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

UNIT I

- $P = \rho RT$: 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](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