North Carolina Agricultural and Technical State University

Spring 23 Course Syllabus

College of Science & Technology Physics

NOTE: Students are responsible for reading, understanding, and following the syllabus.

Undergraduate Course Information

Course Name: Atmospheric Dynamics II
Course Number/Section: ASME 434 Credit Hours: 3
Days and Times: 9:30 – 10:45 TR Class Location: on Zoom

Instructor Contact Information

Instructor: Dr. Yuh-Lang Lin
Office Location: 302H Gibbs Hall Email Address: ylin@ncat.edu Office Phone: 336-285-2127

Communication

Students will receive an answer to all communications by email within 48 hours excluding holidays. The secondary point of contact will be Jackson Wiles. See below for his email address.

Teaching Assistant: Jackson Wiles <jtwiles@aggies.ncat.edu>

Student Hours

11:00 -12:00 TR. For a longer discussion, email to make an appointment.

Monday ☐ Tuesday ☒ Wednesday ☐ Thursday ☒ Friday ☐

Course Prerequisites

ASME 433 or equivalent

Course Description

This course presents classical and physical hydrodynamics. Topics covered include Circulation and vorticity, General Circulation, Quasi-Geostrophic (QG) Theory, QG analysis, QG prediction, Midlatitude Cyclone Evolution, and Introduction to Atmospheric Wave Dynamics

Student Learning Objectives/Outcomes (SLO)

Objective: Use analytical thinking skills to evaluate information critically
Outcome: Students will demonstrate the ability to answer conceptual questions on examination questions.
Objective: Effectively relate basic ideas and concepts to more sophisticated atmospheric systems.
Outcome: Students will demonstrate the ability to employ critical thinking in answering short questions as well as solving problems on examinations.
Objective: Use a wide range of disparate information and knowledge to draw references and summarize various concepts, theories, and observational evidence in the literature.
Outcome: Students will demonstrate the ability to absorb various concepts, theories and observations in assigned references and summarize and present them to the class.

Required Textbooks and Materials

Required Texts: An Introduction to Dynamic Meteorology
J. R. Holton and G. J. Hakim, 5th Ed., Elsevier Academic Press

Required Materials: Calculator when taking the Midterm and Final (no cell phone or pc calculators allowed)

Suggested Course Materials

Suggested Readings/Texts: "Lecture Notes" by Yuh-Lang Lin, NCAT, will be posted on the MesoLab website or Blackboard. [Please note that the lecture notes are composed for convenience, and are not intended to replace the required textbook. Test problems may be applications of the theories to real or idealized atmospheres, which you do not see in homework problems or lecture notes.]

Suggested Materials: N/A

Grading Policy

Course Grade Scale *[Undergraduate level courses]*

94% and above	A	83% - 80%	B-	69% - 67%	D+
93% - 90%	A-	79% - 77%	C+	66% - 60%	D
89% - 87%	B+	76% - 74%	C	59% - 0%	F
86% - 84%	B	73% - 70%	C-		

Grading Allocation

Course grades are based on a weighted grading scale of 100%. The breakdown for the course is as follows (subjected to change):

30% Homework
30% Midterm
40% Final Exam

Course Policies

Use Blackboard as The Learning Management System

Blackboard is the primary online instructional and course communications platform. Students can access the course syllabus, assignments, grades, and learner support resources. Lecture notes will be posted on the MesoLab website. Students are encouraged to protect their login credentials, complete a Blackboard orientation and log in daily to the course.

Make-Up Exams Any request for make-up should follow the University's policies and procedures. A penalty may be applied.

Extra Credit N/A

Late Work Penalty will be applied for late submission of assignments.

Special Assignments N/A

Class Schedule [Click here for a complete calendar]

Presentation Schedule

Date	Pres. #	Presentation Title	Remarks (Sec.)
1/10 (T)	1	Introduction	Overview
1/12	2	Vertical Motion	Sec. 3.5
1/17	3	Surface Pressure Tendency	Sec. 3.6
1/19	4	Circulation Theorems	Sec. 4.1
1/24	5	Circulation Theorems	Sec. 4.1
1/26	6	Circulation Theorems	Sec. 4.1
1/31	7	Vorticity	Sec. 4.2
2/2	8	The Vorticity Equation	Sec. 4.3
2/7	9	The Vorticity Equation	Sec. 4.4
2/9	10	Potential Vorticity	Sec. 4.4
2/14	11	Potential Vorticity	Sec. 4.4
2/16	12	Potential Vorticity in Homogeneous Fluid	Sec. 4.6
2/21	13	Ertel PV in Isentropic Coordinates	Sec. 4.6
2/23		Wellness Day	
2/28	14	Applications of PV Thinking to the Atmosphere	Lin's Note
3/2		Midterm	
3/6-3/10		Spring Break	
3/14	15	Applications of PV Thinking to the Atmosphere	Lin's Note
3/16	16	General Circulation	Sec.6.1 & Ch.10
3/21	17	Quasi-Geostrophic (QG) Approximation	Sec. 6.3
3/23	18	Derivation of the QG Equations	Sec. 6.3
3/28	19	QG Vorticity Equation	Sec. 6.3
3/30	20	Application of QG Vorticity Equation	Sec. 6.3
4/4	21	QG Geopotential Tendency Equation	Sec. 6.4
4/6	22	QG Geopotential Tendency Equation	Sec. 6.4
4/11		Wellness Day (4/10-11)	
4/13	23	Diagnosis of Vertical Motion– Omega Equation	Sec. 6.5
4/18	24	Diagnosis of Vertical Motion– Omega Equation	Sec. 6.5
4/20	25	Diagnosis of Vertical Motion – Q-Vector	Sec. 6.5
4/25	26	Baroclinic Instability and Cyclogenesis	Sec. 11.1
4/27	27	Introduction to Wave Dynamics	Lin's Note
5/2	28	Introduction to PBL	Lin's Note
5/4		Review	
5/8-5/12		Final Exam	

** These descriptions and timelines are subject to change at the discretion of the instructor.*

- Please refer to the Common Policies file for all other University policies, which should also be provided to all students or available in the course Blackboard shell.