ATM 211
Final Exam Topics

* Pressure, dew point, relative humidity
* Soundings
    * Finding an inversion, tropopause level, moist/dry layers
* Radar
    * How radar works
    * Reflectivity
    * Doppler Radar
    * Dual-pol radar and associated products (Zdr, correlation coefficient)
* 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: Balance between PGF and Coriolis only
    * Frictional force
    * Surface flow (Ekman balance: Balance between PGF, Cor., and Friction)
* Why is there a jet stream? (relationship between jet and temp gradients)
* Divergence and convergence (mass continuity)
    * Relation to surface highs/lows
    * Relation to ascent/subsidence
* 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)
* Jet streaks
    * Four quadrants of a jet streak, and associated divergence/convergence
* Introduction to airmasses and fronts
* Midlatitude cyclones
    * Cyclone structure and terminology
    * Cyclogenesis
    * The occlusion process, and 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
*Preferred regions of cyclogenesis:
    * Lee cyclogenesis / (lee lows/lee lower tropospheric “troughs”)

    * Sensible and latent heating, and their 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; data assimilation)
    * Ensembles
    * MOS (Model Output Statistics): Know what MOS is, and 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
* Stability
    * Lapse rates (DALR / MALR / ELR)
    * Types of ELR:
        * Stable layer
        * Unstable layer
        * Conditionally unstable layer
    * CAPE and CINH; capping inversion
    * LCL, LFC, EL
* Thermal wind
    * Finding the thermal wind given geostrophic wind at two pressure levels
    * Veering / Backing and implications

Any material from the homework/quizzes (other than geography)