

## **Syllabus: ATMS 317 Intermediate Meteorology and Weather Forecasting**

**Course Administration:** <http://www.patarnott.com/atms317> and webcampus.

**Time and Place:** Tues/Thurs 10:30-11:45 am, Zoom and LP 105

**Main Textbook:** Mid-Latitude Atmospheric Dynamics: A First Course. By Jonathan E. Martin.

**This course will be taught by Pat Arnott. Office hours by appointment (and are encouraged).**

### **Prerequisites:**

ATMS 117 or ATMS 121 or GEOG 121; Physics 181; Math 285.

### **Topics:**

- Overview of atmospheric thermodynamics, structure, and balloon sonde measurements.
- Air Pressure and Winds.
- Wind: Small Scale and Local Systems.
- Wind: Global Systems.
- Air Masses and Fronts.
- Middle-Latitude Cyclones.
- Weather Forecasting. Anatomy of Weather Models and Limitations.
- Mountain Meteorology.
- Boundary Layer Meteorology

### **Learning Outcomes:**

1. Demonstrate understanding of atmospheric flows and thermodynamics in the atmosphere to establish a foundation for future courses.
2. Use surface weather maps and atmospheric sounding data to obtain information about atmospheric conditions.
3. Demonstrate understanding of mathematical methods to describe physical phenomena in the atmosphere.
4. Derive the governing equations for mass and momentum in the atmosphere and simplify using scale analysis.
5. Use open access sources of atmospheric data from both observations and numerical models.
6. Demonstrate enhanced computational skills for accessing data, plotting graphs, and data analysis.

### Planned Schedule of Topics:

Week 1. Review of fronts and global circulation. Meteorological data for weather observations. Assignment 1 given for students to present weather briefing each day at the beginning of class. Begin mathematics of fluid dynamics.
Week 2. Mathematics of fluid dynamics continued. Visual flow associated with a flow purely of divergence and vorticity. Assignment 2 given on mathematics of fluids. Lagrangian and Eulerian points of view and HYSPLIT back trajectory example. Scalar and vector potentials for representing fluid velocity vectors.
Week 3. Fundamental forces in fluids in the rotating reference frame of the Earth.
Week 4. Simple steady motion
Week 5. Midterm #1.
Week 6. Applications of the equations of motion. Thermal wind balance. Geostrophic, cyclostrophic, and gradient flow.
Week 7. Circulation, vorticity and divergence
Week 8. Quasi geostrophic equations
Week 9. Midlatitude vertical motions.
Week 10. Midterm #2.
Week 11. Vertical circulations at fronts
Week 12. Mid latitude cyclones
Week 13. Atmospheric boundary layer from Stull's book chapter 18
Week 14. Potential vorticity
Week 15. Numerical Weather Prediction from Stull's book chapter 20
Final Exam

**Optional Introductory Textbook as a Reference:** Meteorology Today: An Introduction to Weather, Climate, and the Environment.

**Optional Midlevel Textbook as a Reference:** Applied Atmospheric Dynamics, First Edition. Authors are Lynch and Cassano. ISBN-10: 0470861738. ISBN-13: 978-0470861738.

**Optional Free Comprehensive Textbook Using Algebra:**  
**Stull, R., 2017: "Practical Meteorology: An Algebra-based Survey of Atmospheric Science" -version 1.02b.** Univ. of British Columbia. 940 pages. isbn 978-0-88865-283-6 .  
[https://www.eoas.ubc.ca/books/Practical\\_Meteorology/](https://www.eoas.ubc.ca/books/Practical_Meteorology/)

### Brief Description:

This course provides a firm foundation for understanding small scale to global winds and their connections with weather. Local circulations have direct impacts on atmospheric boundary layer development and turbulent exchange of heat and mass between the atmosphere and the surface.

### GRADING:

40% on homework. 20% on exam 1. 20% on exam 2. 20% on comprehensive final exam.

**GRADING SCALE:**

92% >= Score <= 100%	= A
90% >= Score < 92%	= A-
88% >= Score < 90%	= B+
82% >= Score < 88%	= B
80% >= Score < 82%	= B-
78% >= Score < 80%	= C+
72% >= Score < 78%	= C
70% >= Score < 72%	= C-
68% >= Score < 70%	= D+
62% >= Score < 68%	= D
60% >= Score < 62%	= D-
0% >= Score < 60%	= F

**POLICY ON LATE HOMEWORK:** 0% possible. Contact instructor for circumstances.

**ONLINE CONTENT:** Grades are posted on webcampus.

**Final Exam:**

Tuesday May 11<sup>th</sup> 9:50 – 11:50 am.

**GUIDE TO DOING WELL IN THIS CLASS:**

**(My observations of students that get the most out of their course work during this brief time in life when you get to be a student)**

1. Attend class, every class. Ask questions in class. I benefit greatly from questions students ask in class as it helps me refine my understanding of the subject matter, and it helps me convey topics more effectively. Other students benefit as well. I am very open to questions in class and find that when we have a discussion rather than a monologue, we all get a lot more out of our time together, and we can make interesting discoveries as we go along.
2. Do the homework every time, on time.
3. Work with others on the homework so that you learn to work in a group, and you gain the insights of others as they gain from you.
4. Be sure you thoroughly understand the homework and course material.
5. Read the textbook and assigned supplemental material.
6. Arrange your daily schedule so that you have time for sleep at night and can digest the course material daily. Work on each course a little each day.

7. Get started early on everything. It helps cement your knowledge.
8. Eat well and get some exercise. Some diversions help refresh your enthusiasm and skill.
9. Attend office hours to ask questions and refine your understanding of the subject matter.
10. Seek connections with the subjects of this course and others you are taking or will take later on.
11. Pay close attention to subjects that are of great interest to you, and you may be able to link future employment and/or your thesis to the concepts of this course.

## **Special Circumstances Due to the COV-19 Viral Pandemic**

### **AH - Alternative HyFlex**

**This course has been designated AH. Here is the University Definition of AH.**

“Course originally scheduled to be delivered in-person but will have attendance adjustments so students will alternate in-person and remote participation. Students will receive communication directly from their instructors with specifics. Fully remotely participation by students can be accommodated for those with extenuating circumstances.”

I will accommodate as many students as possible to attend class in person and will communicate frequently about plans for how to attend class. The class will start off online.

We all need to be flexible during these challenging times. Be sure you have a web camera and microphone computer connected to the internet at home in case part or all of the class needs to be held online.

## **University Policies**

### **Statement on Academic Dishonesty:**

"Cheating, plagiarism or otherwise obtaining grades under false pretenses constitute academic dishonesty according to the code of this university. Academic dishonesty will not be tolerated and penalties can include filing a final grade of "F"; reducing the student's final course grade one or two full grade points; awarding a failing mark on the coursework in question; or requiring the student to retake or resubmit the coursework. For more details, see the [University of Nevada, Reno](#)

[General Catalog.](#)"

#### Statement of Disability Services:

"Any student with a disability needing academic adjustments or accommodations is requested to speak with me or the [Disability Resource Center](#) (Pennington Achievement Center Suite 230) as soon as possible to arrange for appropriate accommodations."

#### Statement on Audio and Video Recording:

"Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded."

#### Services for a Safe and Equitable Campus

Counseling and advocacy services are available through Counseling Services (775-784-4648) and the Equal Opportunity & Title IX office.

The University of Nevada, Reno is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, or stalking, whether on or off campus, or need information related to immigration concerns, please contact the University's Equal Opportunity & Title IX office at 775-784-1547. Resources and interim measures are available to assist you. For more information, please visit the [Equal Opportunity and Title IX](#) page.

#### Statement for Academic Success Services

"Your student fees cover usage of the [Math Center](#) (775) 784-4433, [Tutoring Center](#) (775) 784-6801, and [University Writing Center](#) (775) 784-6030. These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student."

# University Statement on COVID-19 Policies

## Training

Students must complete and follow all guidelines as stated in the *Student COVID-19 Training* modules, or any other trainings or directives provided by the University.

## Face Coverings

In response to COVID-19, and in alignment with State of Nevada Governor Executive Orders, Roadmap to Recovery for Nevada plans, Nevada System of Higher Education directives, the University of Nevada President directives, and local, state, and national health official guidelines face coverings are required at all times while on campus, except when alone in a private office. This includes the classroom, laboratory, studio, creative space, or any type of in-person instructional activity, and public spaces.

A “face covering” is defined as a “covering that fully covers a person’s nose and mouth, including without limitation, cloth face mask, surgical mask, towels, scarves, and bandanas” (State of Nevada Emergency Directive 024).

Students that cannot wear a face covering due to a medical condition or disability, or who are unable to remove a mask without assistance may seek an accommodation through the Disability Resource Center.

## Social Distancing

Face coverings are not a substitute for social distancing. Students shall observe current social distancing guidelines where possible in accordance with the Phase we are in while in the classroom, laboratory, studio, creative space (hereafter referred to as instructional space) setting and in public spaces. Students should avoid congregating around instructional space entrances before or after class sessions. If the instructional space has designated entrance and exit doors students are required to use them. Students should exit the instructional space immediately after the end of instruction to help ensure social distancing and allow for the persons attending the next scheduled class session to enter.

## Disinfecting Your Learning Space

Disinfecting supplies are provided for you to disinfect your learning space. You may also use your own disinfecting supplies.

## COVID-19 Like Symptoms, and Contact with Someone Testing Positive for COVID-19

Students must conduct daily health checks in accordance with [CDC guidelines](#). Students testing positive for COVID 19, exhibiting COVID 19 symptoms or who have been in direct contact with someone testing positive for COVID 19 will not be allowed to attend in-person instructional activities and must leave the venue immediately. Students should contact the [Student Health Center](#) or their health care provider to receive care and who can provide the latest direction on quarantine and self-isolation. Contact your instructor immediately to make instructional and learning arrangements.

### **Tracking In-Class attendance**

In person attendance will be fluid and difficult to track for classes taught through hyflex or multimodal instructional delivery. If a student in your class tests positive for COVID 19, an awareness of which students are present and in which seat they are sitting will be very important for contact tracing. Therefore, we suggest that instructors use their cell phones to photograph or video record classroom participants at the beginning of each class period. This will provide a record of in class attendance and student seating positioning. Instructors choosing this option, will be required to inform students during the first day of class and in their syllabus that in class participants will be photographed or videoed each period only for use for contact tracing purposes in the case one of their classmates test positive for COVID 19.

### **Laboratory, Studio, and Creative Space Settings**

You will be provided specific instructions and procedures by your instructor for art studios, recording studios, digital media labs, testing centers, observation labs, podcasting studios, dance studios, clinical centers, research labs, physical science labs, etc. as necessary.

### **Failure to Comply with Policy (including as outlined in this Syllabus) or Directives of a University Employee**

In accordance with section 6,502 of the University Administrative Manual, a student may receive academic and disciplinary sanctions for failure to comply with policy, including this syllabus, for failure to comply with the directions of a University Official, for disruptive behavior in the classroom, or any other prohibited action. "Disruptive behavior" is defined in part as behavior, including but not limited to failure to follow course, laboratory or safety rules, or endangering the health of others. A student may be dropped from class at any time for misconduct or disruptive behavior in the classroom upon recommendation of the instructor and with approval of the college dean. A student may also receive disciplinary sanctions through the Office of Student Conduct for misconduct or disruptive behavior, including endangering the health of others, in the classroom. The student shall not receive a refund for course fees or tuition.

## Zoom Guidelines

### Participation During Zoom Meetings

Portions of our class will take place synchronously via Zoom. During these meetings, students are expected to pay attention, participate in small groups, and engage with the material. If possible, find a quiet space without interruptions/background noise.

*Video:* Your video should be on during class—if you are not able, please email me ahead of time. Make sure your face can be seen clearly. Note that your instructor and classmates will be able to see you, and prepare accordingly (i.e., be fully dressed, avoid lying down in bed, etc.). Note that UNR has loaded campus-themed virtual backgrounds into all Zoom accounts that can be used to hide your surroundings, if desired.

*Audio:* Your audio should be on when you join class, and you should immediately mute yourself upon entering the session (if you are not already muted). You can unmute yourself when you want to participate. Turning on your microphone is a good way to indicate you want to add to the discussion, but you can also use the hand-raising symbol. Your audio should be on the whole time you're in your breakout room.

*Chat Function:* Please use the chat tool to ask questions or contribute ideas; please stay on topic to the information being presented.