



Department of
Atmospheric and
Oceanic Sciences

University of Colorado at Boulder

Graduate Student Handbook Spring 2021

DEPARTMENT DESCRIPTION: GRADUATE PROGRAM IN ATMOSPHERIC AND OCEANIC SCIENCES

.....
The Department of Atmospheric and Oceanic Sciences (ATOC) at the University of Colorado Boulder provides a world-class, interdisciplinary research and educational environment to examine the dynamical, physical, and chemical processes that occur in the atmosphere and ocean. A major theme is the establishment of a physical basis for observing, modeling, and understanding climate and global change.

The University of Colorado Boulder is located in a region having the greatest concentration of geophysical researchers in the nation and perhaps the world. The proximity of ATOC to this atmospheric and oceanic science excellence is the foundation of our unique philosophy and vision, which elevates our department to one of worldwide prominence. The guiding principle of ATOC is to be the focal point for atmospheric and oceanic science education and research training in this geographic region of world-renowned excellence. The University of Colorado, Boulder was ranked number one in atmospheric science in Shanghai Ranking's 2018, 2019, and 2020 Global Ranking of Academic Subjects.

ATOC's faculty members study Earth's weather and climate from the seafloor to the exosphere and from the tropics to the polar ice sheets. We aim to understand and respond to climate change and improve climate change projections in the atmosphere, cryosphere and oceans.

ATOC has been fortunate to attract the most outstanding graduate students in the field. Our students receive a significant number of fellowships and nationally recognized awards each year. They provide excellent instruction to CU's undergraduates as teaching assistants. They make scientific advances while conducting innovative research. Our graduate students go on to successful careers in academia, national research institutes, and private industry.

Graduate students, research staff, and faculty work together on a wide range of research topics: large-scale dynamics of the ocean and the atmosphere; air-sea interaction; radiative transfer and remote sensing of the ocean and the atmosphere; sea ice and its role in climate; cloud-climate interactions; atmospheric chemistry and aerosols; oceanic biogeochemistry; atmospheric technology; extended weather and climate prediction; hydrological processes; boundary layer measurement and modeling; and planetary atmospheres.

Interdisciplinary education and research opportunities exist with the Hydrology Program and the Center for Science and Technology Policy Research Program. Interdisciplinary research opportunities also exist with the Cooperative Institute for Research in the Environmental Sciences (CIRES), the Institute for Arctic and Alpine Research (INSTAAR),

the Laboratory for Atmospheric and Space Physics (LASP), the Renewable and Sustainable Energy Institute (RASEI) and many other labs in the area.

ATOC has extensive computer facilities and laboratories in remote sensing, chemistry, and hydrodynamics. The presence of leading laboratories in the environmental sciences in Boulder, including the National Center for Atmospheric Research, the NOAA Environmental Research Laboratories, and the National Renewable Energy Laboratory, provides additional opportunities for a rich educational experience. Opportunities also exist for involvement in field programs.

Areas of Study and Research

ATOC is an interdisciplinary program that provides an educational and research environment to examine the dynamical, physical, and chemical processes that occur in the atmosphere and the ocean. A major theme is the establishment of a physical basis for understanding, observing, and modeling climate and global change.

Graduate students admitted to ATOC are eligible to receive an advanced degree in Atmospheric and Oceanic Sciences. Graduate students outside of ATOC can pursue the Graduate Certificate in Atmospheric and Oceanic Sciences while earning a graduate degree from another department at CU-Boulder, or while taking coursework as a non-degree seeking student through Continuing Education's ACCESS Program provided they have already earned a bachelors degree and meet the course prerequisites.

Department Culture

ATOC strives to provide a learning environment that is supportive, inclusive, accessible, and free of bias, discrimination, and harassment. ATOC is working to create a culture that attracts diverse voices and empowers everyone to be their authentic, whole selves as we educate and conduct outstanding research at the forefront of our science. All ATOC graduate students should expect respectful and fair treatment from other department members. Enrolled ATOC graduate students are expected to abide by the CU Boulder student code of conduct at all times, to treat one another with mutual respect, to value and embrace differences, and to support one another in academic coursework and research.

Degrees Offered

Master's Degree (MS) For both thesis and non-thesis options, a total of 30 credit

hours is required with at least 15 credit hours of ATOC courses numbered 5000 and above. Other specific course requirements are in the ATOC Graduate Handbook. For the thesis option, the final examination consists of an oral exam on the thesis. The non-thesis option requires the successful completion of a written final examination based on ATOC regular coursework requirements.

Doctoral Degree (PhD) A total of 36 credit hours of regular coursework is required, of which 30 hours must be numbered 5000 or above, with at least 18 credit hours of ATOC graduate lecture courses including core ATOC course requirements, and a graduate-level course in applied or computational mathematics. In addition, 30 credit hours of dissertation must be completed per Graduate School rules and requirements. Students must pass a two-part comprehensive examination before admission into candidacy. Part I of the comprehensive examination is a written exam based on core course material and is normally taken in the second year. Part II of the comprehensive examination is normally taken in the third year and is an oral examination based on an original research paper prepared by the student. After the PhD dissertation has been submitted, a final examination of the dissertation will be conducted. For further information, please contact:

Graduate Program Assistant
Department of Atmospheric and Oceanic Sciences
Tel: (303) 492-7167
Fax: (303) 492-3524
E-mail: atocasst@colorado.edu
Web: <https://www.colorado.edu/atoc/>

ADMISSION REQUIREMENTS & APPLICATION PROCEDURES

ADMISSION REQUIREMENTS

An applicant may be admitted to the Graduate School as either a regular degree student or a provisional degree student. For acceptance into the Department of Atmospheric and Oceanic Sciences (ATOC), the following requirements must be met:

Regular Degree Students must:

1. Hold a baccalaureate degree from a college or university of recognized standing, or have done work equivalent to that required for such a degree.
2. Show promise of ability to pursue advanced study and research, as judged by the student's previous scholastic record and letters of reference.
3. Have had adequate preparation to enter graduate study in the chosen field.
4. Have at least a 3.00 (B) undergraduate grade point average.
5. International applicants must also submit official Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) scores.

Students with undergraduate degrees in the physical sciences (e.g., physics, chemistry, mathematics) and engineering are encouraged to apply. The general background expected of incoming graduate students includes:

- Undergraduate courses in calculus, differential equations, and computer programming.
- One-year sequences of undergraduate physics (calculus based) and chemistry.

Students with undergraduate degrees in other fields such as biology, environmental science, geography, or geology, are also invited to apply provided they meet the standards given here. Upper-level undergraduate courses in physics, chemistry, and mathematics are strongly recommended. Research and computer programming experience is also strongly recommended. Undergraduate courses in atmospheric science or oceanography are useful but not required as part of the undergraduate background.

While ATOC has on occasion admitted students in the spring semester, it is very rare. Your chances for admission and financial support from the department in the form of a teaching or research assistant position are much greater in the fall semester.

For answers to Frequently Asked Questions:

<http://www.colorado.edu/atoc/academics/academic-faq>

APPLICATION PROCEDURES

An applicant for admission must present complete application materials that include:

- The graduate application (online)
- For review and decision purposes you are required to upload an unofficial copy of your transcript(s) in the online application (see more information below).
- Four letters of recommendation (submitted online or mailed to the department)
- A personal statement of academic interests
- \$60 non-refundable application fee for domestic applicants or \$80 for international applicants*

*ATOC offers a need-based application fee waiver program. See [here](#) for more details.

At a minimum, the personal statement of academic interests should describe the following:

- 1 Motivation for applying to graduate school
- 2 Experience or other relevant qualifications
- 3 Long-term goals

If known, please also describe your specific field of interest, including faculty members or scientists with whom you would like to work. The personal statement will be evaluated not only for content, but also to gauge writing ability.

CU Boulder Graduate School

All international applicants are required to meet a minimum standard of English proficiency. The Test of English as Foreign Language (TOEFL), or an International English Language Testing System (IELTS) score is required unless English is your native language. If you have completed at least one year full-time academic study at a U.S. institution (or at an institution in a country where English is the native language) at the time you apply, you have fulfilled the English proficiency requirement for the Office of Admissions. The University requires a minimum TOEFL score of 537 (paper based), 203 (computer based), and/or 75 (new internet based). The University requires a minimum IELTS score of 6.0.

For admission in the fall semester with full consideration for financial assistance from the department, complete domestic applications must be received by January 1 and complete international applications by December 1. Late applications will be considered until all positions are filled.

Department financial support is in the form of teaching assistantships (TA), research assistantships (RA), and/or fellowship money. There is not a separate form to apply for this support. However, please do include a short note with your application asking to

be included in the pool for these forms of financial support from the department or indicating that you have your own financial support. This note may be included in your personal statement or an email sent to atocasst@colorado.edu.

Application Deadlines

Fall admission:

- Domestic application deadline: December 1
- International application deadline: December 1

Spring admission:

- Domestic application deadline: October 1
- International application deadline: October 1

For admission in the fall semester with full consideration for financial support from the department, complete applications must be received by December 1. Late applications will be considered until all positions are filled. Please note, while the department does accept late applications it is in the applicant's best interests to submit all application materials as soon as possible.

How to Submit Transcripts

For review and decision purposes you are required to upload an unofficial copy of your transcript(s) in the online application. We require one copy of the scanned transcript from each undergraduate and graduate institution that you attended. This includes community colleges, summer sessions, and extension programs. While credits from one institution may appear on the transcript of a second institution, unofficial transcripts must be submitted from each institution, regardless of the length of attendance, and whether or not courses were completed. Failure to list and submit transcripts from all institutions previously attended is considered to be a violation of academic ethics and may result in the cancellation of your admission or dismissal from the university.

ONLY after you are recommended for admission will you need to provide official transcripts. For instructions on how to upload unofficial transcripts go to http://www.colorado.edu/GraduateSchool/academics/docs/uploading_unofficial_transcripts.pdf.

MASTER'S DEGREE THESIS OPTION

ACADEMIC STANDARDS

A student is required to maintain at least a 3.00 (B) average in all work attempted while enrolled in the Graduate School. For the M.S., a course mark below C is unsatisfactory and will not be counted toward fulfilling requirements for the degree.

MASTER'S DEGREE THESIS OPTION REQUIREMENTS

The requirements for an M.S. degree include the following:

1. 30 semester hours of coursework, of which 24 hours must be numbered 5000 or above, and at least 15 semester hours must be from ATOC graduate courses, including four of the core ATOC courses. See specific ATOC course requirements for the M.S. below.
2. A minimum of 4 (but no more than 6) thesis hours. Note: thesis credit hours can be counted toward the total 30 hours of coursework and the 15 hours of ATOC coursework requirement.
3. Successful completion of a M.S. thesis and oral final examination based on this thesis.
4. Completion of all degree requirements within 4 years of the date of commencing course work, but normally in 2 years. Students may petition the Graduate School for extension(s).

Note: Students planning to pursue a Ph.D. degree may elect to obtain the M.S. degree, but this is not a requirement for advancement to the Ph.D. program.

COURSE REQUIREMENTS

1. Up to 6 semester hours of approved 3000- and 4000-level coursework from engineering, math, physics, chemistry, or biology may be applied toward the M.S. degree. No credit will be given toward the M.S. degree for ATOC coursework below the 5000 level.
2. A minimum of 15 semester hours from ATOC lecture courses (independent study courses cannot be used to satisfy this requirement).
3. All of MS students are required to take the following four ATOC core courses, or their equivalent:

ATOC 5050: Atmospheric Thermodynamics and Dynamics
ATOC 5051: Introduction to Physical Oceanography

ATOC 5060: Dynamics of the Atmosphere and Oceans

ATOC 5235: Intro to Atmospheric Radiative Transfer and Remote Sensing

4. Up to 3 semester hours of independent study (ATOC 5900), and/or seminar (ATOC 6020) may be used toward the 30 hours of regular coursework in the degree requirements.
5. A minimum of 4 (but no more than 6) thesis hours. Note: thesis credit hours can be counted toward the total 30 hours of coursework and the 15 hours of ATOC coursework requirement.
6. Up to 9 semester hours may be transferred from another accredited institution and applied toward an M.S. degree. Credit for ATOC core coursework must be approved by the graduate advisor.

GUIDELINES FOR MS THESIS

The M.S. thesis must consist of original and independent research conducted by the graduate student under the supervision of the faculty advisor. The thesis topic must be related to the major field, and:

1. Represent the equivalent of 4 to 6 semester hours of course work.
2. Receive the approval of the major department at least 30 days before commencement at which the degree is to be conferred.
3. Be completed at the time the final examination is held.
4. Comply with the University of Colorado Graduate School Thesis and Dissertation Specifications.
5. Be filed with the Graduate School by posted deadlines for the semester for which the degree is to be conferred.

MS THESIS EXAM COMMITTEE

The examination committee for the M.S. final exam will consist of three graduate faculty members, at least two of whom must be ATOC core faculty members. The examination consists of a 30 minute oral presentation given by the candidate on the thesis subject, followed by a period of questions for the candidate by the committee. The oral presentation is open to anyone that wishes to attend. The full examination typically does not exceed two hours in duration.

Any student with a research advisor outside of ATOC (e.g., an advisor who is from another department, or a full time employee at NCAR, NOAA, etc.), must also have an academic advisor who is an ATOC core faculty member. The academic advisor should be identified by the student in collaboration with their research advisor as soon as possible, and no later than one month after research begins. Once an ATOC faculty

member agrees to act as academic advisor, it is their responsibility to communicate ATOC policies and requirements to the research advisor, and to ensure that the student is meeting all ATOC requirements and making good academic progress toward the degree.

MASTER'S DEGREE NON-THESIS/FINAL EXAM OPTION

.....

ACADEMIC STANDARDS

A student is required to maintain at least a 3.00 (B) average in all work attempted while enrolled in the Graduate School. For the M.S., a course mark below C is unsatisfactory and will not be counted toward fulfilling requirements for the degree.

MASTER'S DEGREE NON-THESIS/FINAL EXAM OPTION REQUIREMENTS

The requirements for an M.S. degree include the following:

1. 30 semester hours of coursework, of which 24 hours must be numbered 5000 or above, and at least 15 semester hours must be from ATOC graduate courses, including four of the core ATOC courses. See specific ATOC course requirements for the M.S. below.
2. Successful completion of a written final examination based on ATOC regular coursework. The ATOC Comprehensive Exam I can be used to satisfy this requirement.
3. Completion of all degree requirements within 4 years of the date of commencing course work, but normally in 2 years. Students may petition the Graduate School for extension(s).

Note: Students planning to pursue a Ph.D. degree may elect to obtain the M.S. degree, but this is not requirement for advancement to the Ph.D. program.

COURSE REQUIREMENTS

1. Up to 6 semester hours of approved 3000- and 4000-level coursework from engineering, math, physics, chemistry, or biology may be applied toward the M.S. degree. No credit will be given toward the M.S. degree for ATOC coursework below the 5000 level.
2. A minimum of 15 semester hours from ATOC lecture courses (independent study courses cannot be used to satisfy this requirement).
3. All of MS students are required to take the following four ATOC core courses, or their equivalent:

ATOC 5050: Atmospheric Thermodynamics and Dynamics
ATOC 5051: Introduction to Physical Oceanography
ATOC 5060: Dynamics of the Atmosphere and Oceans
ATOC 5235: Intro to Atmospheric Radiative Transfer and Remote Sensing

4. Up to 3 semester hours of independent study (ATOC 5900), ATOC 6700 Weather Forecasting Seminar, and/or seminar (ATOC 6020) may be used toward the 30 hours of regular coursework in the degree requirements.
5. Up to 9 semester hours may be transferred from another accredited institution and applied toward an M.S. degree. Credit for ATOC core coursework must be approved by the graduate advisor.

DOCTORAL DEGREE REQUIREMENTS

ACADEMIC STANDARDS

A student is required to maintain a 3.00 (B) average in all work attempted while enrolled in the Graduate School. For the Ph.D., a course grade of C+ or below is unsatisfactory and will not be counted toward fulfilling requirements for the degree.

DEGREE REQUIREMENTS

The requirements for a Ph.D. degree include the following:

1. 36 semester hours of regular coursework, of which 30 hours must be numbered 5000 or above, and at least 18 semester hours must be from ATOC graduate lecture courses, including core ATOC course requirements.
2. 30 semester hours of dissertation credit with no more than 10 having been accrued prior to the semester the comprehensive examination was passed. Up to 10 hours of dissertation credit may also be taken during the semester the comprehensive examination is passed. Note: students can take a maximum of 10 dissertation credit hours per semester, and a total of 15 credit hours of combined dissertation and general class hours per semester.
3. Successfully passing the Ph.D. Comprehensive Examinations (COMPS I and COMPS II).
4. Completing a Ph.D. dissertation, with successful defense of the dissertation in a Final Examination.
5. The minimum residence requirement for a Ph.D. is six semesters beyond the attainment of an acceptable bachelor's degree. During this time a student must be full-time. (Two semesters enrolled in a Master's degree program from another institution may be counted towards this requirement).
6. A student is required to register continuously, fall and spring semesters of each year, beginning with the semester following the passing of the Comprehensive Examinations and extending through the semester in which the dissertation is defended (final examination). Students should complete all requirements for the degree within six years of commencing work in the doctoral program, but may petition the Graduate School for extension(s).

COURSE REQUIREMENTS

1. All courses taken for the Master's degree at the 5000 level or above at the University of Colorado may be applied toward the Doctoral degree at the University.
2. Up to 6 semester hours of approved 3000- and 4000-level coursework from engineering, math, physics, chemistry, or biology may be applied toward the Ph.D. degree. No credit will be given toward the Ph.D. degree for ATOC coursework below the 5000 level.
3. A minimum of 18 semester hours must be taken from ATOC lecture courses. Note: independent study courses and/or seminar courses are not considered lecture courses.
4. All of Ph.D. students are required to take the following four ATOC core courses, or their equivalent:

ATOC 5050: Atmospheric Thermodynamics and Dynamics
 ATOC 5051: Introduction to Physical Oceanography
 ATOC 5060: Dynamics of the Atmosphere and Oceans
 ATOC 5235: Intro to Atmospheric Radiative Transfer and Remote Sensing

All of Ph.D. students are required to take two courses from the following list of core courses, or their equivalent:

ATOC 5151: Atmospheric Chemistry
 ATOC 5200 Biogeochemical Oceanography
 ATOC 5600: Physics and Chemistry of Clouds and Aerosols
 ATOC/ASTR 5400: Introduction to Fluid Dynamics
 GEOL 5270: Marine Chemistry and Geochemistry
 GEOL 5430: Paleoceanography and Paleoclimatology
 MCEN 5021: Introduction to Fluid Dynamics

5. One graduate-level mathematics course must be taken from the following approved list:

ATOC 7500: Objective Data Analysis*
 ASTR 5540: Mathematical Methods
 APPM xxxx: Any course with number at the 4000 level or above
 ASEN 5227: Mathematics for Aerospace Engineering Sciences 1
 ASEN 5417: Numerical Computations
 ASEN 5327: Computational Fluid Dynamics
 CVEN 5454: Statistical Methods for Natural and Engineering Systems
 CVEN 6833: Advanced Data Analysis
 PHYS 5030: Intermediate Mathematical Physics 1
 PHYS 5040: Intermediate Mathematical Physics 2

*strongly recommended by ATOC to fulfill the math requirement

In exceptional cases, the math requirement can be fulfilled through demonstrated, prolonged application of advanced mathematics. This option must be approved by the student's committee and is intended primarily for professionals with ten+ years of experience in advanced applications of mathematics outside of graduate school

6. Up to 6 semester hours of independent study (ATOC 5900), and/or seminar (ATOC 6020) may be used toward the 36 hours of regular coursework in the degree requirements.
7. Up to 21 semester hours may be transferred from another accredited institution and applied toward a Ph.D. degree. 9 of the remaining 15 semester hours must be ATOC courses. However, students must still satisfy the ATOC core course requirement either by taking ATOC core courses or transferring like courses contingent upon approval by the grad advisor.

COMPREHENSIVE EXAMINATION

A student must pass the Ph.D. Comprehensive Examination before admission into Ph.D. candidacy. The Comprehensive Examination is given in two parts, which are referred to as "Comps I" and "Comps II".

Comps I consists of a written, closed book examination. Students who fail to pass the exam after the second attempt will be dismissed from the Ph.D. program.

After completing the requisite course work and passing Comps I, a student is eligible to apply for candidacy for the Ph.D. degree by submitting the form "Application for Admission to Candidacy for an Advanced Degree" to the Graduate School. Before admission into candidacy, the student must pass Comps II, which is an oral exam based primarily upon a written document that represents original research by the student. An "Exam Request Form" must be submitted to the Graduate School at least two weeks in advance of the Comps II exam. A successful candidate must receive the affirmative votes of a majority of the members of the examining board. The student is suspended automatically by the Graduate School after a second failure.

DOCTORAL DISSERTATION

A dissertation based on original investigation and showing mature scholarship and critical judgment, as well as familiarity with tools and methods of research, must be

written on a subject approved by the student's Ph.D. committee. Each dissertation presented in partial fulfillment of the doctoral degree must:

1. Comply with the "University of Colorado Graduate School Thesis and Dissertation Specifications."
2. Be filed with the Graduate School by the posted deadline for the semester in which the degree is to be conferred.

FINAL EXAMINATION

After a preliminary copy of the dissertation has been accepted for defense by the student's committee, a final examination on the dissertation and related topics is conducted. The following rules must be observed:

1. A student must be registered as a regular degree student on the Boulder Campus for a minimum of 5 dissertation hours during the semester in which the final examination is scheduled.
2. The examination consists of an oral presentation given by the candidate on the dissertation subject, followed by a period of questions for the candidate by the committee. The oral presentation is open to anyone who wishes to attend. The full examination typically does not exceed two hours.
3. The examination will be conducted by the Ph.D. Committee.
4. More than one dissenting vote will result in failure. In case of failure, the examination may be attempted once more. A second failure will result in automatic suspension by the Graduate School. Signatures from 5 committee members are required.
5. Students must notify the Graduate School at least two weeks in advance of the scheduled date of the final examination.

Ph.D. COMPREHENSIVE EXAMINATION

.....

The Ph.D. Comprehensive Examination is conducted in two parts, referred to as "Comps I" and "Comps II". Comps I is a written exam. Comps II is an oral exam based upon a written report of original student research. Successful completion of the Comprehensive Examination is required before a student is admitted into Ph.D. candidacy.

COMPS I

For students who have been continuously enrolled as full time students and started the program in a fall semester, the exam should be taken just prior to the start of the second year in August. For students who started the program in a spring semester, the exam should be taken just prior to the start of the third semester in August. Students may opt to take the exam just prior to starting the first year in August, so long as they recognize that this counts towards their two attempts to pass.

- Comps I is a proctored written exam (closed book). The time allocated for the Exam is 6 hours (9AM-noon and 1PM-4PM with a one hour lunch break). Typically the exam is offered shortly before classes start in the fall semester.
- Calculators and one single-sided page (8.5" x11" or smaller with a 1" margin) of notes for each of the 7 areas referenced below (7 pages total, no more than 1 page for each area) are allowed. Each page may contain text, graphs, and/or equations deemed relevant to the main ideas and techniques presented in the courses. Font size should be equivalent to 10 point or larger, or, if the notes are hand written they should be easily readable without magnification. Multiple colors may be used. The sheets will be checked at the exam. Books, and lap-top type computers **are not** permitted.
- Each candidate must answer 4 out of 7 questions based on the following ATOC courses. Students must answer at least one question from either ATOC 5050: Atmospheric Thermodynamics and Dynamics or ATOC 5060: Dynamics of the Atmosphere and Oceans:

ATOC 5050: Atmospheric Thermodynamics and Dynamics

ATOC 5051: Introduction to Physical Oceanography

ATOC 5060: Dynamics of the Atmosphere and Oceans

ATOC 5151: Atmospheric Chemistry

ATOC 5200: Biogeochemical Oceanography

ATOC 5235: Intro to Atmospheric Radiative Transfer and Remote Sensing

ATOC 5600: Physics and Chemistry of Clouds and Aerosols

- Partial credit is given.
- Candidates who fail the exam must retake the exam the following year. Only one retake is allowed. The ATOC faculty may judge that a candidate has demonstrated mastery of individual subjects while failing the exam as a whole. In that case, a candidate must retake the exam, but they shall not answer questions for subjects in which they have already demonstrated mastery. On the retake, these candidates must select questions from subjects they either did not answer on the first attempt, or in which they did not demonstrate mastery. On the retake, a candidate must answer the number of questions required so that the number of questions on which the candidate demonstrated mastery on the first attempt plus the number they answered on the retake is equal to 4. The time for the exam will be pro-rated based on the number of questions to be answered.

To prepare for the exam, students should take at least 4 of the ATOC core courses (or transfer in the equivalent). Copies of questions and solutions from previous exams can be obtained from the Graduate Program Assistant.

Every effort is made to ensure fairness in formulating and grading the questions. The questions are collectively considered by an Examination Committee, which includes several students that are Ph.D. candidates. Each student taking the exam is assigned a letter designation, so that the papers are anonymous to the faculty grading the question. Each question is graded separately by 2 faculty members - the faculty member that wrote the exam question and an additional faculty member that has expertise in the subject area. The decision as to whether a student passes the Exam is made by the entire ATOC faculty. While grades vary from year to year and from question to question based upon difficulty of the questions, a total score of 70% or higher is typically a passing score. Students are informed of the outcome of the Exam within 3 weeks of the Exam.

COMPS II

Successful completion of the Comps II is required before a student is admitted into Ph.D. candidacy. The following are guidelines for the comprehensive examination:

1. At least one week before the Exam, the candidate must provide each member of the Ph.D. committee with a written document representing original research by the student.

2. The form "Application for Admission to Candidacy for an Advanced Degree" must be completed by the student. The application with all required signatures must be submitted to the Graduate School at least 14 days before the Comps II Exam is taken.
3. The COMPS II exam must be taken by November 15 of the third year. This assumes that COMPS I was first attempted just prior to the start of the second year in August; exceptions will be dealt with on a case-by-case basis. The student is responsible for scheduling the Examination. If the student is not ready for the examination at this time or if committee member travel schedules preclude scheduling, the student should submit an Official Request for Time Extension. Failure to take the exam in the allotted time frame constitutes a failure of the exam (see #6 below).
4. The Comps II Exam typically requires 2 hours. The candidate makes an oral presentation on the research, typically of about 40 minutes duration, for which attendance is open. The remainder of the Exam consists of questions directed to the candidate by the committee members (closed attendance; only the candidate and the committee). The questions typically pertain to the subject matter and content of the research, but may also be asked on topics outside this area, at the committee's discretion.
5. The Exam is conducted by the Ph.D. Committee. The student's advisor cannot be the chair of the Examination Committee (although the advisor typically serves on the Committee).
6. A successful candidate must receive the affirmative votes of a majority of the members of the examining board. In case of failure, the examination may be attempted once more after a period of time determined by the Ph.D. committee, which typically does not exceed 3 months. The student is automatically suspended after a second failure.

GOALS and EXPECTATIONS

The goal of the second comprehensive exam (COMPS II) is to demonstrate the candidate's ability to conduct independent research. The objective is not to eliminate poor students, but to teach students how to do research, and confirm they are learning the process. COMPS II consists of writing a paper on, and orally presenting the results of, a research project. The oral presentation is followed by questions from a 5-member exam committee (which is selected by the student). The questions are meant to probe whether the student is familiar with the literature in the area, whether they understand

the basic techniques and science related to the problem, and whether they have the ability to work and generate research ideas independently. Generally, it is desirable that the research be of a quality that could be published, or lead to something later that could be published. Indeed, at this point some students are able to submit (or have already submitted) a paper on their Comps II project to a peer-reviewed journal.

Occasionally some students have trouble with COMPS II. A common problem is that students are not given a well defined problem by their advisor that is uniquely their own, as opposed to a group effort. Students have to demand a problem from their advisors that is well defined, and depends mainly on their own work. If a student is uncertain about the problem, they should form their exam committee early and have the committee assess the problem. Another common issue is that some projects take longer than expected, resulting in a delay in taking the exam. In this event, the student should discuss the delay with their committee to ensure that they are proceeding as efficiently as possible in a fruitful direction. Rarely a student's project is destroyed by events beyond their control, such as a satellite malfunction. This can result in a very substantial delay. In this case a new question related to the thesis (so that the thesis is not delayed) may be posed, and the Comps delayed until that project is developed. Such a decision would need to be approved by the ATOC Chair, in consultation with the ATOC graduate advisor.

If the student is funded as a research assistant, then the research topic is typically selected to fall within the scope of the research grant providing the financial support for the student. However, the student is expected to select and articulate their own research topic. Varying degrees of guidance may be provided by the research advisor and other members of the research group; it is generally expected that the research advisor will work closely with the student to ensure the research project is of publication quality. However, the student must still demonstrate the ability to conduct independent research.

The length of the research papers of successful candidates has varied widely. A typical length is 25 pages; 10 pages is likely to be too short, while 40 pages may be unnecessarily long. A successful written research paper and examination convinces the Ph.D. committee that the candidate has:

- A thorough understanding of the research literature in the chosen field
- Addressed an original research problem
- Familiarity with the tools and methods of research
- Demonstrated a capability to conduct independent research
- The writing skills to satisfactorily communicate their research

Ph.D. EXAM COMMITTEE

The student will establish a Ph.D. committee of at least 5 members of the CU graduate faculty. Three of the committee members must be regular CU faculty members, comprised of 2 ATOC core faculty, and one faculty member outside the ATOC core faculty. The remaining committee members may be regular faculty members or others (including scientists from other institutions) that have been approved as members of the CU Graduate Faculty. The Chair of the Ph.D. Committee must be a regular CU faculty member. The membership of this committee must be approved by the Department Chair and the Graduate School. This committee will serve as the examining board for the Comprehensive Examination and the Final Examination and is expected to meet with the student on an annual basis (Note: the membership of this committee may differ from that of the Comps II Exam committee).

Any student with a research advisor outside of ATOC (e.g., an advisor who is from another department, or a full time employee at NCAR, NOAA, etc.), must also have an ATOC academic advisor who is an ATOC core faculty member. The academic advisor should be identified by the student in collaboration with their research advisor as soon as possible, and no later than the first attempt at the Comps I exam, after research begins. Once an ATOC faculty member agrees to act as academic advisor, it is their responsibility to communicate ATOC policies and requirements to the research advisor, and to ensure that the student is meeting all ATOC requirements and making good academic progress toward the degree. Generally, the academic advisor will also be a member, but not chair, of the student's COMPS II and dissertation committees.

DOCTORAL DISSERTATION AND FINAL EXAM/DEFENSE

The Ph.D. thesis is based upon original research and shows mature scholarship and critical judgment, as well as familiarity with tools and methods of research. The Ph.D. thesis differs from a M.S. thesis or a single journal publication in terms of the scope and/or originality and significance of the research.

The subject of the Ph.D. thesis should be approved by the student's Ph.D. Committee in a meeting with the student within 18 months of admission into Ph.D. candidacy. Some research advisors may request a written thesis proposal; others may require only an oral presentation. The Ph.D. Committee may provide advice on the scope and methods of the research, and will provide an assessment of the suitability of the proposed research for a Ph.D. thesis. The Ph.D. candidate is expected to meet with

the committee annually to discuss research progress. A written report will be provided to the student by the research advisor after each meeting with the committee.

The content of a Ph.D. thesis should include:

- Motivation for the research
- Hypotheses, scientific questions, and/or unique observational or analytical tools addressed in the research
- Survey of relevant literature
- Description of research tools and methods
- Research results
- Conclusion that assesses the significance of the results, limitations of the research, and future applications of the research

Theses that emphasize development of observational or analytical tools (e.g. development of instrumentation or numerical models) are expected to include in the thesis research some application of the tool to a scientific problem.

The format of the thesis may be that of the conventional thesis, where individual chapters correspond to topics such as those described above. If the student has published or submitted for publication several manuscripts, the student may elect to include these manuscripts as appendices in the thesis. These manuscripts should only include those for which the student is first author (Note: student's contributions to non-first-authored papers can be included in the body of the thesis). The body of the thesis may then be relatively short, describing the overall motivation, hypotheses, tools, highlights of results (including any results not in the appendices), and conclusions.

Scheduling the Final Examination (defense) is the responsibility of the student. The student should schedule a meeting with his or her entire committee approximately one year prior to when the student thinks he or she will be ready to defend to determine if completion of the dissertation along this timeline is feasible. Scheduling of the actual defense date is normally done only after the research advisor and other committee members have read at least a preliminary copy of the written dissertation and have given approval to proceed with the Exam. Once the defense date has been set, the ATOC guideline for submitting a polished copy of the written dissertation to each committee member is one month prior to the date of the defense.

The format of the Final Examination (defense) is similar to that of the Comprehensive Examination. However, the entire Final Examination is open to any interested person. The candidate gives an oral presentation of the thesis research that is about 45 minutes in length. After the presentation, questions from the audience are addressed.

More detailed questions are then asked by the committee members. After the Exam, the Ph.D. Committee meets in closed session to decide upon the outcome.

FINAL EXAMINATION

After a preliminary copy of the dissertation has been accepted for defense by the student's committee, a final examination on the dissertation and related topics is conducted. The following rules must be observed:

1. A student must be registered as a regular degree student on the Boulder Campus for a minimum of 5 dissertation hours during the semester in which the final examination is scheduled.
2. The examination consists of an oral presentation given by the candidate on the dissertation subject, followed by a period of questions for the candidate by the committee. The oral presentation is open to anyone who wishes to attend. The full examination typically does not exceed two hours.
3. The examination will be conducted by the Ph.D. Committee.
4. More than one dissenting vote will result in failure. In case of failure, the examination may be attempted once more. A second failure will result in automatic suspension by the Graduate School. Signatures from 5 committee members are required.
5. Students must notify the Graduate School at least two weeks in advance of the scheduled date of the final examination.

Ph.D. DISSERTATION

A dissertation based on original investigation and showing mature scholarship and critical judgment, as well as familiarity with tools and methods of research, must be written on a subject approved by the student's Ph.D. committee. Each dissertation presented in partial fulfillment of the doctoral degree must:

1. Comply with the "University of Colorado Graduate School Thesis and Dissertation Specifications."
2. Be filed with the Graduate School by the posted deadline for the semester in which the degree is to be conferred.

PART TIME STUDENT GUIDELINES FOR COMPLETION OF DEGREE

ATOC Departmental Definition: A part time student is a student who does not receive financial support in the form of a graduate student appointment (teaching assistant or research assistant) from ATOC, another academic department, or university research institute.

PLEASE NOTE: This definition is separate from university and graduate school definitions of a full or part time student. This definition applies only to ATOC departmental rules. The student will still need to adhere to university and graduate school rules regarding continuous enrollment, time limits, and enrollment past the oral comprehensive exam (COMPS II).

COMPS I: For students who have been continuously enrolled as full time students and started the program in a fall semester, the exam should be taken just prior to the start of the second year in August. For students who started the program in a spring semester, the exam should be taken just prior to the start of the third semester in August. Students may opt to take the exam just prior to starting the first year in August, so long as they recognize that this counts towards their two attempts to pass.

Part time students often do not complete the ATOC core coursework necessary for the COMPS I exam during the first year. Instead, the part time student is expected to complete the COMPS I exam in August following the completion of the ATOC core coursework, no later than the fourth year, and are expected to meet with an ATOC advisor yearly.

COMPS II: The COMPS II exam must be taken by November 15 of the third year. This assumes that COMPS I was first attempted just prior to the start of the second year in August; exceptions will be dealt with on a case-by-case basis. The student is responsible for scheduling the examination. If the student is not ready for the examination at this time or if committee member travel schedules preclude scheduling, the student should submit an Official Request for Time Extension. Part time students are also expected to submit this official request so that the department can insure that good academic progress is being made.

A part time student is expected to complete the COMPS II exam on the same schedule as a full time student, that is by November 15 of their third year. A part time student may choose to complete the oral comprehensive exam (COMPS II) before the written comprehensive exam (COMPS I) has been accomplished. The student should carefully discuss this option with his or her research advisor and other committee members.

This does not relax the requirement for the successful completion of the written comprehensive exam (COMPS I).

STUDENT CODE OF CONDUCT

ATOC graduate students are expected to abide by the [CU Boulder student code of conduct](#), the honor code, the sexual misconduct policy, and the discrimination and harassment policy at all times, to treat one another with mutual respect, to value and embrace differences, and to support one another in academic coursework and research. This handbook lists selected conduct and policy violations from the full code and policy documents. Students are encouraged to read the full codes of conduct and policy documents for further information.

[Student Conduct](#) violations, including, but not limited to:

- Physical misconduct: any intentional physical force that could cause bodily harm
- Threats to or endangerment of person(s): verbal or written threats that endanger the safety of others
- Abusive conduct: including severe, persistent, or pervasive verbal abuse, threats, intimidation, coercion, or other conduct which causes substantial emotional distress
- Theft: possessing property known to be stolen, or taking property of another without consent
- Drugs: possessing, using, providing, manufacturing, or selling drugs in violation of university policies or law. This includes a prohibition of any marijuana or other drug use or possession, either on campus or while participating in university sponsored activities, such as fieldwork or conference-related travel.
- Alcohol: intoxication to the point of endangering oneself or another person's health or safety

[Honor Code](#) violations, including, but not limited to:

- Plagiarism: portrayal of another's work or ideas as one's own
- Cheating: use of prohibited notes or study aides, copying another student's course work
- Resubmission: submitting the same or similar work for credit more than once without permission from all course instructors involved
- Aiding academic dishonesty: facilitating any act which may help a student to gain an unfair academic advantage, including sharing a previous semester's course materials

[Sexual Misconduct, Intimate Partner Violence, and Stalking Policy](#) violations, including, but not limited to:

- Engaging in unwelcome sexual advances or behaviors
- Stalking or domestic violence
- Failure to report: all ATOC graduate students are considered responsible employees and expected to report incidents and concerns of sexual misconduct, intimate partner violence, stalking, or related violations to the [Office of Institutional Equity and Compliance](#), regardless of their mode of financial support (TA/RA/fellowship).

[Discrimination and Harassment Policy](#) violations, including, but not limited to:

- Protected class harassment or discrimination: Protected class refers to age, color, disability, gender, gender expression, gender identity, national origin, political affiliation, political philosophy, pregnancy, race, religion/creed, sex, sexual orientation, veteran status
- Failure to report: all ATOC graduate students are considered responsible employees and expected to report incidents or concerns of protected-class discrimination and harassment or related violations to the [Office of Institutional Equity and Compliance](#), regardless of their mode of financial support (TA/RA/fellowship).

GRIEVANCE POLICY

.....

Student Ethics

Students are expected to adhere to the highest codes of personal and professional ethics. Students who do not adhere to written guidelines regarding academic honesty, academic or research ethics, may be dealt with according to the policies for academic dishonesty, academic ethics, or research misconduct as published in the appropriate policy documents available in the Graduate School. Students found guilty of misconduct in any of these areas may have sanctions imposed, or may be dismissed from CU-Boulder.

Grievances

The Graduate School Grievance Process and Procedure (“the Grievance P&P” or “P&P”) establishes and describes the process through which graduate students can communicate concerns related to academic issues or academic conflicts, with the goal of ensuring that the student filing a grievance is better able to achieve academic success. This is a non-adversarial, non-judicial process. The rules of evidence, and any

other rules that typically govern a criminal or civil court, are not applicable to the Grievance Procedure.

Information regarding this policy can be found on the Graduate School's website at https://www.colorado.edu/graduateschool/sites/default/files/attached-files/grievance_process_and_procedures_2019_final.pdf.

CERTIFICATES

The University of Colorado recognizes that interdisciplinary study at the graduate level may involve coursework and formal requirements that exceed those of established degree programs. To recognize this additional work by graduate students, interdisciplinary faculty may establish a certificate program within the Graduate School.

Graduate students can pursue a graduate level certificate while earning a graduate degree at CU-Boulder or while taking coursework as a non-degree seeking student through Continuing Education's ACCESS Program, provided they have already earned a bachelor's degree and meet the course prerequisites.

CERTIFICATE IN ATMOSPHERIC AND OCEANIC SCIENCES

Requirements for a Graduate Certificate in Atmospheric and Oceanic Sciences:

If you are currently a graduate student at CU, or if you have a bachelor's degree and are a non-degree seeking ACCESS student, you may pursue the ATOC Graduate Certificate by satisfactorily completing four ATOC graduate level courses* or their cross-listed equivalents (ie ATOC 5151 or CHEM 5151) provided the cross-listed equivalents are not offered through your home department(s). To satisfactorily complete a course, you must earn a grade of B or better.

Students must meet course prerequisites prior to enrollment. Most of the ATOC Graduate Certificate Courses require at least one year of Calculus and one year of Calculus-based Physics. During the final semester of coursework or upon completion of the ATOC Graduate Certificate requirements, students should contact the ATOC Graduate Program Assistant (atocasst@colorado.edu).

*ATOC graduate level courses are considered those above the 5000 level. ATOC 5000: Critical Issues in Climate and the Environment cannot be applied towards the ATOC certificate requirements.

CERTIFICATE IN OCEANOGRAPHY

Graduate students can pursue the Graduate Certificate in Oceanography while earning a graduate degree at CU-Boulder or while taking coursework as a non-degree seeking student through Continuing Education's ACCESS Program, provided they have already earned a bachelor's degree and meet the course prerequisites. The Graduate Certificate in Oceanography is noted on the official CU transcript.

Requirements for a Graduate Certificate in Oceanography:

To earn a Graduate Certificate in Oceanography, students must take at least three qualifying oceanography courses (see below) passed with grade B or better. An independent study course may replace one of the qualifying oceanography courses.

Courses:

- ATOC 5051: Introduction to Physical Oceanography. Covers atmospheric motion and its underlying mathematical and physical principles. Explores the dynamics of the atmosphere and the mathematical laws governing atmospheric motion. Topics will include atmospheric composition and thermodynamics, conservation laws, geostrophic balance, vorticity dynamics, boundary layers, and baroclinic instability. Offered once per year (3 credits).
- ATOC 5061: Dynamics of Oceans. Explores theories of the large-scale, wind-driven, and thermohaline circulations in the oceans, and models of boundary currents, western intensification, ventilation, equatorial surface and undercurrents, ocean waves, and eddies. Mostly offered every other year (3 credits).
- ATOC 5200: Biogeochemical Oceanography. Provides a large-scale synthesis of the processes impacting ocean biogeochemistry. Transforms theoretical understanding into real-world applications using oceanographic data and models. Topics include: chemical composition, biological nutrient utilization and productivity, air-sea gas exchange, carbonate chemistry, ocean acidification, ocean deoxygenation, iron fertilization, biogeochemical climate feedbacks, and much more. Offered once per year (3 credits).
- ATOC 5300: The Global Carbon Cycle. Covers the role of the ocean, terrestrial biosphere, and atmosphere in the global carbon cycle. Specific topics include marine carbonate chemistry, biological production, terrestrial fluxes, anthropogenic emissions, and the evolution of the global carbon cycle in changing climate. Prereq., graduate standing in a physical science or instructor consent. Offered every other year (3 credits).
- ATOC 5730: Physical Oceanography and Climate. Introduces the field of physical oceanography, with emphasis on the ocean's interaction with the global atmosphere. Analysis of the ocean's heat, salt, and momentum budgets, wind-driven and thermohaline circulations, climate cycles including El Nino, and the ocean's role in climate change. Theory complemented by state-of-the art observations and models. Department recommended prerequisites: ATOC 1060 or ATOC 3070 or ATOC 3600 and one semester of calculus. Same as ATOC 4730. Offered once per year (3 credits).

- ASEN/ATOC 5215: Descriptive Physical Oceanography. Introduces the descriptive and dynamical physical oceanography, focusing on the nature and dynamics of ocean currents and their role in the distribution of heat and other aspects of ocean physics related to the Earth's climate. Dynamical material limited to mathematical descriptions of oceanic physical systems. Offered by the ASEN department.
- ASEN 5307: Engineering Data Analysis Methods. Gives students broad exposure to a variety of traditional and modern statistical methods for filtering and analyzing data. Topics include estimation methods, principal component analyses and spectral analyses. Introduces these methods and provides practical experience with their use. Offered by the ASEN department (3 credits).
- ASTR/ATOC 5400: Introduction to Fluid Dynamics. Covers equations of fluid motion relevant to planetary atmospheres and oceans, as well as stellar atmospheres; effects of rotation and viscosity; and vorticity dynamics, boundary layers, and wave motions. Introduces instability theory, nonlinear equilibration, and computational methods in fluid dynamics (3 credits).
- ASTR/ATOC 5410: Fluid Instabilities, Waves, and Turbulence. Involves linear and nonlinear analyses of small-scale waves and instabilities in stratified fluids, with effects of rotation. Studies internal gravity and acoustic waves with terrestrial, planetary, and astrophysical applications. Also studies thermal and double-diffusive convection, homogeneous and stratified shear flow instabilities. Examines these topics from the onset of small amplitude disturbances to their nonlinear development and equilibration (3 credits).
- GEOL 5060: Oceanography. Examines the ocean as a system influencing the Earth's surface processes and climate. Composition and properties of seawater, ocean circulation, waves, tides, coastal-, shallow-, and deep-water processes, biogeochemical cycles, and deep sea sediments. Laboratory emphasizes the use of oceanographic data. Offered by the GEOL department (3 credits).
- GEOL 5270: Marine Chemistry and Geochemistry. Examines the chemical, biological, geological, and physical processes affecting (and affected by) the chemistry of the oceans. Topics include: chemical speciation in seawater; the marine carbon cycle and its long-term control on atmospheric CO₂; the large-scale interdependence of nutrient distributions and biological productivity; chemical tracers of ocean circulation; and the chemistry of marine sediments, including early diagenesis. (3 credits)
- GEOL 5430: Paleoceanography and Paleoclimatology. Examines scientific tools, data, and theories related to the dramatically varied past climate of the Earth. Focus will be on marine records of climate change and ocean circulation, but ice core and continental archives will also be discussed. Course will cover the Cretaceous Period to the present, with particular emphasis on the past 150,000 years (the last ice age cycle). (3 credits)

- Graduate Level INDEPENDENT STUDY (3 credits). Students are allowed to take an “independent study” course to replace one of the core courses. The students may choose any member from the Oceanography Certificate Coordinating Committee or any professor who contributes to teaching the core courses to complete the “independent study” course. It is subject to the Certificate Program Director’s approval if the students choose independent study advisors from someone other than the above list. The course should combine textbook knowledge with real research experience, and thus provide the students with some basic research experience in oceanography. The course will also increase choices for the students who wish to obtain research experience.

Tracks:

Here are a few sample tracks satisfying the Oceanography Certificate requirements:

- **Astrophysical and Planetary Sciences Student interested in Europa:** ATOC 5051 (Intro to Physical Oceanography), ATOC 5061 (Dynamics of Oceans), ATOC/ASTR 5400 (Intro to Fluid Dynamics), GEOL 5270 (Marine Chemistry and Geochemistry).
- **Applied Math Hydrodynamicist:** ATOC 5051 (Intro to Physical Oceanography), ATOC/ASTR 5400 (Intro to Fluid Dynamics), ATOC 5061 (Dynamics of Oceans), ATOC/ASTR 5410 (Fluid Instabilities, Waves, and Turbulence).
- **Aerospace Engineer Remote Sensing of the Ocean:** ATOC 5215 (Oceanography), ATOC 5051 (Intro to Physical Oceanography), ATOC 5061 (Dynamics of Oceans).
- **Geology Paleooceanographer:** ATOC 5215 (Oceanography), GEOL 5060 (Oceanography), GEOL 5270 (Marine Chemistry and Geochemistry), ATOC 5051 (Intro to Physical Oceanography), GEOL 5430 (Paleoceanography and Paleoclimatology).
- **Ocean Geographer:** ATOC 5215 (Oceanography), GEOL 5060 (Oceanography), GEOL 5270 (Marine Chemistry and Geochemistry).

FUNDING

This section of the handbook addresses policies, guidelines, helpful hints, and opportunities for graduate students.

RESEARCH ASSISTANTSHIPS

During the academic year, graduate students who are conducting research with a faculty member typically receive a 50% research assistantship. This assistantship includes a stipend for living expenses plus tuition remission that is paid out of the research grant. The student is expected to work 20 hours per week in support of the research project in return for this stipend and tuition remission. Typically, this research is directly related to the student's thesis work. During the first two semesters, when students have a heavier course load, they may spend less than 20 hours per week on research upon approval of their research advisor. During subsequent years, when the course load is light, students typically spend substantially more than 20 hours per week doing research. During summer, students spend full time on research and typically receive a 100% research assistantship for a period of two and a half months. Note that a student does not receive paid vacations as a research assistant; 2 weeks of unpaid vacation are typically allotted during the summer. Additional (or less) vacation time is per prior agreement between the student and the advisor. Note that all research assistantships are subject to availability of federal research funds. Continuation of a research assistantship requires that a student maintain a B (3.00) GPA and perform satisfactorily in research.

TEACHING ASSISTANTSHIPS

During the academic year, some students may receive a 25% or 50% teaching assistantship. This assistantship includes a stipend for living expenses plus tuition remission depending on the percentage of the appointment.

Teaching assistants assigned to a lecture class are required to grade homework assignments, to provide written solutions to assignments, to be familiar with lecture material, to attend (or have attended in previous semesters) lectures, to proctor exams, and to grade all hourly examinations and the final examination. In addition, the lecture TA may be required to conduct occasional evening or daytime reviews for examinations.

Teaching assistants assigned to the weather laboratory are required to conduct two (2) two-hour laboratory sections each week, to prepare and deliver brief introductory material relating to each exercise, to see that the equipment is properly set up and

cared for, and to grade students' laboratory notebooks and laboratory-related homework. All TA's using laboratory equipment are expected to attend training sessions in the careful use of equipment, to follow established procedures, and to report breakage and malfunctions in a timely manner.

All Teaching Assistants are expected to hold one or two office hours per week for each 25% appointment. All efforts are to be coordinated with the faculty member responsible for the course.

TUITION CLASSIFICATION - RESIDENCY

For information about tuition classification, call the automated phone service at 303-492-6868. Information on petitioning for in-state tuition classification, as defined by Colorado law, is printed in the tuition classification guidelines available from the Tuition Classification Office, Regent 1B 54. The guidelines are also available on the web at:

<https://www.colorado.edu/registrar/students/state-residency>

Read the guidelines carefully, and be certain you understand the petition process and deadlines. If you have questions about your particular circumstances, call 303-492-0907 to make an appointment with a staff member. ***In brief: In-state status will be required after one year for all students who are eligible and supported by a teaching assistant or research assistant position.*** In-state status requires domicile (legal, primary residence) in Colorado for the year immediately preceding the first day of class. The only exceptions to the one-year domicile requirement, as provided by law, are for active-duty military personnel on permanent duty station in Colorado and for Olympic athletes in training at the United States Olympic Training Center in Colorado Springs, Colorado. *Domicile is defined as your true, fixed, and permanent home and place of habitation.* Domicile is a legal characteristic that everyone has, and you can have only one domicile at any one time. Your domicile is your legal, primary residence.

PROFESSIONAL SOCIETIES

The two principal professional societies for atmospheric and oceanic sciences are:

The American Meteorological Society AMS (<http://www.ametsoc.org/AMS/>)

The American Geophysical Union (AGU) (<http://www.agu.org/>)

Graduate students are encouraged to join one or both of these societies. Applications can be obtained from the respective home pages. Benefits of student membership

include notification of scientific meetings, receipt of a weekly (AGU) or monthly (AMS) professional news publication, and discounted rates on purchase of professional journals and books published by the society.

Society dues and fees for subscription are the responsibility of the individual.