



Wein's Law  
Selective absorbers/emitters in the atmosphere (dependency on wavelength)  
Greenhouse effect and the role of the atmosphere and clouds  
Terrestrial radiation budget (don't need to memorize values) April 4

### **Chapter 3: Seasonal and Daily Temperatures**

**Seasonal Temperature Cycle** April 6  
Tilt, distance from the sun  
Which is the biggest factor?  
Angle of incidence of solar radiation  
Length of day  
Latitudinal distribution of surface and top-of-atmosphere insolation  
Solstices and equinoxes

**Annual Radiation Balance** April 10  
Net loss at poles, net gain near the equator  
The result: circulation of atmosphere/ocean toward higher latitudes (Bri and needy boyfriend)  
Mechanisms of energy transport:  
Latent heat, sensible heat, and ocean transport

**Annual Temperature Cycle**  
Max in August and min in February (2 to 3-month lag)

**Diurnal Temperature Cycle** April 10  
Caused by earth's rotation on its axis  
Mechanisms of warming and cooling of the surface and atmosphere  
Relationship between maximum insolation and the max daily temperature

**Controls on Temperature** April 12  
Tilt  
Specific heat  
Albedo  
Elevation  
Ocean currents

### **Chapter 4: Atmospheric Moisture** April 17

Specific humidity, mixing ratio, and saturation mixing ratio  
Vapor pressure ( $e$ ) and saturation vapor pressure ( $e_s$ )  
Know fig. 4.10 pg. 91 and how to use it (for example, given  $T$  and  $e$  one can get  $e_s$ ,  $T_D$ , and relative humidity)  
Relative humidity (RH) April 18  
How do changes in  $T$ ,  $T_D$ ,  $e$ , and  $e_s$  affect RH?  
Dew point ( $T_D$ )  
Latent heat  
Figure 2.3 on p. 31

Can-crushing experiment – What happened?

### **Chapter 5: Condensation: Dew, Fog, and Clouds**

Formation of dew and frost

April 20

#### **Fog**

Radiation fog

Advection fog

Steam fog

Dry and wet haze

Cloud types

Visible and IR satellite imagery

April 24

### **Chapter 6: Stability and Cloud Development**

#### **Rising motion, adiabatic cooling, dry and moist lapse rates**

Why is moist lapse rate less than dry lapse rate?

April 25

Example of air forced to ascend/descend over a mountain (use adiabatic chart, pp. 156-157)

#### **Stability**

Compare lapse rates

April 26

Know types of clouds one would expect for a given stability

April 27

#### **Cloud development: lifting mechanisms**

Surface heating

Uplift over topography

Large-scale ascent

Uplift along fronts

### **Chapter 7: Precipitation Processes**

What are different ways to define saturation?

May 1

#### **Condensation Nuclei (CN) aid in droplet formation/growth by the following two effects:**

Curvature effect

Solute effect

Collision and coalescence

Bergeron process

May 2

#### **Further growth of ice crystals**

Aggregation

Accretion/riming

Cloud Seeding: How effective?

## **Precipitation types**

Rain, drizzle, virga, snow, freezing rain, sleet, snow grains / pellets (Figure 7.23)  
Shape of falling raindrops

What does Doppler radar show you?

## **Chapter 8: Air Pressure and Winds**

### **Atmospheric Pressure**

Hydrostatic equation

Ideal gas law

How does density/temperature affect pressure change with height?

Pressure units

Why do we reduce station pressure to sea level?

Isobars

Constant pressure surfaces

Upper-level charts

Highs and lows (ridges and troughs)

Cyclones and anticyclones

### **Winds**

Newton's laws of motion

Forces that influence winds

    Pressure gradient force

    Coriolis force

    Centripetal force

    Friction

Geostrophic wind

Gradient wind

The effect of friction on surface winds

Divergence

Convergence

May 11

May 15

## **Chapter 9: Wind: Small-Scale and Local Systems**

### **Scales**

Mesoscale, synoptic scale, planetary scale

Onshore wind, offshore wind

### **Local Wind Systems**

Land-sea breeze

Monsoon

Downslope winds, Santa Ana winds

## **Chapter 10: Wind: Global Systems**

### **General Circulation**

What is the underlying cause of the earth's general circulation?

Hadley cell

ITCZ

Trade winds

Westerlies

Subtropical highs

Semi-permanent highs and lows (Bermuda High, Aleutian Low)

Average seasonal wind patterns over the western U.S.

May 16

### **Jet Streams**

Polar jet

Subtropical jet

### **Atmosphere-Ocean Interactions**

Upwelling

## **Chapter 11: Air Masses and Fronts**

**Air masses** (don't worry about the classification names)

Differences between land and water

Wind direction might show you where an air mass is coming from (and therefore its characteristics)

### **Fronts**

May 17

What is a front?

Stationary front

Cold front

Warm front

May 18

Occluded front

    Cold occlusion

    Warm occlusion

Spatial (horizontal and vertical) structure

Frontogenesis

Frontolysis

Cold air damming

Overrunning

Frontal inversion

Types of precip and clouds associated with fronts

## **Chapter 12: Middle-Latitude Cyclones**

### **Formation**

May 22

Polar front theory (Norwegian school of thought)

Frontal wave

Warm sector

Stages of development  
Lee-side lows  
Where do they form? Importance of topography/mountains  
Wind patterns around cyclones  
Average speed  
Nor'easters

**Vertical Structure and Upper-Level Support** May 23

Where do convergence and divergence occur aloft? (in terms of ridges vs. troughs)  
Wavy flow  
Surface low needs net divergence out of a column to deepen  
Jet streaks  
Why are jets stronger during the winter?

**Chapter 13: Weather Forecasting** May 24

**Acquisition of Data**

Surface data  
Upper air data  
Radiosondes  
Satellites  
Commercial aircraft

**Forecasting Methods**

Persistence  
Trend method  
Analog method  
Numerical weather prediction

**Numerical Weather Prediction (NWP)** May 25

Equations are integrated in time  
Calculations at grid points in horizontal and vertical  
What are the 7 major weather variables calculated?  
How many days out is a modern forecast model accurate?

**NWP Limitations/Problems**

Accuracy of starting point  
Models aren't perfect  
Resolution limitations (is higher always better?)  
Geographic location - Which areas have the least forecast skill?

**Chapter 15: Hurricanes** May 30

Other names for hurricanes  
How are they fueled?  
How are they steered?  
Average speed of the hurricane  
Lifespan

Basic structure, horizontally and vertically  
Basic circulations, horizontally and vertically  
Why are hurricanes only found in the tropics?  
In which major geographical regions are they usually found?  
Stages of development  
Categorization of hurricane intensity (you do not need to memorize numbers)  
Storm surge  
Seasonal prediction of hurricanes  
How do hurricanes compare to midlatitude cyclones?

### **Chapter 16: Climate Change and Global Warming**

May 31-June 1

Content covered in the powerpoint presentation on May 31 (available online)  
Methods of determining past climates (proxy data)  
Feedbacks, positive and negative  
Variations in CO<sub>2</sub>  
Local effects

### **Chapter 19: Light, Color, and Atmospheric Optics**

#### **Methods of light path alteration**

May 2

Scattering (also includes reflection)  
Refraction  
Diffraction

#### **Optics Applications**

May 3

Blue, red, black sky  
White clouds, crepuscular rays  
Twinkling stars and shimmering objects  
Mirages (superior and inferior)  
Halos (22° and 46°)  
Tangent arc  
Sun dogs  
Sun pillars  
Rainbows  
Corona

May 4

### **NOT A CHAPTER: Puget Sound Weather**

June 1-2

Windstorms!  
Puget Sound Convergence Zone  
Sound Breeze  
Rainshadow