

ESC 1000: Introduction to Earth Science

Study Guide for Lectures 11-14

Note: this study guide lists topics covered in lectures 11-14 (Sep 20 – Sep 29). 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.

Lecture 11 (Igneous Rocks; Sep 20):

What are magmas and what comprises them?

What are the factors that influence the melting of rocks, and how?

What processes can modify the composition of a magma after its formation?

Know the main types of lava, how and where they are formed, and the rocks that come from them (see next item).

At the bottom of this study guide is a diagram listing the main lava types, the igneous rocks that form from them, and the relationships between lava type and SiO₂ content, viscosity, and melting temperature. Know this diagram inside and out.

What factors control the movement of lavas?

What geologic features represent the plumbing of magma systems?

How is crystal size related to cooling rate, and what are the implications of this for the crystal sizes found in igneous rocks in different environments?

What is the importance of igneous rock composition?

How can igneous rock composition be inferred from the minerals present?

Vocabulary: magma, decompression melting, partial melting, assimilation, fractional crystallization, magma mixing, viscosity, volcanic ash, pluton (intrusion), dikes and sills, aphanitic, phaneritic, porphyritic, obsidian, pumice, pyroclastic, pegmatitic

Lecture 12 (Gold; Sep 24):

What are the differences between renewable and nonrenewable resources?

How do resources and reserves differ?

In an economic sense, what makes an ore deposit?

How do commodity price, technology, and availability influence profitable ore grade?

What are the major gold producing countries and states?

What properties of gold make it valuable for various uses?

What rock cycle processes and properties of gold are important for forming gold deposits?

What are the main methods of gold mining?

What are the environmental impacts of gold mining?

What is the Sawyer Decision, and what is its importance in American environmental law?

Vocabulary: renewable and nonrenewable resources, resource, reserve, ore, inert, placer, veins, open pit mining, underground mining, placer mining, hydraulic mining, Sawyer Decision

Lecture 13 (Volcanoes; Sep 27):

What controls the violence/explosiveness of a volcanic eruption?

What controls the viscosity of magmas and lavas, and how is this related to the different lava/magma types?

What are the main types of volcano, and how do they differ in terms of size, shape, and eruptive products?

What are the general features of all volcanoes?

Where are volcanoes concentrated in the U.S.?

Which volcanoes in the continental U.S. have erupted in the last 100 years?

What are the hazards associated with eruptions of volcanoes like Mt. St. Helens and Long Valley?

(How) can volcanic eruptions be predicted?

Vocabulary: viscosity, shield volcano, stratovolcano (composite cone), cinder cone, fissure eruption, caldera eruption (megavolcano), crater, vent, caldera, pahoehoe, aa, Mauna Loa, Kilauea, ash clouds, nueé ardente, seismic activity

Lecture 14 (Forensic Geology; Sep 29):

What were the main events and who were the main players in the development of forensic geology?

What is the transfer principle?

What types of materials are studied by forensic geologists, and what features do they look at?

What geologic principles are applied in forensic geology?

Know the salient features of the case studies mentioned in class.

Vocabulary: forensics, forensic geology, provenance, superposition, Materials Analysis Unit, transfer principle

Magma/Lava Type

		Ultramafic	Mafic (Basaltic)	Andesitic (Intermediate)	Granitic (Felsic, Silicic)
Textures	Aphanitic (Fine grained, usually volcanic)	komatiite	basalt	andesite	rhyolite
	Phaneritic (coarse grained, plutonic)	peridotite	gabbro	diorite	granite
Wt % SiO ₂		45	55	65	

