



# NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIVERSITY

## Course Syllabus

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### Course Information

<i>Course Number/Section</i>	ASME 434
<i>Course Title</i>	Atmospheric Dynamics II
<i>Term</i>	Spring 2017
<i>Days &amp; Times</i>	11:00 – 12:15 TR, Gibbs 302

### Professor Contact Information

<i>Professor</i>	Dr. Yuh-Lang Lin
<i>Office Phone</i>	(336) 285-2127
<i>Email Address</i>	ylin@ncat.edu/ yuhlang2009@gmail.com
<i>Office Location</i>	302H Gibbs Hall
<i>Office Hours</i>	5:00-6:00 TR, 2-3 W, stop by anytime (short discussions), or by appointment (long discussions)
<i>Teaching Assistants</i>	Bantwale Enyew

### Course Pre-requisites, Co-requisites, and/or Other Restrictions

Atmospheric Dynamics I or equivalent

### Course Description

This course presents classical and physical hydrodynamics. Topics covered include Planetary Boundary Layer, Quasi-Geostrophic (QG) Theory, QG analysis, QG prediction, Midlatitude Cyclone Evolution, Atmospheric Wave Dynamics

### Student Learning Objectives/Outcomes

- 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:** Student 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

### Suggested Course Materials

#### Suggested Readings/Texts

- (1) Mesoscale Dynamics  
Y.-L. Lin, Cambridge Univ. Press, 2007

(Relevant material will be provided by Dr. Lin)

**Assignments & Academic Calendar** (Subjected to change)

*Topics, Reading Assignments, Due Dates, Exam Dates (optional: withdrawal dates, holidays, etc.)*

**Presentation Schedule**

Date	Pres. #	Presentation Title	Remarks
1/9	1	Introduction	Overview
1/11	2	Circulation Theorems	Sec. 4.1
1/16	3	Circulation Theorems	Sec. 4.1
1/18	4	Circulation Theorems	Sec. 4.1
1/23	5	Vorticity	Sec. 4.2
1/25	6	The Vorticity Equation	Sec. 4.3
1/30	7	The Vorticity Equation	Sec. 4.3
2/1	8	Potential Vorticity	Sec. 4.4
2/6	9	Potential Vorticity	Sec. 4.4
2/8	10	Potential Vorticity in Homogeneous Fluid	Sec. 4.5
2/13	11	Ertel PV in Isentropic Coordinates	Sec. 4.6
2/15	12	Ertel PV in Isentropic Coordinates	Sec. 4.6
2/20	13	Applications of PV to the Atmosphere	Dr. Lin's Note
2/22	14	Applications of PV to the Atmosphere	Dr. Lin's Note
2/27		Review for Midterm	
3/1		Midterm	
3/5-9		Spring Break	
3/13	15	Wave Dynamics – Perturbation Method	Sec. 5.1
3/15	16	Wave Properties Sound Waves	Sec. 5.2 Sec. 5.3
3/20	17	Shallow-Water Waves	Sec. 5.3
3/22	18	Internal Gravity (Buoyancy) Waves	Sec. 5.4
3/27	19	Inertia-Gravity Waves	Sec. 5.5
3/29	20	Geostrophic Adjustment and Rossby Waves	Sec. 5.6, 5.7
4/3	21	Mountain Waves	Dr. Lin's Note
4/5	22	General Circulation	Sec. 6.1 & Dr. Lin's Note
4/10	23	Derivation of the QG Equations	Sec. 6.2
4/12	24	QG Prediction – Geopotential Tendency	Sec. 6.3
4/17	25	QG Prediction – QG Potential Vorticity Equation	Sec. 6.3
4/19	26	QG Diagnosis – Omega Equation	Sec. 6.4
4/24	27	Idealized Model of a Baroclinic Disturbance	Sec. 6.5
4/26	28	Hydrostatic Instability	Ch. 7
5/1	29	Baroclinic Instability	Ch. 7
5/3		Review for the Final	
5/7-11		Final Exam (1-3pm, May 10, R)	

**Grading Policy**

- (1) Homework 20%
- (2) Midterm 35%
- (3) Final 45%

**Grading Scale**

Grade										
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Scores	94	90	87	83	80	77	73	70	67	63	60	55
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**Course Policies**

*Make-up exams*

No make-up mid exams are allowed. With excused absences, the homework and final exam with appropriate weights will be used to evaluate the overall grade.

*Extra Credit*

No Extra Credit

*Late Work*

Late submission of homework and model projects must be within a reasonable period of time permitted by the instructor.

*Special Assignments*

Not applicable

*Academic Integrity*

Enrollment in the class means that you agree to abide by the expectations of North Carolina A&T State University about academic integrity. For specific information refer to your Student Handbook. Also, refer to the most current Undergraduate Bulletin for the academic dishonesty policy. The North Carolina A&T State University’s Academic Honor Code will be enforced.

Your responsibilities in the area of honor include, but are not limited to, avoidance of cheating, plagiarism and improper or illegal use of technology. Your presentations, assignments, and quizzes are expected to be your own work. Any questions about these should be directed to the professor. It is permissible to request assistance from a librarian when doing database research as long as the selection and organization of the research for the presentation is in your own work.

*Class Attendance*

The College of Arts and Sciences requires students to be on time for class and to attend class on a regular basis. If the student has unexcused absences, is late for class or leaves class early, the student’s grade may be lowered.

(See attendance policy set forth by the instructor in the course syllabus.)

Excused absences will comply with the following university policy on make up work: “Sickness (verification needed); death of relative (immediate family); participation in an approved university related activity; acting in the capacity of a university representative (band, choir, sports, related travel, etc.); extraordinary circumstances including court appearances, family emergency~ at the discretion of the professor, etc. require a signed statement.

NOTE: “Other reasons for class absences are not acceptable.”

*Classroom Citizenship*

Normal classroom decorum is expected.

**Technical Support**

If you experience any problems with your A&T account you may call Aggie Tech Support (formerly Help Desk) at 336.334.7195.

## **Field Trip Policies / Off-Campus Instruction and Course Activities**

Not applicable

Student Affairs website <http://www.ncat.edu/~staffair/>;

**Student Handbook:** <http://www.ncat.edu/~deanofst/Handbook.htm>;

Student Travel Procedures and Student Travel Activity Waiver

<http://businessfinance.ncat.edu/policies%20and%20procedures%20index.htm>

*Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at the website address: Student Travel Procedures and Student Travel Activity Waiver <http://businessfinance.ncat.edu/policies%20and%20procedures%20index.htm>. Additional information is available from the office of Student Affairs, please check the website at <http://www.ncat.edu/~staffair/>.*

*Below is a description of any travel and/or risk-related activity associated with this course.*

**Other Policies (e.g., copyright guidelines, confidentiality, etc.)**

**Student Handbook:** <http://www.ncat.edu/~deanofst/Handbook.htm>

**Family Educational Rights and Privacy Act** [http://www.ncat.edu/~registra/ferpa\\_info/index.htm](http://www.ncat.edu/~registra/ferpa_info/index.htm)

## **Student Conduct & Discipline**

North Carolina A&T State University has rules and regulations that govern student conduct and discipline meant to ensure the orderly and efficient conduct of the educational enterprise. It is the responsibility of each student to be knowledgeable about these rules and regulations. Please consult the undergraduate [http://www.ncat.edu/~acdaffrs/Bulletin\\_2008-2010/2008-2010\\_Undergraduate\\_Bulletin.pdf](http://www.ncat.edu/~acdaffrs/Bulletin_2008-2010/2008-2010_Undergraduate_Bulletin.pdf) and graduate bulletins: 2008-2010 Graduate Catalog.doc <http://www.ncat.edu/~gradsch/cstudents.html> and student handbook <http://www.ncat.edu/~deanofst/Handbook.htm> for detailed information about specific policies such as academic dishonesty, cell phones, change of grade, disability services, disruptive behavior, general class attendance, grade appeal, incomplete grades, make up work, student grievance procedures, withdrawal, etc.

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

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01.27.09 – Submitted to Faculty Senate by LEW