ATM 211
Final Exam Topics

* Atmospheric composition and layers of the atmosphere
* Pressure, dew point, relative humidity
* Soundings
  * Finding an inversion, tropopause level, moist/dry layers
* Radar
  * How radar works
  * Reflectivity
  * Doppler Radar
  * Dual-pol radar
* Satellite
  * Geostationary vs. Polar orbiting
  * Types of imagery: Visible / Infrared / Water Vapor
* Isobaric maps
* Map terminology (gradient, trough/ridge)
* Thickness and geopotential height
* Forces and basic force balances
  * Pressure gradient force
  * Coriolis force
  * Geostrophic balance
  * Frictional force
  * Surface flow (Ekman/surface balance)
* Why is there a jet stream? (relationship between jet and temp gradients)
* Divergence and convergence, and their relation to surface highs/lows
* Curved flow, and gradient wind balance
  * Ageostrophic wind
  * Divergence and convergence in curved flow
* Vorticity (curvature and shear vorticity)
* Advection / temperature advection
* Vorticity advection
  * CVA/AVA and implications
* Four-quadrant model of divergence/convergence associated with jet streaks
  * Jet streaks in curved flow
* Airmasses
* Midlatitude cyclones
  * Cyclone structure and terminology
  * Cyclogenesis
  * The occlusion process, and cycloysis (cyclone weakening after occlusion / vertically stacked cyclones)
  * Symmetric upper-level cut-offs and implications
* Fronts
  * Types: Cold, Warm, Stationary, Occluded
  * Characteristics of fronts (how to find fronts on surface maps)
  * Drylines (development, airmass origins)
  * Frontogenesis/Frontolysis
* Midlatitude cyclone development
* Preferred regions of cyclogenesis:
  * Lee cyclogenesis / (lee lows/lee lower tropospheric “troughs”)
Sensible and latent heating, and their effect on cyclones
Lack of significant surface friction and effect on cyclones
Cold air damming
Numerical weather prediction
Models
Spectral vs. grid-point models
Model resolution
Model initialization (current data with prior model run)
Ensembles
MOS (Model Output Statistics): Know how to read MOS data
Mixing
(Surface-based) Mixed layer formation
Low temperature forecasting
Radiation inversions, and conditions that are favorable for the development of a radiation inversion
Conditions that result in warm lows vs. cold lows
High temperature forecasting
How do we acquire a deep mixed layer?
Conditions that result in warm highs vs. cold highs
Precipitation, and its effect on the temperature (wet-bulb)
Stability
Lapse rates (DALR / MALR / ELR)
Types of ELR:
Stable layer
Unstable layer
Conditionally unstable layer
CAPE (SBCAPE and MUCAPE) and CINH; capping inversion
LCL, LFC, EL
Thermal wind
Relationship between the thickness and geostrophic vertical shear
Finding the thermal wind given geostrophic wind at two pressure levels
Veer ing / Backing and implications
Midlatitude flow properties
Zonal vs. meridional flow, Digging vs. lifting troughs
Blocking
Anticyclonic/cyclonic wave breaking

SHW 4th Edition: 1, 2, 3, 4, 6, 7, 8, 9, 10, 11 ... (only the material discussed in class)
Any material from the homework (other than RAOB code; no geography/airport codes)