



MET4500(C): Synoptic Meteorology

GEO6938 X-list

Department of Geography
College of Liberal Arts & Sciences, University of Florida

COURSE SYLLABUS

Instructor:	Dr. Esther Mullens	Term:	Fall 2024
Office:	TUR 3138	Class Meeting Days:	Tues, Thurs
Phone:		Class Meeting Hours:	P4&5 (T), P4&(5)**
Email:	<u>emullens@ufl.edu</u>	Class Location:	(R) TUR3006
Office Hours:	Wednesdays 9.30-noon, or by appointment*	Course Credits:	3-4 hours

*Office hours in-person or via zoom.

** Thursday period 5 only applies to students registered for 4 credits

I. Course Overview

Welcome to this brand-new class! Together we will explore in detail mid-latitude storm systems using conceptual and theoretical frameworks established through lecture material, and application of these concepts through immersive labs/exercises. Content includes atmospheric circulation, mid-latitude cyclones, fronts, jet streams, winter weather and severe storm environments. This course assumes prior knowledge of meteorology, as well as some calculus-based mathematics.

II. **Pre-requisites:** MET3503 (or another MET/GEOG 3000 level course with focus on meteorology), MAC2311/12, PHYS2048/L, OR instructor permission.

III. Student Learning Outcomes

Learning Goals for this course

- Identify and describe fundamental atmospheric processes that create temperature change, vertical motions and precipitation, the development and decay of mid-latitude storms, fronts, and their associated hazards.
- Apply the quasi-geostrophic (QG) and potential vorticity (PV) frameworks for synoptic weather systems.
- Describe orally and in writing both current and forecast synoptic-scale weather patterns based on critical evaluation of multi-platform meteorological data (e.g., observations, models, satellite, radar etc.)
- Develop competencies in the analysis of meteorological data through use of computational software.

IV. Materials and Supplies:

Laptop Computer

Students will be required to use computers to complete exercises/labs/assignments associated with this course. Students may bring a laptop to class and should expect to do so on Lab days (Thursdays), however we will not necessarily use one in every class. I will provide notice of when computers are required. You also have access to the Geography department computer lab (TUR3006). Any required software (such as Microsoft Excel, Word, Power Point) will be available on students' laptops through UF Apps at <https://info.apps.ufl.edu>. The Interactive Data Viewer (IDV) – our primary tool for lab exercises, is also available on UF apps, however I recommend that students download this open-source (free) software to their personal computer for ease of access.

V. Required Texts and Useful Online Resources

Required Text: “Mid-latitude Synoptic Meteorology: Dynamics, analysis, and forecasting”, by Gary Lackmann, second edition (2015), ISBN: 9781878220103. Book cost ranges from \$30 (used/rent) to \$90 new.

Supplemental reading options will be provided on Canvas – this will include peer-reviewed journal articles. Course notes, assignment and project information etc. will be available via <https://elearning.ufl.edu/>.

VI. Course Format, Activities, and Basis for Evaluation

This is primarily a lecture-based class, but with as much ‘active learning’ as I can reasonably stuff in. Given the low course enrollment, you may expect that this version of the course will emphasize discussion, mentoring, and a commitment to active and engaged learning from you. **Furthermore, you can expect attendance to be mandatory** unless there is advanced communication with me regarding an issue where absence is warranted. For more on excused absences – see later in this syllabus.

Important material will be covered in every class. We will use a combination of slide-based lectures, multimedia presentations, and in-class and online participation. It is my aim to provide relevant class notes, and readings, will be available on canvas at least 24-hours prior to the class however as this course is being developed alongside its delivery, there may be instances where this is not possible – in which case the notes will be delivered asap. Please be prepared to read, print and/or retain those notes. I strongly advise that you listen well during class and take good notes for yourself. Laptop-based notes are acceptable; however, research has demonstrated that hand-writing your notes leads to better outcomes in terms of retention and class performance, therefore I encourage you to use this approach if you are able. The subject of synoptic-dynamic meteorology cannot be fully appreciated without the synthesis of the many topics we learn about throughout the semester. **This course will cover an abundance of material;** therefore, it is particularly important that you keep up with the assignments as well as attending class regularly. Your participation score and overall performance in this course (in addition to the course itself) will suffer if you regularly skip class.

Evaluation and Grading:

Applies to enrollment in 3 and 4 credits, Grad and undergrad. A (G) indicates graduate-level assignment and/or expectations only, UG indicates undergraduate only, and L indicates those enrolled in formal lab only.

- **Attendance and participation (15%):** Your presence in class is highly valued by me and your peers, so presence is considered mandatory. Attendance will be logged by the instructor for each class. You are permitted two (2) unexcused absences for the semester. If your absence is approved by me then it will not be counted against your final grade (see absence policy). Participation involves their engagement in class activities and fulfillment of those activities to good standard, though not all in-class activities are formally graded (with exception of labs). Students that have an excused absence may still be responsible for completing the in-class activity in their own time.
- **Homework (short answer) (40%, or 20%(L)):** Homework activities will be approximately bi-weekly and a mixture of short-answer questions, and mathematical/data interpretation. A rubric for written work is provided on canvas, along with answer keys following completion of the assignment. The lowest homework score will be dropped from your grade.
- **Project – research paper and presentation (20%):** Each student will take an aspect of the science they have been learning about during the semester and develop a short research/literature review project, cumulating in a paper (~2000-2500 word), and 10-minute presentation on their chosen subject. More information, guidance, and rubrics will be provided in class by week 9 as to the available topics and the specifics of what is expected. Students will be expected to select their topic shortly after the mid-term and will have the remaining time until the last full week of classes to complete this assignment. Some data analysis/visualization will be required in this project.

Expectations for G students differ: Graduate students will be expected to produce a journal style article (e.g., in format of American Met. Soc. But with reduced word count) with extensive literature summary in addition to evident original data analysis and visualization.

Pre-submission review option: Students will be given the opportunity to have their work critically examined by the instructor prior to final submission. This provides insight from the instructor as to how to improve their work. Pre-review deadlines are typically up to 1-week before the final deadline, so students who wish to use this option should manage their time accordingly and make sure to start the project early.

- **Midterm and Final Exam (25%):** There will be two exams. Exams are not cumulative. In other words, we will test on the material to that point in the semester for exam 1 (midterm, 10%), and then the final will test on the material between the prior exam and the one being taken. The last of the regular exams will be a longer exam and worth more of your grade (15%). You may bring one letter-sized ‘cheat sheet’ to each exam (you can use both sides). An equation sheet will be provided for both exams.
- **Labs (4 credit students, 20%):** Students who are registered for the lab section will have an additional 50-minute period dedicated to specific exercises on data analysis and interpretation. Some labs may run over a couple weeks on the same theme, but you should anticipate a graded lab each week. Each lab will be due Sunday at 11.59PM (3-days after the day of the weekly lab). The Lab software we will be using is called “Integrated Data Viewer” or IDV. This is a freely available software provided by Unidata. Information, including installation, is available at <https://www.unidata.ucar.edu/software/idv/>. Please select the “Current Release” or IDV 5.4 and up. IDV is available through UF-Apps but has not been tested extensively by the instructor and does not currently contain the required packages for the lab. Thus, it is recommended that students download the software to their personal machine. We will start labs using this software formally in week 3.

Assignments and Exams	Percent of Final Grade (%)	
	(3 credit)	(4 credit)
Attendance/in-class activities (2 dropped)	15	15
Homework (lowest dropped)	40	20
Project	20	20
Lab	-	20
Midterm/Final Exams	10/15	10/15
Total	100%	100%

Grading Scale (%)	
92.0 – 100	A
89.5 – 91.99	A-
86.5 – 89.49	B+
82.5 – 86.49	B
79.5 – 82.49	B-
76.5 – 79.49	C+
72.5 – 76.49	C
69.5 – 72.49	C-
66.5 – 69.49	D+
62.5 – 66.49	D
59.5 – 62.49	D-
< 59.5	E

VII. Important Dates to Remember:

<https://catalog.ufl.edu/UGRD/dates-deadlines/2024-2025/#fall24text>

Classes Begin:	Aug 22
Drop/Add Ends:	Aug 28
Labor Day	Sep 2
Homecoming	Oct 18
Veteran' Day	Nov 11
Thanksgiving Break	Nov 25-30
Reading Days	Dec 5-6
Evaluations Due	Dec 6
Final Exam	Dec 7-13
Grades visible	Dec 18

VIII. Weekly Topic Schedule including Exams (Schedule is subject to change – any changes will be posted to canvas)

Week of semester	Course Material	Textbook Chapter
1 (Aug 22)	Course Introduction and syllabus overview	-
2 (Aug 26)	Basics, Fundamental equations, scales Lab set up	1
3 (Sep 2)	Basics, Fundamental equations, scales Lab 1 - basics	1
4 (Sep 9)	Manual analysis, QG Theory (I) Lab 2 – manual analysis techniques	2,12
5 (Sep 16)	QG-Theory (2) Lab 3 – QG Theory	2
6 (Sep 23)	Isentropic Frameworks Lab 4 – isentropic analysis	3
7 (Sep 30)	PV frameworks Lab 5 - PV	4
8 (Oct 7)	Mid-term exam (Tuesday) Extratropical Cyclones (I)	5,7
9 (Oct 14)	Extratropical Cyclones (II), Wx Fronts (I) Lab 6 – Extratropical cyclones	5,6
10 (Oct 21)	Wx Fronts (II), Winter Storms (I) Lab 7 – ET cyclones (II), Fronts	6,8
11 (Oct 28)	Winter Storms (II) Lab 8 – Fronts (II)	8,9
12 (Nov 4)	High Impact Weather (I) Lab 9 – cold air damming and winter precip	11, other sources
13 (Nov 11)	High impact weather (II) Lab 10 – forecasting severe local storms	11, other sources
14 (Nov 18)	Wrap-up, project presentations, exam review. Lab 11 – forecasting excessive rainfall	
15 (Nov 25)	Thanksgiving (no class)	
16 (Dec 2)	Final Exam – Tuesday in class <i>Reading Day Thursday</i>	
Finals Week		

IX. Course Policies: Attendance, Make-Ups, and Grades

Attendance and Make up work: Students are required to attend class on a regular basis. Absences can be excused with proper documentation according to university policy. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Should you need modifications or adjustments to your course requirements because of documented pregnancy, childbirth, or childcare issues, please contact me as soon as possible to discuss. Generally, modifications will be made where necessary. This also applies to C19 issues, including personal or immediate family illness, and self-isolation over suspected or confirmed C19 exposure.

Drops: Should you decide to drop the course for whatever reason, you must request to do so through the appropriate channels by the appropriate date. Failing to do so will result in a failing (F) grade for the course. For planning purposes, it is helpful to me for you to communicate with me if you are anticipating needing to drop the class.

Late Work: All assignments submitted after their respective deadlines will be assessed a penalty: ten percentage points for each day (24-hr period) that the assignment is late. Assignments will not be accepted if overdue by more than seven days. *This does not apply for an approved accommodation or excused absence.* Note that blank files submitted on time will also be considered late, therefore, you should confirm that your work has been uploaded to canvas successfully before the due date.

Examination Policies and Reading Days: Course policies are consistent with University policies on during-term exams, final exams, reading days, and make-up exams. Students must notify the instructor as soon as possible in case of absence during a class with critical content, such as an exam, and provide documentation as to the reason for the absence. If deemed an excused absence, the student will be permitted to undertake a revised exam for credit. More details can be found at <https://catalog.ufl.edu/UGRD/academic-regulations/examination-policies-reading-days/>.

Grade Dissemination: You can access your scores at any time using the Grade function in Canvas. The instructor will post grades within 14 business days after the due date of each assignment and will communicate a timeline and reason for any delay.

Grading Policies for Assigning Grade Points: Information on current UF grading policies for assigning grade points may be found at <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

NOTE: There are NO opportunities for extra credit unless otherwise stated. I do drop select assignments through the course of semester. **I DO NOT EVER adjust a grade or offer extra assignments at the end of the semester to make up grade points, and I will disregard any requests on this topic,** with the exception being if a calculation error was made or in conditions of serious documented extenuating circumstances. I may adjust grades (curve) based on the average class grade distribution, and they will curve up if they curve at all. You should work to achieve your desired grade throughout the semester and contact me with any concerns sooner rather than later.

Grades of "Incomplete": The current university policy concerning incomplete grades will be followed in this course. An incomplete grade may be assigned at the discretion of the instructor as an interim grade for a course in which you have completed a major portion of the course with a passing grade, been unable to complete course requirements before the end of the term because of extenuating circumstances, and obtained agreement from the instructor and arranged for resolution of the incomplete grade. Instructors are not required to assign incomplete grades.

X. Course Policies: Technology and Media

Email: Each of you has a UF email address. It is vital that you maintain an active UF email account and that you **check it often**. Your instructor will post class notices at the beginning of each week. This tentative syllabus is **subject to change**, and any changes will be transmitted to you via your UF email account and Canvas (see below). Students should email the instructor if they have questions about any of the lectures, readings, assignments, or exams. You should expect a response within about 24 hours during weekdays. On holidays or weekends, expect a response on the next business day. The instructor will reasonably expect similar time frames for responses to emails sent to students.

Canvas: Course materials such as lecture slides, readings, the syllabus, and assignment instructions will be available through Canvas (<https://elearning.ufl.edu>). You will also find all due dates and grades on Canvas. Students must activate their UF GatorLink account in order to use Canvas. If you need help learning how to perform various tasks related to this course or other courses that utilize Canvas, please consult the above webpage. You may also contact the UF Computing Help Desk at (352) 392-HELP(4357) or helpdesk@ufl.edu.

Online Course Evaluation: Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at gatorevals.aa.ufl.edu/. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at gatorevals.aa.ufl.edu/public-results/.

Recordings and Notes: It is not permitted to sell notes, recordings, or videos from this class without written consent of the instructor. Nor are students permitted to disseminate recordings, videos, or post copies of assignments or exams on the internet. You are permitted to retain class notes, readings, and course content for your own use. There are many introductory courses of this nature, and so there may be many notes floating around online. However, the notes I will provide you, as well as information from legitimate subject-relevant textbooks will be considered as the final authority on matters of grading.

XI. Course Policies: Student Expectations

Disabilities Statement:

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Academic Honesty & Conduct Policy: UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code." On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor code (sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor in this class.

AI tools policy: Please see the on-canvas policy for use of AI tools. Failure to adhere to the policy will be treated as Plagiarism and a violation of the Honor Code.

Title IX: For any concerns regarding gender-based discrimination, sexual harassment, sexual assault, dating/domestic violence, or stalking, there are resources available. To learn more or to report an incident, go to: <https://titleix.ufl.edu>. Also, please be advised that your instructor is required to report instances of sexual harassment, sexual assault, or discrimination.

We are an inclusive classroom: University is an opportunity to learn from one another, no matter our background, ethnicity, nationality, disability status, sexuality, gender and gender identity, religion, and socioeconomic background. From personal experience, being the first female in my family to obtain a university degree, and the first at all to attain a PhD (internationally), I am particularly cognizant that many of you may feel out of place at such a large and prestigious place as UF. This can be amplified when you represent a minority. Make no mistake, you are here because you deserve to be, and you have the potential to do great things. In this classroom, my goal is to provide a learning environment that is inclusive to all. If you are struggling or experiencing challenges to your learning, please do not hesitate to discuss with me.

Other: I have the right to institute new policies pertaining to course content, structure, and assessment during the semester without advanced notice to ensure a positive learning environment for all students.

XII. Campus Resources for Students:

Academic Resources

E-learning technical support: Contact the [UF Computing Help Desk](#) at 352-392-4357 or via email at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services at career.ufl.edu/.

Library Support: <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352-392-6420. General study skills and tutoring. <http://teachingcenter.ufl.edu/>

Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>

Student Complaints On-Campus: sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/

On-Line Students Complaints: distance.ufl.edu/student-complaint-process/

Health and Wellness Resources

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit umatter.ufl.edu/ to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: Visit <https://counseling.ufl.edu/> or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit <https://shcc.ufl.edu/>.

University Police Department: Visit police.ufl.edu/ or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; ufhealth.org/emergency-room-trauma-center.