

ESC 1000: Introduction to Earth Science

Study Guide for Lectures 11-14

Note: this study guide lists topics covered in lectures 14-18 (Oct 1 – Oct 11). It is not intended to replace going to lecture or doing the readings, rather, it serves largely to alert you to the important topics covered in these lectures that will likely be covered on the exams. The topics listed are non-exclusive, that is, there will be other material in the lectures that you are likely responsible for learning. Make special note of the vocabulary lists...there is a lot of terminology in this class that you will need to learn. Your textbook has a glossary that should be helpful.

Note on adjustments to schedule due to Hurricane Jeanne: The previous study guide listed lecture 14 as occurring on Sept 29 and concerning forensic geology. This lecture has been postponed to later in the quarter and will obviously not be covered on the next exam. Lecture 14 will now occur on Oct 1 and deals with crustal deformation. Midterm exam will contain material covered in lectures 11 to 18 (Sept 20 to Oct 11).

Lecture 14 (Crustal Deformation; Oct 1):

What are deformation, stress, and strain, and how are they related?

What are the main types of stress, how do they act, and how might they be related to different plate tectonic environments?

What controls the style of deformation (ductile or brittle) that a rock experiences?

How is deformation recognized and assessed?

Know the main types of geologic structures discussed in class, how rocks behave (move) during their formation, what environments they occur in, and what type of stress they are associated with.

Vocabulary: deformation, stress, differential stress, pressure, tensional stress, shear stress, compressional stress, strain, elastic deformation, brittle deformation, ductile deformation, geologic structures, folds, joints, faults, dip-slip faults, reverse faults, normal faults, strike-slip faults, thrust fault, hanging wall, foot wall

Lecture 15 (Earthquakes; Oct 4):

What is seismicity and what causes it?

What is the difference between the focus and epicenter of an earthquake?

How are faults formed?

How far do rock bodies move along faults during earthquakes?

Know the differences between the main types of seismic waves, including their relative speeds.

What is a seismometer and how does it work?

How are seismic waves from different types of sources (earthquakes, magma movement, large explosions) distinguished?

How are the locations of earthquakes determined?

What are Mercalli Intensities and Richter Magnitudes, and how do they differ?

What is the plate tectonic significance of the depth of an earthquake?

What are the main hazards associated with earthquakes?

Vocabulary: earthquake, seismicity, focus, epicenter, friction, asperities, aseismic behavior, fault creep, stick-slip behavior, seismic waves, surface waves, body waves, compressional waves (P-waves), shear waves (S-waves), Rayleigh waves (R-waves), Love waves (L-waves), Mercalli Intensity, Richter Magnitude, seismometer, volcanic tremors, travel-time graph, shallow focus earthquakes, intermediate focus earthquakes, deep focus earthquakes

Lecture 16 (paleomagnetism; Oct 6):

What is the cause of magnetism, and what determines whether a material is a magnet, magnetic, or non-magnetic?

How is Earth's magnetic field generated?

What are the effects of Earth's magnetic field?

What is magnetic declination? Inclination? What can we learn from them?

What is the nature of movement of the magnetic poles?

What is apparent polar wander (what causes it, what do we learn from it)?

What are magnetic anomalies and what causes them?

What is the distribution of magnetic anomalies on the ocean floor, what causes them, and what do they tell us?

What is a magnetic reversal?

Vocabulary: magnetism, dipole, magnetic material, magnets, North and South magnetic poles, magnetic field, declination, inclination, apparent polar wander, magnetic anomalies, magnetometer, magnetic reversal, seafloor spreading, chron, normal and reverse polarity

Lecture 17 (Plate tectonics I; Oct 8):

What was the evidence that Alfred Wegener used to argue for continental drift?

What is continental drift, and how does it differ from plate tectonics?

What are the main features of the seafloor?

How does heat flow vary across the seafloor?

What is the age (and patterns in the age) of the seafloor?

What evidence did Harry Hess use to support the theory of seafloor spreading?

What is seafloor spreading, how does it work, how is it related to plate tectonics, and how does it explain magnetic reversals and the evidence used by Harry Hess?

Vocabulary: Alfred Wegener, Pangaea, continental drift, bathymetry, continental slope, continental shelf, continental margin, abyssal plain, mid-ocean ridge, heat flow, seafloor spreading hypothesis,

Lecture 18 (Plate tectonics II; Oct 11):

This lecture will summarize all of the material from lectures 9-17 in the context of plate tectonics and the environments that arise at plate boundaries and between plates.

What are the main tenets of plate tectonic theory?

What are the differences between continental and oceanic crust?

For each of the different types of plate boundaries, know the following (if discussed in this lecture or previously): rock cycle processes, types of volcanoes, types of melting processes, types of igneous rocks, types of geologic structures and the stresses they represent, main geomorphological features (e.g., trenches, mountains, etc.), types of earthquakes, geographic examples, how these margins evolve with time

What causes intraplate volcanism?

Vocabulary: see vocabulary for lecture 4 and lectures 9-17, as well as the following terms: accretionary prism, fold-thrust belt, craton, hot spot, accreted terraine, island arc