University of Nevada, Reno  
Graduate Program in Atmospheric Science Graduate Student Guide  
Revised January 2018

Prepared by:

Dr. Mark C. Green, Director  
Graduate Program in Atmospheric Sciences  
University of Nevada, Reno  
green@dri.edu  
(775) 674-7118

Introduction
This student guide for the Graduate Program in Atmospheric Sciences (GP-ATMS) at the University of Nevada, Reno is intended to be a resource to help guide students in their graduate study. It provides details on program requirements, including courses, graduate committees, theses and dissertations. It also provides guidance on who to contact with questions regarding meeting the academic program requirements. The guide gives a listing of ATMS courses currently in the UNR catalog and a list of ATMS graduate faculty and their research areas.

Program overview
The Graduate Program in Atmospheric Sciences offers graduate coursework and research training that lead to M.S. and Ph.D. degrees in Atmospheric Sciences. Originally founded in 1967 as a graduate program of Atmospheric Physics within the UNR Department of Physics, the curriculum was expanded in 1990 and the program name was changed to Atmospheric Sciences. Faculty of the DRI Division of Atmospheric Sciences (DAS) perform teaching of most ATMS courses, and they serve as primary thesis/dissertation advisors for graduate students from Atmospheric Sciences as well as other UNR interdisciplinary programs. Tenure
track faculty in the UNR Physics and Geography Departments also teach classes and advise students in the program. As of January 2018 there were 26 faculty in the program. Research interests and contact information for each faculty member are shown in Appendix B. Atmospheric Sciences program students enroll in courses offered through UNR and most perform their research at DRI. The M.S. degree requires a thesis and the Ph.D. degree requires a dissertation.

**Student Learning Outcomes (SLOs)**

Student learning outcomes are listed below (and are common to the M.S. and Ph.D. programs).

- **SLO 1**: Students will be able to demonstrate knowledge of theoretical and observational aspects of Atmospheric Sciences.

- **SLO 2**: Students will be able to engage with the observational and theoretical aspects of research studies (numerical and graphical analysis of data and modeling results, writing reports, operating and developing instruments, working with models, etc.).

- **SLO 3**: Students will be able to demonstrate achievement in communication skills.

**Contact information**

The director of the Graduate Program in Atmospheric Science is Dr. Mark Green (green@dri.edu), 775-674-7118.

The chair of the Physics Department is Dr. Paul Neill (paul@unr.edu), 775-784-7520.

The Physics Department office manager is Mercy Balderrama (mercyb@unr.edu), 775-682-6605.

**Health Insurance**

All domestic degree seeking graduate students, who are enrolled in six or more credits (regardless of the course level) in a semester, will be automatically enrolled and billed for the University sponsored health insurance for each term they are eligible (fall & spring/summer). If a student has other comparable coverage and would like to waive out of the student health insurance, it is the student’s responsibility to complete the University online waiver form prior to the deadline. If approved, a health insurance waiver is good for the current academic year only. A new waiver must be submitted each academic year. All international graduate students are required to carry student health insurance, and the cost will be automatically added to your student account. Any international graduate students with insurance questions must contact the
Office of International Students and Scholars (OISS) directly. [Graduate Student Health Insurance](#)

**Degree Requirements:**
UNR has minimum requirements to be met for all MS and PhD degrees. In addition, the Graduate Program in Atmospheric Sciences (GP-ATMS) has more specific requirements. The director of the Graduate Program in Atmospheric Science may approve minor deviations from the program defined requirements as long as all UNR requirements are met. The UNR requirements are listed first:

**UNR PROGRAM OF STUDY REQUIREMENTS- MS**
- Minimum of 30 graduate credits
- Minimum of 21 of these credits earned at UNR
- Minimum of 18 credits (including thesis credits) taken at 700-level
- Masters Students must enroll in 6 thesis credits for degree completion
- Maximum of 3 credits may be taken with S/U grading
- Maximum of 9 credits completed prior to admission (including transfer credits)
- All requirements (credits) for degree (including transfer credits) must be completed within the period of six years (6) immediately preceding the granting of the degree.
- Minimum enrollment of 3 graduate credits each fall and spring semester.

**UNR PROGRAM OF STUDY REQUIREMENTS- PhD**
- Minimum of 72 graduate credits
- Minimum of 48 graduate credits of course work
- Maximum of 24 graduate credits from a completed master’s degree program or previous post-baccalaureate work may be applied to program (this includes grad special, transfer, the total can not be more than 24 credits)
- Maximum of 9 graduate credits of S/U grading (including transfer credits)
- At least 30 credits of 700-level graduate credits exclusive of dissertation credits are required: as many as 18 of these credits may be used from a masters degree program
- Doctoral Students must enroll in a minimum of 24 dissertation credits for degree completion
- Fulfill residency requirement; two consecutive semesters (fall/spring or spring/fall) of at least nine (9) graduate credits each; (students on 20hr/week assistantships require six (6) credits each semester (fall/spring or spring/fall)
- All requirements for the doctoral program, excluding prerequisite graduate course work or masters degrees, must be completed within a period of 8 years immediately preceding the granting of the degree.

---

1 [http://www.unr.edu/grad/funding/graduate-assistantships](http://www.unr.edu/grad/funding/graduate-assistantships)
Minimum enrollment of 3 graduate credits each fall and spring semester.

**Graduate School Academic Requirements:**
All graduate students must maintain a cumulative graduate GPA of 3.0. If their GPA drops below 3.0 they are either placed on probation or dismissed. Undergraduate courses will not count towards graduate GPA.

**Probation:**
Students whose cumulative graduate GPA is .1 to .6 points below that needed for a 3.0 GPA are put on probation. Students are placed on academic probation for one semester. If they fail to raise their cumulative GPA to 3.0 by the end of one semester, they are dismissed from their graduate program. Thesis, dissertation, S/U graded credits, and transfer credits have no impact on a student’s GPA.

**Dismissal:**
Students whose cumulative graduate GPA is .7 or more grade points below that needed for a 3.0 GPA are dismissed. Dismissed students are no longer in a graduate program but may take graduate-level courses as a Grad Special. Students wishing to complete their degree must obtain approval to take graduate-level courses, raise their graduate GPA to at least 3.0 and then re-apply to a graduate program. Any courses taken to raise their GPA will be included in the graduate special/ transfer credit limitation (9 credits for master’s degrees).

**Transfer credits**
These are credits transferred from another institution. Credits completed at UNR in another program or as a graduate special do not need to be transferred. Transfer credit is requested on the Graduate Credit Transfer Evaluation Request Form available on Graduate School website and must be signed by the student, major advisor, and graduate director. Transfer credits applied to a master’s program must comply with the time limitation on master’s work (6 years). Thus, if a student took a course five years prior to admission, they would have to complete the degree within one year for the course to apply to the degree. Credits from a completed master’s degree will be exempt from the 8-year time limitation for those students earning a doctoral degree.

**Program of study**
Students must complete an approved Program of Study Form. It is available at also available on the university’s [Graduate Forms and Deadlines](https://www.unr.edu/grad/forms-and-deadlines) website.

The program of study form lists the courses that will be used to satisfy the degree requirements and is signed by the student, all committee members, the ATMS Graduate Program Director, and

---

2 [http://www.unr.edu/Documents/graduate-school/GraduateCreditTransferEvaluationRequest.pdf](http://www.unr.edu/Documents/graduate-school/GraduateCreditTransferEvaluationRequest.pdf).
3 [https://www.unr.edu/Documents/graduate-school/program-of-study.pdf](https://www.unr.edu/Documents/graduate-school/program-of-study.pdf)
4 [https://www.unr.edu/grad/forms-and-deadlines](https://www.unr.edu/grad/forms-and-deadlines)
then turned into the graduate school for approval. It is strongly recommended that the program of study form be approved by the graduate program director before obtaining signatures from the committee members. The program of study form must be submitted to the graduate school by the third semester for Master’s students and the fourth semester for Ph.D. students. This will help to avoid any possible problems later on regarding whether all requirements were met. Students may change their program of study by using the Program of Study Change Form. The graduate courses in atmospheric sciences, including a short course description and their schedule of offering are listed in Appendix A and also below after the PhD requirements section.

**GP-ATMS MS requirements:**

Thirty credit hours, including:

- 12 credits ATMS core courses
- 1 seminar (ATMS 790)
- 6 additional ATMS 700 level credits
- 5 additional 700 level credits
- 6 thesis (ATMS 797)

The core courses are:

ATMS 611, Atmospheric Physics (4 credits), ATMS 612 Air Pollution (4 credits), ATMS 617 Airflow, Weather Dynamics and Forecasting (4 credits).

Core courses are offered once per year. Most 700 level courses are offered every other year.

Students must complete an approved thesis to obtain the M.S. degree in Atmospheric Sciences. This includes a public presentation of their thesis work (thesis defense).

**GP-ATMS PhD requirements:**

Seventy-two credit hours, including:

- 12 credits ATMS core courses
- 2 credits seminar (ATMS 790); one credit may be Physics 790
- 1 credit ATMS 795 Comprehensive exam
- 9 additional credits ATMS 700 level from the list below
- 18 additional credits 700 level ATMS or other programs
- 6 additional graduate level credits ATMS or other programs
- 24 credits dissertation (ATMS 799)

Students in the Ph.D. program are required to take three out of the eight following courses:

---

5 https://www.unr.edu/Documents/graduate-school/2change-of-program-of-study.pdf
- 706 Applied data analysis
- 742 Atmospheric Dynamics 2
- 743 Aerosol and Cloud Physics
- 745 Atmospheric Turbulence
- 746 Atmospheric Modeling
- 747 Atmospheric Chemistry
- 748 Measurement in the Atmosphere
- 749 Atmospheric Radiation

Due to the infrequent offering of some courses, students are strongly encouraged to enroll in these courses when available, as they may not have another chance. To the extent the program budget and other resources allow, the seven classes listed above will be offered once every other year.

Up to 24 hours of graduate course credits from previous study at UNR or other institutions may be counted toward the PhD course credit requirements.

Students must complete an approved dissertation to be awarded the Ph.D. degree in Atmospheric Sciences. This includes a public presentation of their dissertation work (dissertation defense).

For both MS and PhD, if the core courses or their equivalent were taken at UNR or another institution, then, with the approval of the Graduate Program director, these courses are not required. However, the required total number of course credits are not changed.

**Course offering schedule**

The course offering schedule is listed below.

<table>
<thead>
<tr>
<th>Course</th>
<th>Recurring schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>411/611 Atmos. Physics</td>
<td>Every fall</td>
</tr>
<tr>
<td>412/612 Air Pollution</td>
<td>Every fall</td>
</tr>
<tr>
<td>417/617 Airflow, Wx Dynamics, Forecasting</td>
<td>Every spring</td>
</tr>
<tr>
<td>706 Applied Data Analysis</td>
<td>Fall odd years</td>
</tr>
<tr>
<td>742 Atmos Dynamics 2</td>
<td>Fall even years</td>
</tr>
<tr>
<td>743 Cloud and Aerosol Physics</td>
<td>Spring even years</td>
</tr>
<tr>
<td>745 Atmos Turbulence</td>
<td>Spring odd years</td>
</tr>
<tr>
<td>746 Atmos modeling</td>
<td>Fall odd years</td>
</tr>
<tr>
<td>747 Atmos Chemistry</td>
<td>Spring odd years</td>
</tr>
<tr>
<td>748 Measurement in the Atmosphere</td>
<td>every spring</td>
</tr>
<tr>
<td>749 Radiation transfer</td>
<td>Fall even years</td>
</tr>
<tr>
<td>750 Field Course in Mountain Meteorology</td>
<td>Summer odd years</td>
</tr>
<tr>
<td>790 Seminar</td>
<td>Every spring</td>
</tr>
</tbody>
</table>
**Advisor/Examining Committee**

Each student shall form an advisory/examining committee that will guide the student’s academic studies and research. The committee will approve the student’s program of study and thesis/dissertation research and preparation. The committee must also approve the student’s thesis or dissertation and administer the comprehensive exam for PhD candidacy. All committee members must be members of the UNR graduate faculty unless otherwise approved by the Graduate School. Most students that are funded with research assistantships upon entering the program will have a major advisor from the beginning. The graduate school requires that the committee must be formed no later than the third semester for M.S. students and fourth semester for Ph.D. students. The committee is officially selected by completion of the Program of Study Form. The committee for both the Master’s and Ph.D. degrees must include a graduate school representative. The Graduate School Representative cannot have a primary appointment in the same department (or other appropriate major unit) as the student's committee chair. Formal approval of all student advisory committees is made by the Graduate Dean.

The Declaration of Advisor/Major Advisor/Committee Chair Form must be received by the Graduate School no later than the end of the second semester for master's students and by the end of the third semester for MFA and doctoral students.

**MS committees**:

The MS committee consists of 3 or more members, one of which is designated the graduate school representative.

**PhD committees**:

Consist of a minimum of five graduate faculty members; the chair, at least two faculty members from the student’s major department/program, at least one faculty member from a department in a field related to the student’s major, and at least one Graduate School representative.

**PhD Advancement to Candidacy**

The University of Nevada, Reno requires a written and oral qualifying exam (comprehensive exam) that must be passed before a student is advanced to “candidacy” for the PhD degree. PhD students must sign up for and receive a satisfactory grade (S) for ATMS 795 (Comprehensive

---

exam) before being advanced to candidacy. **The program of study form must be completed and approved by the graduate school before taking the comprehensive exam.** In December, 2013 the GP-ATMS adopted the research prospectus approach for the comprehensive exam.

**THE RESEARCH PROSPECTUS**

The student's committee will need to serve as a major advisory committee for the student. All faculty members in the program will potentially impact the outcome of the comprehensive exam by volunteering to participate in the public portion of the exam.

The comprehensive exam is a detailed research prospectus to be presented by the student to his/her committee and to the public for a portion of it. In the following, 'Discussion' is to be read as both oral and written communication. The research prospectus outcome is a document that contains a strong outline for the Ph.D. dissertation. The comprehensive exam is passed by completing the research prospectus and associated oral exam to the satisfaction of the student's graduate committee.

The research prospectus includes:

a. Discussion of the research area and how it globally fits in to atmospheric sciences.
b. Discussion of all the areas of atmospheric sciences that are impacted by the proposed research, with details of impacts.
c. Historical development of the research area.
d. Survey of the current state of the art in the research area.
e. Discussion of other approaches to the problem that are being pursued elsewhere.
f. Outline for the proposed research topic with milestones to be achieved.
g. Discussion of branches necessary should the research go in unexpected directions.
h. Projection of the importance of the research to the future of atmospheric science.
i. Discussion of the career goals of the student.
j. Discussion of the nature of the proposed research from the evolving NSF perspective: Example: Is the research evolutionary and/or transformative? What are the impacts of the research on the general public? In what ways, if any, could the research be brought to the attention of the general public?
k. Discuss who funds the research, why they are interested in funding this research, and what they expect as an outcome of this research as a tangible product (dissertation, papers, data? new code development? instrument development? patents? products?)

There will be public and committee and student only portions of the oral exam. The public portion of the oral exam will be a seminar where the students present items c, d, e, f, and g. For the committee and student only portion of the exam, the committee will ask questions both directly related to the prospectus and more fundamental questions regarding the general subject area addressed in the prospectus. For example, these questions may test the student’s knowledge of the underlying atmospheric science, physics, and chemistry of the research area.
The written prospectus must be completed to the satisfaction of the student’s graduate committee before taking the associated oral exam. At the discretion of the graduate committee, the student may retake the oral examination once if the oral exam is failed. If the committee declines to offer the student a second attempt at the oral exam a notice of proposed dismissal from the program will be sent to the student. A second attempt at the oral exam must be within one year of the initial attempt. For any student failing the oral portion of the comprehensive exam twice a notice of proposed dismissal will be sent to the student.

Title 2, Chapter 11 of the NSHE code outlines procedures for dismissal of students from a program. The pertinent section from the code is presented below in bold.

**Section 2. Dismissal for Failure to Maintain Required Grades or Required Grade Point Average (GPA).**

If the program dismissal is based upon failure to maintain required grades or a required GPA for the particular program or for a course within the program, this program dismissal procedure does not apply and the student may be summarily dismissed from the program. The student’s only recourse to challenge a grade is to utilize the institution’s grade appeal process. If the student’s grade appeal is successful, the student must be reinstated in the program.

Failing the comprehensive exam (an unsatisfactory (S) grade) is considered failure to maintain required grades and will result in dismissal of the student from GP-ATMS.

**Timing for completion of the comprehensive exam:** Students shall complete the written exam (prospectus) and a successful (passed) oral exam by the end of their third year or be subject to possible dismissal from the program due to lack of progress. Dismissal due to lack of progress shall be based upon an evaluation by the committee members and the director of the ATMS graduate program of the potential for the student to complete a PhD dissertation in a reasonable time period (in any case not longer than the eight year maximum set by the graduate school). Any dismissal is subject to Title 2 Chapter 11 of the NSHE code as discussed above.

The 3-year time limit to complete the comprehensive exam applies to all students entering the PhD program in fall 2013 or later. Students entering before fall 2013 are encouraged to make similarly steady progress and are reminded of the eight-year limit to complete the degree set by the graduate school.

**Final oral examination**
Ph.D. students must pass a final oral examination (dissertation defense) administered by their advisory committee.

**Thesis and Dissertation format and completion forms**
For Graduate School forms and resources related to thesis and dissertations see:
Time line for degree completion

Students are expected to make sustained progress toward completing degree requirements. Most Master’s students should finish within 2-3 years and Ph.D. students within 4-6 years. The Graduate School has set time limits for the degrees as listed below:

Master’s degrees time limit:

All course work (includes thesis credits) must be completed within six years preceding the awarding of the degree.

Doctoral degrees time limit:

All course work (including dissertation credits) must be completed within eight years preceding the awarding of the degree. Credits transferred into doctoral degree from a completed master’s degree are exempt from this eight-year limit. As noted earlier, Ph.D. students must complete their comprehensive exam by the end of their third year or be subject to dismissal due to lack of progress.

Links to some applicable forms are given below:

- Doctoral degree admission to candidacy
- Graduation Application – see UNR’s Apply for Graduation Website
  - Must be submitted to the graduate school several weeks in advance. Check website for exact dates
- Notice of completion – completed form should be submitted after all requirements have been met.
  - Master’s Notice of Completion Form
  - Doctoral Notice of Completion Form
- Exit Survey

11 https://www.unr.edu/mynevadahelp/studentcenter/academicprogress/graduationapplication
14 https://www.unr.edu/grad/forms-and-deadlines/exit-survey
An updated list of forms and requirements can be found on the [Graduate Forms and Deadlines](https://www.unr.edu/grad/forms-and-deadlines) page.

**Graduate Assistantships**

Most students in the graduate program in atmospheric sciences are supported by graduate research assistant (GRA) positions at DRI or UNR. There are at times a small number of teaching assistant positions as well. GRAs are dependent on the availability of external grants and contracts and continuation of support depends on the student’s satisfactory progress toward degree completion, satisfactory performance on the grant research, and availability of funding for the duration of the student’s academic study. Graduate assistantships are considered half-time (20 hours per week) during fall and spring semesters and may be increased to up to full-time during winter break and summer, if funding is available.

All graduate students holding an assistantship (teaching GTA or GRA) are considered Nevada residents for tuition purposes. Non-resident tuition is only waived for the duration of the assistantship. To be eligible for an assistantship, students must be admitted to a degree-granting program and be in good academic standing. The student must have an overall GPA of at least 3.0 and must be continuously enrolled in at least 6 graduate level credits (600-700) throughout the duration of the assistantship.

State-funded assistantships (GTA/GRA) may be held for a maximum of: three (3) years for master’s degree students and five (5) years for doctoral degree students.

General information on graduate assistantship can be found on the [Graduate Assistantships Funding](https://www.unr.edu/grad/funding/graduate-assistantships) website.

Please also refer to the [Graduate Assistantship Handbook](https://www.unr.edu/Documents/administration-finance/hr/hr-graduate/GA_handbook.pdf).

**Health Insurance**

All domestic degree seeking graduate students, who are enrolled in six or more credits (regardless of the course level) in a semester, will be automatically enrolled and billed for the University sponsored health insurance for each term they are eligible (fall & spring/summer). If a student has other comparable coverage and would like to waive out of the student health insurance, it is the student’s responsibility to complete the University online waiver form prior to the deadline. If approved, a health insurance waiver is good for the current academic year only. A new waiver must be submitted each academic year. All international graduate students are

---

15 [https://www.unr.edu/grad/forms-and-deadlines](https://www.unr.edu/grad/forms-and-deadlines)

16 [https://www.unr.edu/grad/funding/graduate-assistantships](https://www.unr.edu/grad/funding/graduate-assistantships)

17 [https://www.unr.edu/Documents/administration-finance/hr/hr-graduate/GA_handbook.pdf](https://www.unr.edu/Documents/administration-finance/hr/hr-graduate/GA_handbook.pdf)
required to carry student health insurance, and the cost will be automatically added to your student account. Any international graduate students with insurance questions must contact the Office of International Students and Scholars (OISS) directly.

More information at the Graduate Health Insurance\textsuperscript{18} website.

\textbf{Graduate Student Association}

The Graduate Student Association (GSA)\textsuperscript{19} represents all graduate students and promotes the welfare and interests of the graduate students at the University of Nevada, Reno. The GSA works closely with appropriate university administrative offices, including the Graduate School and Student Services and reports to the President of the University. The GSA government functions through the Council of Representatives, Executive Council and established committees.

\textbf{Leave of Absence}

\textbf{Continuous Enrollment:}

To maintain “good standing” all graduate students are required to enroll in a minimum of three (3) graduate credits each fall and spring semester until they graduate. International students may be required to enroll in nine graduate credits each fall and spring semester depending on the requirements of their visa. All students holding assistantships (whether teaching or research assistantships) are required to enroll in a minimum of six (6) graduate credits each semester they hold the assistantship.

\textbf{Leave of Absence:}

Students in good standing may request a leave of absence by completing a Leave of Absence Form\textsuperscript{20} available on the Graduate School website during which time they are not required to maintain continuous registration. Usually, a leave of absence is approved for one or two semesters. The leave of absence request may be extended by the student filing an additional leave of absence form. Students applying for a leave of absence should not have any “incomplete” grades which could be changed to “F” and have a detrimental impact on their cumulative GPA. Requests for leave of absences must be received by the Graduate School no later than the last day of enrollment for the semester the leave is to begin.

\textbf{Reinstatement:}

When a student has been absent for one semester or more without an approved leave of absence, he or she may request reinstatement via the Notice of Reinstatement to Graduate Standing

\begin{itemize}
\item \textsuperscript{18}http://www.unr.edu/grad/health-insurance
\item \textsuperscript{19}http://www.unr.edu/gsa/
\item \textsuperscript{20}http://www.unr.edu/Documents/graduate-school/leaveofabsencer_9.23.pdf
\end{itemize}
Form\textsuperscript{21} (available on the Graduate School website). This form allows the program the option to recommend the student be re-admitted to their graduate program based on their previous admission OR require the student to re-apply for admission which would require students to submit a new application for admission and pay the application fee. The Notice of Reinstatement to Graduate Standing must be received by the Graduate School no later than the last day of enrollment for the semester the reinstatement is to begin.

**Graduate School Forms:**

Please refer to the [Graduate School Forms and Deadlines\textsuperscript{22}](https://www.unr.edu/grad/forms-and-deadlines) website for all forms available at the Graduate School.

\textsuperscript{21}https://www.unr.edu/Documents/graduate-school/Notice-of-Reinstatement-Graduate-Standing.pdf

\textsuperscript{22}https://www.unr.edu/grad/forms-and-deadlines
Appendix A:

Graduate courses in Atmospheric Sciences at the University of Nevada, Reno and course offering schedule are listed below:

**ATMS 611 INTRODUCTION TO ATMOSPHERIC PHYSICS** (every fall)

**Lecture+Lab: 4+0**

Credit(s): 4

Atmospheric structure; global radiation balance; radiation scattering by gases and aerosol particles; introduction to radioactive transfer; optical phenomena; atmospheric thermodynamics; cloud physics; aerosol mechanics.

**ATMS 612 INTRODUCTION TO AIR POLLUTION** (every fall)

**Lecture+Lab: 4+0**

Credit(s): 4

Aerosol and gas phase classification and measurement; regulatory requirements and control technology; smog, acid deposition and the ozone layer. Local and long-range transport.

**ATMS 614 PHYSICAL CLIMATOLOGY** (as needed)

**Lecture+Lab: 3+0**

Credit(s): 3

Physical basis for behavior of the climate system; flows and reservoirs of mass and energy; temporal and spatial scales of variability; contemporary climate issues.

**ATMS 617 AIRFLOW, WEATHER DYNAMICS & FORECASTING** (every spring)

**Lecture+Lab: 4+0**

Credit(s): 4

Introduction to fluid motions in the atmosphere including turbulence, wind shear, mountain-valley circulations and weather fronts. Mathematical description of large-scale motions in the atmosphere; intensification and motion of weather systems; weather analysis, using maps and computer techniques.

**ATMS 706 APPLIED DATA ANALYSIS** (fall odd years)

**Lecture+Lab: 3+0**

Credit(s): 3
Philosophy of data analysis, statistical critical thinking, exploratory data analysis, regression, multivariate methods, spatial and time series analysis, randomization, bootstrap, Monte Carlo methods, statistical graphics.

**ATMS 741 ATMOSPHERIC MOTIONS I (as needed)**

Lecture+Lab: 3+0  
Credit(s): 3

Dynamical principles that govern large-scale atmospheric motions. Theoretical and observational analyses of atmospheric motion systems. Application of theoretical treatment to observed atmospheric behavior.

**ATMS 742 ATMOSPHERIC DYNAMICS II (fall even years)**

Lecture+Lab: 3+0  
Credit(s): 3

Atmospheric motions on small scales without coriolis force; atmospheric thermodynamics and convection, the earths boundary layer; topography and urban areas; severe storms, mesoscale convective complexes.

**ATMS 743 CLOUD AND AEROSOL PHYSICS (spring even years)**

Lecture+Lab: 3+0  
Credit(s): 3

Aerosol nucleation, growth and coagulation, cloud droplet and ice crystal nucleation and growth; cloud thermodynamics and chemistry; precipitation and electrification processes; measurement and modeling techniques.

**ATMS 744 ADVANCED SYNOPTIC METEOROLOGY (as needed)**

Lecture+Lab: 3+0  
Credit(s): 3

Numerical and observational weather analysis techniques for synoptic-scale and mesoscale metrological prediction using computer models, satellite, radar and other tools.

**ATMS 745 ATMOSPHERIC TURBULENCE (spring odd years)**

Lecture+Lab: 3+0  
Credit(s): 3

Mechanical and statistical theory of turbulence. Application to convection, eddy diffusion, temperature and wind profiles.
ATMS 746 ATMOSPHERIC MODELING (fall odd years)
Lecture+Lab: 3+1
Credit(s): 3
Physical principles and methods for numerical predication of the atmosphere. Model theory and implementation with practical training using computer simulation models.

ATMS 747 ATMOSPHERIC CHEMISTRY (spring odd years)
Lecture+Lab: 3+0
Credit(s): 3
Applications of organic and inorganic chemistry to atmospheric sciences, including atmospheric evolution, air pollution, climate change, biogeochemistry and environmental regulation.

ATMS 748 MEASUREMENT IN THE ATMOSPHERE (spring even years)
Lecture+Lab: 3+3
Credit(s): 4
Measurement of physically meaningful parameters in a heterogeneous, turbulent medium. Direct and remote sensing, data reduction, theory of instrument design.

ATMS 749 R RADIATION TRANSFER (fall even years)
Lecture+Lab: 3+0
Credit(s): 3
Theoretical basis and numerical techniques for radiation transfer in the atmosphere. Interaction of radiation with atmospheric gases, cloud and aerosol particles and the surface.

ATMS 750 FIELD COURSE IN MOUNTAIN METEOROLOGY (summer odd years)
Credits: 2
Field course at Storm Peak Laboratory. Students will design and conduct a research project, analyze data and document findings in a journal style report.

ATMS 790 R GRADUATE SEMINAR IN ATMOSPHERIC SCIENCES (every spring)
Lecture+Lab: 1+0
Credit(s): 1
Presentation by students, faculty and invited speakers on research methods and advances. Focus on development and critique of presentation techniques for academic and conference audiences. Maximum of 6 credits.

**ATMS 792 SPECIAL PROBLEMS (as needed)**
**Credit(s): 1 to 6**

Special study of advanced topics not specifically in courses or seminars. Maximum of 6 credits in special problems courses.

**ATMS 795 COMPREHENSIVE EXAMINATION (every spring, summer, fall as needed)**
**Credit(s): 1 S/U only**

Comprehensive exam for advancement to PhD candidacy.

**ATMS 797 THESIS (every spring, summer, fall as needed)**
**Credit(s): 1 to 6**

Master’s thesis credits. Must have at least 6 total.

**ATMS 799 DISSERTATION (every spring, summer, fall as needed)**
**Credit(s): 1 to 24**

Ph.D. dissertation credits, must have at least 24.

---

**Appendix B: Atmospheric Sciences Teaching Program Faculty**
**Updated October 2017 2016**

For detailed information, see:

[Directory of Atmospheric Science Personnel](www.dri.edu/directory/atmospheric-science-personnel) [Note: Telephone Area Code is 775 unless noted otherwise].

**W. PATRICK ARNOTT**

Professor, Dept. of Physics, University of Nevada -Reno, Ph.D. (Physics), 1988, Washington State University. Applications of wave Propagation and scattering, including solar and

[23](www.dri.edu/directory/atmospheric-science-personnel)
terrestrial radiation transfer, remote sensing, and photoacoustic spectrometers for aerosol detection. Phone: 784-6834, Email: arnottw@unr.edu, Website\textsuperscript{24}

FRANCO BIONDI

Professor, Dept. of Geography, University of Nevada – Reno, Ph.D. (Watershed Management and Geosciences), 1994, University of Arizona. Climate and forest dynamics, Holocene processes, environmental change. Phone: 784-692, Email: fbiondi@unr.edu, Website\textsuperscript{25}

TIMOTHY J. BROWN

Research Professor, Ph.D. (Climatology), 1995, University of Colorado. Climatology, Probability and Statistics. Phone: 674-7090, Email: tbrown@dri.edu, Website\textsuperscript{26}

LUNG-WEN (ANTONY) CHEN

Affiliate Associate Research Professor, Ph.D. (Chemical Physics) 2002, University of Maryland. Aerosol measurement and characterization, source apportionment. Phone: (702) 895-1420, Email: Antony@dri.edu, Website\textsuperscript{27}

JUDITH CHOW

Research Professor, Sc.D. (Environmental Science), 1985, Harvard University. ambient air and source sampling, chemical and physical analysis, field study design and management, modeling and impact assessment. Phone: 674-7050, Email: judy.chow@dri.edu, Website\textsuperscript{28}

VICKEN ETYEMEZIAN

Research Professor, Ph.D. (Environmental Science), 1998, Carnegie Mellon University. Fugitive dust emissions and controls, source apportionment, dispersion and deposition in the near-source region, instrument development. Phone: 702-862-5569, Email: vic@dri.edu, Website\textsuperscript{29}

\textsuperscript{24} www.patarnott.com
\textsuperscript{25} wolfweb.unr.edu/homepage/fbiondi/
\textsuperscript{26} www.dri.edu/tim-brown
\textsuperscript{27} http://www.dri.edu/antony-chen
\textsuperscript{28} http://www.dri.edu/judy-chow
\textsuperscript{29} www.dri.edu/vicken-etyemezian
ALAN W. GERTLER

Vice-President for Research, Ph.D. (Physical Chemistry), 1979, University of California, Los Angeles. Atmospheric chemistry; automotive emissions; acid deposition; heterogeneous processes; fates of air pollutants. Phone: 674-7061, Email: alang@dri.edu, Website

JOHN A. GILLIES

Research Professor, Ph.D. (Physical Geography), 1994, University of Guelph, Ontario. Aeolian geomorphology, sediment transport, and air pollution. Phone: 674-7035, Email: jackg@dri.edu, Website

MARK C. GREEN

Research Professor, Ph.D. (Atmospheric Science), 1990, University of California-Davis. Air quality and meteorology issues. Phone: 702-862-5445, Email: green@dri.edu, Website

GANNETT HALLAR

Associate Research Professor, Ph.D. (Atmospheric and Oceanic Sciences), 2003, University of Colorado. Cloud Microphysics, In Situ Trace Gas Measurements, Aerosol Optical Properties. Phone: 970-819-0968, Email: Gannett.Hallar@dri.edu, Website

KENT HOEKMAN

Research Professor, Ph.D. (Organic Chemistry), 1980, Iowa State University. Renewable energy, biomass, biofuels, fossil fuels, fuel processing, fuel regulations, vehicle emissions. Phone: 674-7065, Email: Kent.Hoekman@dri.edu, Website

HEATHER HOLMES

Assistant Professor, Dept. of Physics, University of Nevada, Reno. PhD (Mechanical Engineering), 2010, University of Utah. Physics and chemistry of air pollution, boundary layer

30 www.dri.edu/alan-gertler
31 www.dri.edu/jack-gillies
32 www.dri.edu/mark-green
33 www.dri.edu/gannett-hallar
34 http://www.dri.edu/directory/4910-kent-hoekman
meteorology, particle dispersion and deposition, numerical modeling and field experiments. Phone: 784-6712, E-mail: hholmes@unr.edu, Website\(^{35}\)

JAMES G. HUDSON

Research Professor, Ph.D. (Atmospheric Physics), 1976, University of Nevada, Reno. *Cloud condensation nuclei measurement and characterization.* Phone: 674-7020, Email: hudson@dri.edu, Website\(^{36}\)

MICHAEL KAPLAN

Research Professor, Ph.D. (Atmospheric Sciences), State University of New York, Albany. *Mesoscale modeling, synoptic meteorology, dynamic meteorology, mesoscale meteorology, aviation meteorology, fire meteorology.* Phone: 674-7051, Email: Mike.Kaplan@dri.edu, Website\(^{37}\)

ANDREY KHLYSTOV

Associate Research Professor, Ph.D. (Chemistry) 1998, Wageningen University, The Netherlands. *Atmospheric chemistry, atmospheric aerosol, environmental effects.* Phone: 674-7084, Email: Andrey.Khlystov@dri.edu, Website\(^{38}\)

JOHN M. LEWIS

Adjunct Research Professor, Ph.D. (Meteorology), 1969, University of Oklahoma. *Ocean-air interaction, physical oceanography and parallel processing in computational meteorology.* Phone: 674-7077, Email: john.lewis@dri.edu

DOUGLAS H. LOWENTHAL

Research Professor, Ph.D. (Atmospheric Chemistry), 1986, University of Rhode Island. *Aerosol sources, transport and climate effects.* Phone: 674-7047, Email: dougl@dri.edu, Website\(^{39}\)

---

\(^{35}\)www.unr.edu/~hholmes

\(^{36}\)www.dri.edu/jim-hudson

\(^{37}\)http://www.dri.edu/mike-kaplan

\(^{38}\)www.dri.edu/directory/4988-andrey-khlystov

\(^{39}\)www.dri.edu/doug-lowenthal
STEPHANIE MCAFEE

Assistant Professor, Dept. of Geography, University of Nevada, Reno. PhD (Geosciences), 2009. Applied climatology, downscaling, high-latitude climate. Phone: 784-6999, Email: smcafee@unr.edu, Website

JOHN MEJIA

Assistant Research Professor, Ph.D. (Meteorology), 2008, University of Oklahoma. Climate modeling and environmental impacts, climate dynamics, hydroclimate. Phone: 673-7667, Email: John.Mejia@dri.edu, Website

DAVID L. MITCHELL

Associate Research Professor, Ph.D. (Atmospheric Sciences), 1995, University of Nevada Reno. Cloud microphysics and radiation transfer. Phone: 674-7039, Email: mitch@dri.edu, Website

HANS MOOSMULLER

Research Professor, Ph.D. (Physics), 1988, Colorado State University. Experimental and theoretical research in optical spectroscopy and its application to atmospheric and aerosol physics. Phone: 674-7063, Email: hansm@dri.edu, Website

VERA SAMBUROVA

Assistant Research Professor, Ph.D. (Chemistry), 2007, Swiss Federal Institute of Technology. Speciation and characterization of organic compounds in the atmosphere. Phone: 674-7149, Email: vera.samburova@dri.edu, Website

CRAIG SMITH

Assistant Research Professor, Ph.D. (Atmospheric Science), 2010, Oregon State University. Topographically forced flows and renewable energy, assessment and validation of next-generation remote sensing platforms and numerical weather prediction models, including

40 http://www.unr.edu/geography/people/stephanie-mcafee
41 http://www.dri.edu/john-mejia
42 www.dri.edu/david-mitchell
43 www.dri.edu/hans-moosmuller
44 http://www.dri.edu/vera-samburova
ensemble approaches and large-eddy simulation, in regions of complex terrain. Phone: 674-7091, E-mail: Craig.Smith@dri.edu, Website45

XIAOLIANG WANG

Assistant Research Professor, Ph.D. (Mechanical Engineering), 2006, University of Minnesota. Physical and chemical characterization of aerosols, pollution source characterization, aerosol instrument development. Phone: 674-7177, Email: Xiaoliang.Wang@dri.edu, Website46

JOHN G. WATSON

Research Professor, Ph.D. (Environmental Science), 1979, Oregon Graduate Center. Measurement and analysis of air quality, wet and dry deposition, and visibility; receptor modeling; PM10 standards. Phone: 674-7046, Email: John.Watson@dri.edu, Website47

ERIC WILCOX

Assistant Research Professor, Ph.D. (Oceanography), 2002, Scripps Institute of Oceanography. Radiative forcing of aerosols and clouds, remote sensing and in-situ observation of clouds, atmospheric convection, climate modeling. Phone: 673-7686, Email: Eric.Wilcox@dri.edu, Website48

45 http://www.dri.edu/craig-smith
46 http://www.dri.edu/xiaoliang-wang
47 http://www.dri.edu/john-watson
48 http://www.dri.edu/eric-wilcox