

Final Exam Review

Note: This is intended as a guide to help you study, and may not accurately represent the actual content of the exam.

Note 2: Approximately 50% of the exam will be on topics covered since the last midterm.

I. topics from first 3rd of course

- Weather vs. Climate
- History of the atmosphere
- Heat and temperature
- Specific heat capacity and latent heat.
- Types of energy and energy transfer
- Electromagnetic spectrum.
- Properties of blackbodies
- Energy budget of the Earth system (the need for balance).
- Greenhouse effect.
- Vertical structure of the atmosphere:
How is each layer heated?
- Temperature cycles: seasonal and diurnal.
Land/sea contrasts.

II. topics from second 3rd of course

- Pressure and density
 - why pressure decreases with height
 - hydrostatic balance
 - ideal gas law
 - sea breeze
- humidity
 - measures of humidity and vapor pressure
 - dew point
 - stability and clouds
 - dew, fog, and frost
- precipitation – rain and cloud droplet growth, snow
- optics – reflection, refraction, diffraction, scattering
- dynamics and circulation
 - geostrophic balance between coriolis and pressure gradient forces

- Hadley cell: ITCZ, trade winds, jet stream; effect of rotation
 - 3 cell model
- ozone hole

III. last 3rd of the course

- Fronts
 - Types of fronts (cold, warm, stationary, occluded)
 - Weather and clouds associated with frontal passage (for each type of front).
 - Relative steepness of cold and warm fronts.
- Mid-latitude cyclones
 - Polar front theory
 - Growth and decay
- Weather forecasting
 - Types of forecasts: climatology, persistence, trend, analogue, numerical model
- Puget Sound Weather
 - Convergence zone
 - Marine push
 - Rainshadow
 - Seabreeze
 - Wind storms (katabatic winds)
- tropical cyclones
 - comparison with extra-tropical cyclones
 - hurricanes
 - structure: eye, eye-wall, rain bands, convection, outflow
 - feedbacks that maintain low pressure
 - conditions for formation
- ENSO
 - coupled atmosphere-ocean phenomenon
 - changes in wind, sea level, temperature, upwelling
 - impacts on biology, food supply, precipitation
- climate change / global warming

- carbon dioxide and other greenhouse gases increasing due to human activity
- models show recent warming trend due to increasing carbon dioxide plus solar and volcanic activity
- stabilizing carbon dioxide levels requires drastic change in energy usage