



# NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIVERSITY

## Spring 25 Course Syllabus

### College of Science & Technology

### Physics

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

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#### Undergraduate Course Information

Course Name: Atmospheric Dynamics II

Course Number/Section: ASME 434

Days and Times: 12:30 – 13:45 TR

Credit Hours: 3

Class Location: Gibbs 302

#### Instructor Contact Information

Instructor: Dr. Yuh-Lang Lin

Office Location: 302H Gibbs Hall    Email Address: [ylin@ncat.edu](mailto: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:** Md Shamimul Hasan [mhasan6@aggies.ncat.edu](mailto:mhasan6@aggies.ncat.edu); Lela Shumpert [lashumpert@aggies.ncat.edu](mailto:lashumpert@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:

- (1) An Introduction to Dynamic Meteorology: J. R. Holton and G. J. Hakim, 5<sup>th</sup> Ed., Elsevier Academic Press
- (2) Mesoscale Dynamics by Yuh-Lang Lin, Cambridge University Press, 2007 [Lin07]

**Required Materials:** Calculator is needed when taking the Midterm and Final (no cell phone or pc calculators will be 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 (subject to change):

- 30% Homework [penalties will be applied for late submissions]
- 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 may 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.)
1/14	1	Introduction	Overview
1/16	2	Circulation Theorems	Sec. 4.1
1/21	3	Circulation Theorems	Sec. 4.1
1/23	4	Circulation Theorems	Sec. 4.1
1/28	5	Vorticity	Sec. 4.2
1/30	6	The Vorticity Equation	Sec. 4.3
2/4	7	The Vorticity Equation	Sec. 4.4
2/6	8	Potential Vorticity	Sec. 4.4
2/11	9	Potential Vorticity	Sec. 4.4
2/13	10	Potential Vorticity in Homogeneous Fluid	Sec. 4.6
2/18	11	Application of PV to the Atmosphere	Lecture Note
2/20	12	General Circulation	Sec.6.1 & Ch.10
2/25	13	Frontogenesis and Cyclogenesis Theories	Lecture Note
2/27		Midterm	
3/3-3/7		Spring Break	
3/11	14	Isolated convective storms (single-cell storms, multi-cell storms)	Sec. 8.1-8.3 (Lin07)
3/13	15	Isolated convective storms (single-cell storms, multi-cell storms)	Sec. 8.1-8.3 (Lin07)
3/18	16	Supercell storms & tornadogenesis	Sec. 8.4-8.5 (Lin07)
3/20	17	Supercell storms & tornadogenesis	Sec. 8.4-8.5 (Lin07)
3/25	18	Mesoscale convective systems (squall lines, rainbands)	Sec. 9.1-9.2 (Lin07)
3/27	19	Mesoscale convective systems (squall lines, rainbands)	Sec. 9.1-9.2 (Lin07)
4/1	20	Mesoscale convective systems (MCS)	Sec. 9.3 (Lin07)
4/3	21	Mesoscale convective systems (MCS)	Sec. 9.3 (Lin07)
4/8	22	Tropical Cyclones	Sec. 9.3 (Lin07)
4/10	23	Tropical Cyclones	Sec. 9.3 (Lin07)
4/15	24	Orographic influence on the climatological distribution of precipitation and preexisting disturbances	Sec. 11.1-11.2 (Lin07)
4/17	25	Common ingredients of orographic precipitation	Sec. 11.2 (Lin07)
4/22	26	Orographic precipitation mechanisms & Control parameters	Sec. 11.3-11.4
4/24	27	Introduction to Wave Dynamics	Lecture Note
4/29	28	Introduction to PBL	Lecture Note
5/1		Review	
5/6-5/9		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.