

ESAS 1110 – Professor Paul L. Sirvatka
Topical Outline and Readings
Text: Meteorology by Ackerman and Knox

UNIT I

- P=ρRT: FUNDAMENTAL BEHAVIOR OF THE AIR
Charles' Law; Boyle's Law; The Ideal Gas Law; Adiabatic Processes
Chapter 1, pp. 1-18

Geography Lab

- HEAT AND TEMPERATURE
Chapter 2, pp. 27-35
- STRUCTURE OF THE ATMOSPHERE
Layers; Chemical Constituents; Importance of Gases; Meteors
Chapter 5, pp. 147-156

Geography Quiz

- ENVIRONMENTAL ISSUES AND CONCERNS
The Greenhouse Effect; Global Warming; The Ozone Problem
Chapter 15 pp. 431-444
- WEATHER INSTRUMENTS
Chapter 5, pp. 127-133
- STATION MODELS
Symbols and Meanings
Chapter 1, pp. 18-24

Test I

UNIT II

Math Lab Part 1

- ADIABATIC PROCESSES - GETTING READY FOR THE RAIN
Lapse Rates
Chapter 2, pp. 32-36; Chapter 3, pp. 74-79
- WATER IN THE ATMOSPHERE - "PROVE IT!"
Relative Humidity; Mixing Ratio; Dew Point; Wet Bulb; Vapor Pressure
Chapter 4, pp. 85-94

- WATER ON THE EARTH - "IF YOU SEE IT, ITS A LIQUID!"
Floods; Fog; Steam
Chapter 4, 94-100; Chapter 6, pp. 332-334
- CLOUD PHYSICS - "EVERYTHING YOU ALWAYS WANTED TO KNOW..."
Types; Collision and Coalescence; The Bergeron Process
Chapter 4, 101-124
- STABILITY AND INSTABILITY - LEARNING TO LIFT A PARCEL
Parcel Method; Judging the Atmosphere's Stability; LCL; LFC; EL
Check out http://rst.gsfc.nasa.gov/Sect14/Sect14_1b.html

Instability Lab

- LIFE CYCLE OF A GARDEN VARIETY THUNDERSTORM
Development; Frozen Precipitation
Chapter 11, pp. 312-324, 329

Test II

UNIT III

Math Lab Part 2

- ELECTROMAGNETIC RADIATION - "WHAT IS THE CAUSE OF THE WEATHER?"
 $c = \lambda \cdot f$; Electromagnetic Spectrum
- THE SUN - "HOW HOT IS HOT?"
Physical Properties; Temperature
- BLACKBODY RADIATION
Wien's Displacement Law; Stefan-Boltzmann Law
Chapter 2, pp. 36-50
- VARIABILITY OF INCOMING SOLAR RADIATION - "WHAT CAUSES THE SEASONS?"
Seasons; Orbit; Temperature vs. Length of Day
Chapter 2, pp. 50-54; Chapter 3, pp. 57-74

Climate Lab

- RADIATION AND THE EARTH-ATMOSPHERE SYSTEM - "WHY IS THE SKY BLUE?"
Absorption; Reflectivity; Scattering;
Chapter 5, pp. 133-138
- RADIATION BUDGET - "WHEN WATER VAPOR CONDENSES..."
Conduction and Convection

- GENERAL CIRCULATION - REDEFINING THE WEATHER
Hadley Cell; Three-Cell Model; ITCZ
Chapter 7, pp. 189-201

Test III

UNIT IV

- FORCES OF MOTION - "NEWTON WAS A WEATHERMAN?"
Gravity, PGF, Coriolis Force, Centrifugal Force, Friction
Chapter 6, pp. 159-170
- FORCES AND WINDS - DEVELOPING AN UNDERSTANDING OF THE JET STREAM
Geostrophic; Gradient; Surface; Hydrostatic Equation
Chapter 6, pp. 170-177
- SEA AND LAND BREEZES - LEARNING TO FORECAST IN FLORIDA DURING JULY
Time and Size Scales; Mesoscale Circulations
Chapter 6, pp. 179-186

Physics Quiz

- AIR MASSES AND FRONTS - "DON'T EVEN THINK ABOUT SAYING 'LOW!'"
Identification and Modification; Finding Fronts; Types; Cross-Sections; Associated Weather
Chapter 9, pp. 249-269

Cyclone and Isoplething Lab

- LIFE CYCLE OF A WAVE CYCLONE - THIS IS A WEATHER MAP!
Baroclinicity; Cyclogenesis; Frontogenesis; Associated Weather
Chapter 10, pp. 272-304
- THUNDERSTORMS AND SEVERE WEATHER - LOADING THE GUN
Squalls; Convective Instability; Multicell and Supercell Storms
Chapter 11, pp. 312-332
- SURVIVING AND UNDERSTANDING SEVERE WEATHER
Lightning; Tornadoes; Safety
- HURRICANES AND TROPICAL STORMS
Formation; Safety; Conservation of Angular Momentum
Chapter 8, pp. 223-246

Test IV

Cumulative Final Exam