

**NORTH CAROLINA AGRICULTURAL AND TECHNICAL
STATE UNIVERSITY**

Course Syllabus

Course Information

<i>Course Number/Section</i>	EES 851
<i>Course Title</i>	Dynamic Meteorology
<i>Term</i>	Fall 2017
<i>Days & Times</i>	TR 5:00 – 6:15, 307 Gibbs Hall

Professor Contact Information

<i>Professor</i>	Dr. Yuh-Lang Lin
<i>Office Phone</i>	(336) 285-2127
<i>Email Address</i>	ylin@ncat.edu
<i>Office Location</i>	302H Gibbs Hall
<i>Office Hours</i>	M (3:00–4:40) & W (3:00–3:50) or by appointment
<i>Other Information</i>	MesoLab website: http://mesolab.us
<i>Teaching Assistant</i>	William Agyakwah <william.agyakwah@gmail.com>, Justin Riley <jgriley@aggies.ncat.edu>

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

Undergraduate Atmospheric Dynamics, Fluid Dynamics or equivalent (solid calculus, PDE and physics backgrounds)

Course Description

This course presents the application of classical and physical hydrodynamics to large-scale atmospheric motions and circulations. Topics covered include scale analysis of dynamic equations, elementary applications of the basic equations, circulation and vorticity, boundary layer dynamics, the general circulation, quasi-geostrophic theory of synoptic-scale motions, perturbation theory, and atmospheric wave motions.

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

Suggested Course Materials

- (1) An Introduction to Dynamic Meteorology by J. R. Holton and G. J. Hakim, 5th Ed., Elsevier Academic Press, 2013
- (2) Mesoscale Dynamics by Y.-L. Lin, Cambridge Univ. Press, 2007

Assignments & Academic Calendar

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

Presentation Schedule

Date	Lec #	Presentation Title	Remarks
8/17	1	Introduction, Real Forces, Apparent Forces	Sec. 1.1-1.2
8/22	2	Coordinate Systems, Vertical Coordinates	Sec. 1.3-1.4
8/24	3	Derivation of Equation of Motion	Sec. 2.1 -2.3
8/29	4	Scale Analysis	Sec. 2.4
8/31	5	Continuity Equation and Approximations	Sec. 2.5
9/5	6	The Thermodynamic Energy Equation	Sec. 2.6
9/7	7	Thermodynamics of the Atmosphere Boussinesq Approximation	Sec. 2.7-2.8
9/12	8	Basic Concepts: Static Instability, Conditional Instability, Potential Instability	Sec. 2.9
9/14	9	Basic Eq. in Isobaric Coordinates	Sec. 3.1
9/19	10	Balanced Flow	Sec. 3.2
9/21	11	Trajectories, Streamlines and Streamfunction	Sec. 3.3
9/26	12	Thermal Wind	Sec. 3.4
9/28	13	Diagnostic of Vertical Motion	Sec. 3.5
10/3	14	Surface Pressure Tendency	Sec. 3.6
10/5		Midterm Exam	
10/9-10		Fall Break	
10/12	15	Circulation Theorems	Sec. 4.1
10/17	16	Vorticity, Vorticity Equation	Sec. 4.2-4.3
10/19	17	Potential Vorticity	Sec. 4.4
10/24	18	Introduction to General Circulation	Ch.10
10/26	19	Quasi-Geostrophic Approximation	Sec. 6.1
10/31	20	Quasi-Geostrophic Vorticity Equation	Sec. 6.2
11/2	21	Quasi-Geostrophic Prediction	Sec. 6.3
11/7	22	Diagnostic of Vertical Motion	Sec. 6.4
11/9	23	Diagnostic of Vertical Motion	Sec. 6.4
11/14	24	Idealized Model of a Baroclinic Disturbance	Sec. 6.5
11/16	25	Wave Dynamics	Ch.5
11/21	26	Introduction to PBL	Ch.8
11/22-24		Thanksgiving Holiday (W-F)	
11/28	27	Introduction to Mesoscale Circulations	Ch.9
11/30		Reading Day	
12/4-8		Final Exam	

Grading Policy

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

Grading Scale

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Scores	94- 100	90- 93	87- 89	83- 86	80- 82	77- 79	73- 76	70- 73	67- 69	60- 66	0- 59

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

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

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.

01.27.09 – Submitted to Faculty Senate by LEW