Geography 1000 Midterm Study Guide

Spring 2014

Please find below a list of topics that should be understood by students for the midterm exam. I have concentrated on the key 'take home messages' of the course: those topics that are important to understand and remember beyond Geog1000. Topics are taken directly from lectures. Additional information can be gathered from the textbook.

The exam will be multiple choice, so even though I have asked questions below, these will help you to better understand topics and make decisions with regards to multiple choice questions. Questions in the midterm will come from these study topics.

Lecture 1 – Chapter 1: What is geography? What do geographers study?

Lecture 2 – Chapter 1: Describe the four spheres of Earth System's Science. What are these four spheres and how are they interrelated?

Lecture 2 – Chapter 1: Understand 'scientific method'. What is a hypothesis? Can you provide an example of a hypothesis using an *explanation* for a *phenomenon?* How do we test a hypothesis? What do we need to test a hypothesis? Also, be able to describe the difference between a Null hypothesis and an Alternative hypothesis.

Lecture 2 – Chapter 1: Know the difference between a positive and negative feedback and be able to identify whether a feedback is positive or negative.

Lecture 2 and Lecture 15 – Chapter 1, 10: Describe dynamic equilibrium and tipping point using a couple of examples (climate changes, and land slides are good, easy ones to describe).

Lecture 3 – Chapters 2: Be able to describe linkages between sun spots, solar activity and the Earth's magnetosphere. What are the cycles of sunspot activity?

Lecture 3 – Chapter 2: Describe the electromagnetic spectrum: Which parts of the spectrum have the shortest wavelengths? Which have the longest wavelengths? Describe the Sun's emitted wavelengths vs. Earth's emitted wavelengths. Why are these different? What is the peak wavelength of the Sun vs. Earth?

Lecture 3 – Chapter 2: Name a black body radiator. What are the characteristics of a blackbody radiator?

Lecture 3 – Chapter 2: What is Stefan Boltzmann's Law? What is Wien's Displacement Law?

Lecture 3 – Chapter 2: Be able to describe why solar insolation at the top of the atmosphere and on the Earth's surface varies (e.g. oblique vs. direct angles). Where is the location of greatest insolation? What does this do to the temperature of the Earth as it varies with latitude (distance from the poles) (see Slide 20). Also, what is the solar constant?

Lecture 3 – Chapter 2 (Also see Lecture 7 slide 4 for further clarification): What is the perihelion and aphelion. When do these occur? Why does the northern hemisphere have warmer winters and cooler summers than the summer hemisphere?

Lecture 4 – Chapter 2: Describe the Heterosphere vs. the Homosphere, and be able to list the order of the spheres (based on temperature) within those two.

Lecture 4, 5 – Chapter 3: Know the differences between a) transmission; b) refraction; c) scattering; d) diffuse radiation; e) reflection (albedo); and f) absorption (slide 20). Provide an example of an object with high albedo and one with low albedo.

Lecture 5 – Chapter 3 (but mostly in lecture): Describe why the sky looks blue on a sunny day near noon; yellow to red, at sunrise/sunset; and white or hazy on a foggy day. How do the particles in the atmosphere vary in size, and how does this affect scattering?

Lecture 5 – Chapter 3 (see fig 3.6): What happens during cloud albedo forcing? Cloud greenhouse forcing? How does cloud height and albedo vary during cloud albedo vs. greenhouse forcing?

Lecture 5 – Chapter 3: Know the difference between convection and conduction, provide an example of each.

Lecture 5 – Chapter 3 (see fig 3.10; slide 19): Why do we see spatial variations in reflected short and longwave radiation over the Earth's surface?

Lecture 5 – Chapter 3 (fig 3.12, and in lecture, slide 21): Describe a diurnal (24 hour) energy balance in terms of timing of incoming solar energy and daily temperature maximum and minimums.

Lecture 6 – Chapter 3: What is the difference between 'temperature' and 'heat'? Describe how temperature relates to kinetic energy, and heat in terms of sensible energy.

Lecture 6 – Chapter 3 (pg 88): Define a) heat capacity and b) specific heat. Identify something that has a high heat capacity and something else that has a lower heat capacity. Describe why differences in heat capacity result in large temperature differences between water and land. How might this affect the temperature variations in a coastal vs. inland city (e.g. Victoria vs. Calgary)?

Lecture 6 – Chapter 3: Describe the difference between sensible heat and latent heat. How is heat transferred (into or released from) water as it changes state from solid to liquid to gas, and vice versa? Why does your skin feel cold when it gets wet? (Also see Lecture 9, slide 10, 11).

Lecture 6 – Chapter 3 (fig 3.23, 3.24) What are isotherms? Describe how the isotherms shift in July vs. January.

Lecture 7 - Chapter 4: What are the four atmospheric forces that drive wind direction and speed? Be able to describe how each force individually, and in combination drive the movement of wind from areas of high pressure to areas of low pressure. Given a high pressure system of one pressure and a low

pressure system of another pressure, determine the pressure gradient force over a specified distance (see slide 19).

Lecture 7 – Chapter 4: Describe the direction and movement of winds into low pressure systems and out of high pressure systems in the northern and southern hemispheres (Slide 24).

Lecture 7 – Chapter 4: How does wind speed change between isobars that are far apart vs. isobars that are closer together?

Lecture 8 – Chapter 4: Describe the pressure and rainfall/cloud cover characteristics of the Inter-tropical convergence zone.

Lecture 8: Why is the Indian Monsoon driven by the ITCZ? Where is the ITCZ in summer? Winter? And why do we see massive amounts of precipitation in the summer?

Lecture 8 – Chapter 4 (Fig 4.11 a): If I were to give you a picture of the Earth, make sure that you are able to place the approximate location of the bands of high and low pressure systems (defined as H and L on slide 10) as well as the location of the ITCZ. (don't worry about placement of the jet streams or the Hadley cells).

Lecture 8: Describe surface and upper atmospheric pressure differences driving the formation of Hadley Cells. Make sure that you know where winds flow into the low pressure systems at the ITCZ and diverge at the upper atmospheric high pressure. Also be able to describe the locations of upper atmospheric low (and surface high) pressure systems at 30 deg. N and S (see slide 11).

Lecture 8 – Chapter 4: What are the characteristics of a jet stream? Why are jet streams highly variable, meandering? What are they doing when they become highly meandering? How do they dissipate energy? (relate to formation of high and low pressure systems).

Lecture 8 – Chapter 4: Describe the difference between land and sea breezes at night and during the day. How does the wind blow? Which part is warmer? Cooler? And when?

Lecture 8 – Chapter 4: Describe the general flow of mountain winds at night and during the day.

Lecture 9 – Chapter 5: Understand the difference between climate and weather, and be able to identify what is a change in climate vs. a change in the weather.

Lecture 9 – Chapter 5: Understand why water is highly cohesive and highly adhesive. Be able to describe tension between water molecules, and why surface tension is important for biological/ecological processes (Slide 9).

Lecture 9 – Chapter 5: Be able to define humidity, relative humidity, vapour pressure, and specific humidity. Why is relative humidity much lower when air is warm vs. cold? Why do we get more evaporation (change of state from liquid water to gas in the atmosphere) when it is warmer outside? Understand saturation, dew point temperature.

Lecture 9 – Chapter 5: Understand the diagram shown on slide 16, which shows how maximum specific humidity increases with temperature. I may ask you to determine relative humidity given a specific humidity value (and using this chart).

Lecture 9 – Chapter 5: Describe the differences in characteristics between warm air parcels and cold air parcels, and their movements, pressure differentials at higher and lower pressure.

Lecture 9 – Chapter 5: Understand atmospheric stability, instability. What is the difference between the Lapse rate, environmental lapse rate and adiabatic lapse rate? Also, what are the differences between the dry adiabatic lapse rate and wet adiabatic lapse rate?

Lecture 9 – Chapter 5: Describe cloud formation via cloud condensation nuclei. Where might we get more or less cloud formation (due to CCN)? Why?

Lecture 9 – Chapter 5: Describe the four methods for lift resulting in cloud formation.

Lecture 10 – Chapter 8: Describe the main events found in the Paleozoic era, Mesozoic era, and Cenozoic era. What are the geological time periods based on? (the difference between relative time and absolute time – Lecture 11)

Lecture 10 – Chapter 8: Describe the characteristics of the various Earth layers: The Inner core, outer core, mantle and crust.

Lecture 10 – Chapter 8: What was Pangaea and why did it break up? List (for example) 2 continents that were joined together in the past. Why are plate tectonics important, and what processes does it influence? (Lecture 11)

Lecture 10 – Chapter 8: Be able to differentiate between Convergent, Divergent, and Transform margins or plates. What are the main processes that are going on?

Lecture 11 – Chapter 8: What is Uniformitarianism? How do we use this to understand geological changes and processes over time? What are a couple of examples of catastrophic events that may have altered the Earth in its past?

Lecture 11 – Chapter 8: Describe the different parts of the rock cycle and the general order of processes and rock formation.

Lecture 11 – Chapter 8: Describe the difference between igneous rocks, sedimentary rocks, and metamorphic rocks, and how they are formed.

Lecture 12 – Chapter 9: What are the spatial differences between first order, second order, and third order relief? Provide an example of each.

Lecture 12 – Chapter 9: Know, generally, what elevation is and how it is different from surface relief (I won't ask anything about the geoid or ellipsoid).

Lecture 12 – Chapter 9: Describe three types of crustal formation.

Lecture 12 – Chapter 9: How does crustal deformation alter rock? What is it dependent on?

Lecture 12 – Chapter 9: Where does orogenesis occur? What is it? And why is it related to earthquakes?

Lecture 12 – Chapter 9: Know the locations of the epicenter, and focus. When do foreshocks and aftershocks typically occur?

Lecture 13 (A movie for assignment 2, so no questions asked on that lecture)

Lecture 14 – Chapter 9: Where does the Ring of Fire occur? Can you describe what ocean it surrounds?

Lecture 14 – Chapter 9: Describe four different types of volcanoes, their shape, and the type of lava flows they produce (effusive vs. explosive eruptions - I won't ask you about composition (e.g. basalt, pyroclastics, etc.).

Lecture 14 – Chapter 9: Describe the four stages of caldera formation.

Lecture 14 – Chapter 9: Understand a simple volcano-induced climate cooling feedback (don't worry about the atmospheric chemistry).

Lecture 15 – Chapter 10: Understand the differences between exogenic and endogenic processes. What are the external vs. internal influences? Describe the order of endogenic and exogenic processes (Slide 16).

Lecture 15 – Chapter 10: What is a geomorphic threshold and how is this related to dynamic equilibrium? What is the typical order of processes?

Lecture 15 – Chapter 10: The movement of materials down slope via erosion varies as a result of what three resistances to movement?

Lecture 16 – Chapter 10: What are the main factors that influence weathering processes? How does each influence the decomposition of rock? Give examples of physical weathering, chemical weathering, and biological weathering. Understand the basics of impacts due to frost, salt crystal growth, pressure-release jointing, hydration and hydrolysis, oxidation, and dissolution of carbonates.

Lecture 16 – Chapter 10: How does Karst topography form? What are some of the features of karst landscapes?

Lecture 17 – Chapter 10: What is a mass movement? How are mass movements influenced by driving vs. resisting forces?

Lecture 17 – Chapter 10: Describe the differences between fall, slide, flow and creep. When do these occur? And what are their characteristics?