Spring	12 hours per session
Summer I & II	3 hours per session supported (6 total for both Sum I&II): - If you have begun 6000 coursework, register for 3 hours of ATMO 6000. - If you have not begun 6000 coursework, register for 3 hours of ATMO 7000.

Non-Supported Students:

Fall & Spring	12 hours per session
Summer I & II	1 hour minimum for either Sum I or II (not both): - If you have begun 6000 coursework, register for 1 hour of ATMO 6000. - If you have not begun 6000 coursework, there is no registration requirement, unless otherwise indicated by the student's advisor.

All Students:

Semester of Graduation	Master's students – 3 hours of 6000* Doctoral students – 3 hours of 8000** Students that *miss the defense deadline in a given semester*, but still defend before the final day of classes for that semester, will only be required to take one (1) credit of ATMO 6000 for the subsequent (graduating) semester. Otherwise, three (3) credits of ATMO 6000 will be required.

*If have completed 6 hours of thesis work and defended, student may enroll in at least 3 hours of 5000 or 7000.

**Requirements for doctoral student differ – please consult with advisor and the graduate catalog which can be found at: http://www.depts.ttu.edu/officialpublications/

TEXAS TECH UNIVERSITY
Graduate School

Required Steps for the MASTER'S DEGREE

	ACTION	INITIATED THROUGH	SUBMITTED TO	TIME
1	Plan courses for degree	Graduate Advisor	Graduate Advisor	Prior to registration
2	Set up thesis advisory committee and title, if applicable	Graduate Advisor	Graduate Advisor	Prior to filing "Program for the Master's Degree and Admission to Candidacy" form
3	File changes in degree program, as necessary	Graduate Advisor or Chair, Advisory Committee	Graduate School Enrollment Management	As needed
4	Enroll in semester of graduation (at least 3 hours of thesis, if defending thesis)	Graduate Advisor or Chair, Advisory Committee	Registrar	Semester of graduation
5	File "STATEMENT OF INTENTION TO GRADUATE" form, including official title of thesis, if applicable.	Student	Graduate School Enrollment Management	Semester of graduation (One must be filed for each intended graduation semester)
6	Schedule final comprehensive examination and/or defense. Send email to the Thesis Coordinator indicating the time and date of the defense.	Student	Graduate School Thesis Coordinator	Semester of graduation (usually about 6 weeks before graduation)
7	After the exam, the advisor sends REPORT ON COMPREHENSIVE EXAM FORM to Enrollment Management.	Graduate Advisor (non-thesis option)	Graduate School Enrollment Management	By posted deadline
8	After defense, obtain committee signatures on the ORAL DEFENSE and THESIS-DISSERTATION APPROVAL FORM and submit to Graduate School	Student (thesis option)	Graduate School Thesis Coordinator	Prior to deadline during semester of graduation
9	Pay Thesis-Dissertation fee, if applicable	Student (thesis option)	Student Business Services	Prior to deadline during semester of graduation
10	After incorporating committee changes, submit .pdf file of thesis to the ETD site for official review	Student (thesis option)	Graduate School Thesis Coordinator	Semester of graduation (usually5 weeks before graduation date)
11	Final grade for thesis hours (A or B) Grade will be "CR" until final semester	Chair, Advisory Committee	Registrar Final grade roll	End of semester
12	Submit official .pdf of thesis to ETD web site (MM students submit PDF programs to ETD site and turn CDs of performances in to the Graduate School)	Student	Graduate School Thesis Coordinator	Prior to deadline

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TEXAS TECH UNIVERSITY
Graduate School

Required Steps for the DOCTORAL DEGREE

	ACTION	INITIATED THROUGH	SUBMITTED TO	TIME
1	Plan courses for degree	Graduate Advisor	Graduate Advisor	Prior to registration
2	Take preliminary exam (option)	Graduate Advisor	Graduate School Enrollment Management	Early in doctoral study, usually first semester of coursework
3	Set up doctoral advisory committee and title	Graduate Advisor	Graduate School Enrollment Management	Prior to filing doctoral degree plan
4	File changes in degree program, if necessary	Graduate Advisor or Chair, Advisory Committee	Graduate School Enrollment Management	As needed
5	Take Qualifying Examination for major and minor subjects.	Graduate Advisor or Chair, Advisory Committee	See step #7	After approval of doctoral program and completion of coursework
6	Recommendation for admission to candidacy (request by memo)	Chair of Committee	Graduate School Enrollment Management	After passing qualifying exam and no later than 4 months before graduation
7	Enroll in semester of graduation if all requirements are met (at least 3 hours)	Graduate Advisor or Chair, Advisory Committee	Registrar	Semester of graduation
8	File "STATEMENT OF INTENTION TO GRADUATE" form with official title of dissertation listed	Student	Graduate School Enrollment Management	Semester of graduation (One must be filed for each intended graduation semester.)
9	Pay the Thesis-Dissertation fee through Student Business Services	Graduate School Dissertation Supervisor	Student Business Services	Semester of graduation (This is paid only once.)
10	Schedule final oral defense of dissertation and submit DEFENSE NOTIFICATION FORM at least 3 weeks before defense	Student, Committee Chair, and Advisory Committee	Graduate School Dissertation Supervisor	At least 3 weeks before defense
11	Stand for final oral defense of dissertation	Advisory Committee	Graduate School Doctoral Coordinator	Semester of graduation
12	Submit signed ORAL DEFENSE and THESIS-DISSERTATION APPROVAL FORM and, after incorporating committee changes, submit .pdf file of dissertation to ETD site for review	Student, Advisory Committee	Graduate School Dissertation Supervisor	Semester of graduation (usually 5 weeks before graduation date)
13	Final grade for dissertation hours (A or B)	Committee Chair or Advisory Committee	Registrar-Final Grade Roll	End of semester
14	Submit final .pdf of dissertation to ETD web site (DMA students submit PDF programs to ETD site and turn CDs in to the Graduate School)	Student	Graduate School Dissertation Supervisor	Prior to deadline
15	Complete Doctoral Survey	Student	http://survey.norc.uchicago.edu/doctorate	Before graduation

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