2017 Midterm Review

This review sheet is intended to help you organize your notes and thoughts as you prepare for the midterm. It does not represent a guarantee of what will appear on the test, but if you have a solid understanding of all the topics on this sheet it is unlikely that you’ll be surprised by any questions.

The midterm will be a mixture of multiple choice and short answer questions. It will cover the following lectures and their corresponding readings:

* Earth Structure and Plate Tectonics (Ch. 2)
* Seafloor & Sediments (Ch. 3)
* The Physical Properties of Water (Ch. 4)
* Chemistry of Seawater (Ch. 5)
* Ocean & Atmosphere (Ch. 6)
* Ocean Circulation & Structure (Ch. 7)
* The Waves (Ch. 8)
* The Tides (Ch. 9)
* Coasts, Beaches, and Estuaries (Ch. 10)

Below you will find a list of key terms and concepts that you will be expected to know for the midterm. You should feel comfortable answering all questions from Activities 1, 2, and 3. For chapters 6, 7, and 8 in particular, it is highly recommended that you look over Activity 3 to make sure you understand the mechanics of atmospheric and ocean circulation.

**Earth Structure and Plate Tectonics (Ch.2)**

Earth’s interior

* How do we study the Earth’s Interior?
  + P- waves, S-waves
* What are the layers of the earth’s interior?
  + Chemical vs. physical layers
* Isostasy

Plate tectonics

* Theory
  + Continental Drift
  + Seafloor spreading
* Types of plate boundaries
  + Convergent, divergent, transform fault
* Mechanisms for Plate Tectonics
  + Convection Model
  + Ridge-push, slap-pull
* The Wilson Cycle

**Seafloor & Sediments (Ch. 3) + Activities 1 & 2**

Seafloor

* How do we measure seafloor bathymetry?
* Seafloor provinces - know what they look like, how they’re formed, and what they’re affected by. Including:
  + Continental margin, abyssal plain, mid-ocean ridges, submarine canyons, island arcs, trenches, sea mounts, atolls, etc.
  + Passive vs. Active Margins

Sediments

* Classifying sediments
  + Particle size
  + Location/rate of deposition
  + Chemical composition
* Types of sediments and general global distribution (refer to Activity 2)
* Carbonate Compensation Depth (CCD)

**The Physical Properties of Water (Ch. 4)**

The Water Molecule

* Covalent bonds
* Cation vs. anion

Physical Properties of water

* Difference between temperature and heat
  + Changes of state
    - Question to think about: why doesn’t the temperature change during stage transitions?
* Specific heat, surface tension, viscosity
* Density:
  + How do pressure, temperature, and salinity affect density?
* Heat, light, and sound transmission in the ocean
  + Conduction vs. convection
  + Light: absorption, attenuation, scattering, and refraction

**Chemistry of Seawater (Chapter 5)**

* Salinity
  + How do we measure it?
  + What are the original sources of salt? How are they added to the ocean?
  + Steady state of salinity
  + Global patterns of salinity
    - Evaporation- Precipitation
* Dissolved gases
  + Gas solubility in seawater
  + Photosynthesis & respiration
* Carbonate chemistry
  + pH, buffer, carbonate
  + What happens when we add CO2 to the ocean?
  + Effects of ocean acidification on sea life

**Ocean & Atmosphere (Ch. 6)**

Earth energy budget

* Main inputs and outputs?
* Solar heating across latitudes
* Seasons
* Density of air
* Structure of the atmosphere
* High/low pressure
* Coriolis force
* Convective cells on a non-rotating and rotating Earth
* Predominant global winds
* How are the formed?
* Applying these concepts to:
* El Niño
* Hurricanes
* Rainshadows

**Ocean Circulation & Structure (Ch. 7) + Activity 3**

Stratification

Ocean structure

* Density vs. Depth profile
  + Surface mixed layers
  + “Cline”
    - thermocline, halocline, pycnocline
  + Deep ocean
* Stable vs. Unstable water column
* How do you increase density with:
  + Temperature
  + Salinity
  + Caballing

Thermohaline circulation

* Areas of deep water formation

Wind driven currents

* Coriolis effect on surface currents
  + Ekman transport
* Gyres
* Geostrophic flow

Western intensification & Western boundary currents

Downwelling & Upwelling

* Downwelling at gyres
* Equatorial upwelling
* Coastal downwelling & upwelling
* What are the ecological implications of upwelling?

**The Waves (Ch. 8)**

Wave formation

* Generating forces
* Restoring forces

Wave characteristics

* Deep-water vs. Shallow-water waves
  + What controls speed?
  + Dispersion
  + Wave interaction
  + What controls wave height?
    - Wind speed
    - Wind duration
    - Fetch
  + When do waves break?
  + Transition from deep-water to shallow-water waves
  + Refraction, reflection, diffraction
* Other wave types
  + Episodic waves
  + Tsunamis
  + Internal waves
  + Standing waves

**The Tides (Ch. 9)**

Modeling the Tides

* Earth-Moon system, Earth-Moon system with rotation
* Earth-Sun-Moon system
* Declinational tides

Tide Waves

* Progressive tide waves
* Standing tide waves

**Coasts, beaches, & estuaries (Ch. 10)**

* Primary vs. secondary coasts
* Anatomy of a beach
* Movement of sediment and water at the coast
* Manmade structures and their effect on the coast structure