Syllabus for ATMS 305 – Thermodynamics and Statics – Fall 2008

Date	Topic	Reading/Homework*
W 20 Aug 2008	Introduction, Vertical Structure of the Atmos.	WH 1.3.4
M 25 Aug	Thunderstorms	WH 8.3.2, 7.3.2, HW#1
W 27 Aug	The Gas Laws	WH 3.1
M 1 Sep	holiday	relax
W 3 Sep	Hydrostatic Equation	WH 3.2, HW#2
M 8 Sep	First Law of Thermodynamics	WH 3.3
W 10 Sep	First Law of Thermodynamics	HW#3
M 15 Sep	Review Session	
W 17 Sep	Exam I	20 Aug – 15 Sep material, HW#1-3
M 22 Sep	Adiabatic Processes	WH 3.4, HW#4
W 24 Sep	2nd Law of Thermodynamics	WH 3.7 (except 3.7.3)
M 29 Sep	2nd Law of Thermodynamics	HW#5
W 1 Oct	Water Vapor in the Air	WH 3.5
M 6 Oct	Water Vapor in the Air	Journal article approved, HW#6
W 8 Oct	Review Session	
W 15 Oct	Exam II	22 Sep – 8 Oct material, HW#4-6
M 20 Oct	Phase of Water and Latent Heats	WH 3.5.2, HW#7
W 22 Oct	Phase of Water and Latent Heats	
M 27 Oct	The Clausius-Clapeyron Equation	WH 3.7.3, HW#8
W 29 Oct	The Clausius-Clapeyron Equation	
M 3 Nov	The Concept of Static Stability	WH 3.6, HW#9
W 5 Nov	Thermodynamic Diagrams	
M 10 Nov	Review Session	
W 12 Nov	Exam III	20 Oct – 10 Nov material, HW#7-9
M 17 Nov	Thermodynamic Diagrams	HW#10
W 19 Nov	Skew T – ln p diagrams	
M 24 Nov	Stability Indices	HW#11
M 1 Dec	Stability Indices	HW#12
W 3 Dec	Group presentations	Final Project Report
M 8 Dec	Group presentations	

*assignment completed before class meets on this date

Description

A course designed for the undergraduate atmospheric sciences major which examines the fundamental energetics driving the atmospheric heat engine. The specific application of the fundamental concepts will be toward developing understanding and insights related to thunderstorm development and equipping the student with tools that will serve as aids in thunderstorm forecasting.

Outline

Vertical Structure of Atmosphere (WH, 1.3.4)
Thunderstorms (WH, 8.3.2)
The Vertical Equation of Motion (WH 7.3.2)
The Gas Laws (WH 3.1)
Hydrostatic Equation (WH 3.2)
First Law of Thermodynamics (WH 3.3)
Adiabatic Processes (WH 3.4)
The Second Law of Thermodynamics and Entropy (WH 3.7)
    [except WH 3.7.3]
Water Vapor in the Air (WH 3.5)
Phase of Water and Latent Heats (WH 3.5.2)
The Clausius-Clapeyron Equation (WH 3.7.3)
The Concept of Static Stability (WH 3.6)
Thermodynamic Diagrams – Skew T, Log P (Remer lectures)
Useful Diagnostic Parameters
    CCL, LCL, Tw, θw, Te, θe, etc.
Parcel Method - Stability Indices
Slice Method - Stability Indices
Planetary Boundary Layer basics (*time permitting*, WH 9.3, 9.4)
Student Group Presentations

Grading

Homework	10%
Exam I	20%
Exam II	20%
Exam III	20%
Final Exam	25%
Presentation	5%
Total	**100%**

92% < total score ≤ 100%	A
90% < total score ≤ 92%	A-
88% < total score ≤ 90%	B+
82% < total score ≤ 88%	B
80% < total score ≤ 82%	B-
78% < total score ≤ 80%	C+
72% < total score ≤ 78%	C
70% < total score ≤ 72%	C-
68% < total score ≤ 70%	D+
60% < total score ≤ 68%	D
total score ≤ 60%	F

Homework

Homework will be assigned throughout the semester and is intended to aid in improving your understanding of the course material contained in the lecture and reading assignments. Homework will be defined as *individual* or *group* assignments. When an assignment is designated for a *group*, each individual within the group will receive an identical grade.

Exams I, II, and III

The mid-term exams (I, II, and III) will be primarily testing new material introduced since the previous exam or since the start of the semester.

Final Exam

The final exam is a *comprehensive* exam in which all the material contained in the entire course is testable.

Presentation

Each student will be part of a research team responsible for finding an approved journal article having as its subject a topic related to severe weather and presenting the significant findings of the article. The subject matter of the journal article must meet the approval of the instructor on or before 6 October 2008. The research teams will be assigned before the Labor Day weekend.

Assignment/Quiz/Exam Policy

Assignments are to be handed in before the start of lecture on the date they are due. Assignments handed in after the start of lecture are considered late until 5:00 pm on the date they are due and will be have an automatic 10% deduction from their final score. Assignments handed in after 5:00 pm on the date they are due will receive no credit.

Quizzes and Exams are written tests and will be taken on the date they are scheduled, unless circumstances (e.g. medical or loss in the family) warrant. Make-up quizzes and exams for special circumstances will consist of an individual oral graded question and answer session at a mutually agreed upon time outside of the usual class meeting time.

The lowest homework score for each individual will be *dropped* from the total homework score tabulation.

Instructor

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Textbook

"Atmospheric Science An Introductory Survey", Second Edition, by John M. Wallace and Peter V. Hobbs

supplemented by the "Atmospheric Thermodynamics" lecture notes of Prof. Fred Remer, University of North Dakota

References

"Introduction to Theoretical Meteorology" by S. L. Hess

U.S.A.F. Technical Document Tr79-006 on Skew T- ln P Diagrams

Disabilities

Contact Prof. Miller early in the course if you have a disability that requires special accommodations.

Academic Integrity

Cheating or plagiarism results in a failed assignment, quiz, or exam on the first infraction. A second infraction results in course failure and a report to the UNCA administration. See http://www.unca.edu/catalog/academicregs.html under "Student Responsibilities" for a refresher on the UNCA policy.