1.1: Introduction

Module 1

Earth’s Origin, and an Introduction to Topographic Maps

Figure 1. The ESO 3.6-metre telescope at La Silla, during observations. Across the plan of the picture, is the Milky Way, our own galaxy, a disc-shaped structure seen perfectly edge-on. Above the telescope’s dome, here lighted by the Moon, and partially hidden behind dark dust cloaked and prominent central bulge of the Milky Way. The whole plan of the galaxy is populated by hundred thousand million of stars, as well as a conspicuous amount of interstellar gas and dusts. The dust absorbs the visible light and reemits it at longer wavelength, appearing totally opaque. Located 600 km north of Santiago, at 2400 m altitude in the outskirts of the Chilean Atacama Desert, La Silla was first ESO site in the observatory of its time.
Introduction

In the first module of the course, we will briefly introduce you to the field of geology (Chapter 1). It will also give you a sense of the diversity of topics we will be discussing in detail during the semester. Then, we will move on to the origin of Earth and the Solar System (Chapter 22). This information is important for understanding the key processes and forces at work on both our planet and throughout the universe.

In addition to learning about the formation of our planet, you will also be introduced to topographic maps and their use in visualizing Earth’s surface. A topographic map is an extremely useful type of map that adds a third dimension (vertical) to an otherwise two-dimensional map defined by the north, south, east, and west compass directions. This third dimension on a topographic map is represented by contour lines, which are imaginary lines drawn on a map that represent an elevation above sea level. A map with such elevation lines will provide the map reader with detailed information regarding the shape of the Earth’s surface.

Knowledge of how to interpret a topographic map will allow a person to locate and identify features on the Earth’s surface such as hills, valleys, depressions, steep cliffs and gentle slopes. In addition, the map reader will be able to identify areas that may be prone to geologic hazards such as landslides and flooding. Any person interested in purchasing property, landscaping, planning a hike or camping trip, or who needs to survey an area for construction of a road, dam, or building will want to first consult a topographic map.

Select images throughout this course to see them larger.

Select an image to view larger

Figure 2. Sitting atop Cerro Paranal high above the Atacama Desert in Chile, two of the Very Large Telescope’s Unit Telescopes quietly bask in the starlight, observing the Milky Way as it arches over ESO’s Paranal Observatory. Several interesting objects can be seen in this picture. Some of the most prominent are the
two Magellanic Clouds — one Small (SMC), one Large (LMC) — which appear brightly in between the two telescopes. By contrast, the dark Coalsack Nebula can be seen as an obscuring smudge across the Milky Way, resembling a giant cosmic thumbprint above the telescope on the left. The Magellanic Clouds are both located within the Local Group of galaxies that includes our galaxy, the Milky Way.

Figure 3. VST image of the star-forming region Messier 17

Figure 4. Topographical map of Tucson showing Saguaro National Park (West)
Module Objectives

At the completion of this module you will be able to:

1. Explain what the field of geology is, why it is important, and the type of work geologists do.
2. Describe what happened during the Big Bang, when it happened, and the evidence for it.
3. Explain how clouds of gas and dust can form stars, planets, and solar systems.
4. Describe the early stages of Earth’s formation, how the moon formed, and the age of each.

Activities Overview

See the Schedule of Work for dates of availability and due dates.

Be sure to read through the directions for all of this module’s activities before getting started so that you can plan your time accordingly. You are expected to work on this course throughout the week.

Read

Physical Geology by Steven Earle

- Chapter 1 (Introduction to Geology)
- Chapter 22 (The Origin of the Earth and the Solar System)

Discussion

30 points, class participation

For this week’s discussion topic, “Introductions” you should earn at least 30 points toward your required 150 points of class participation.

Pay close attention to the Course Schedule for when each of your posts are due. Some are due earlier than others. Failure to post on time will result in lost points.

Discussion 1 Instructions

Module 1 Assignment: Topographic Maps

10 points

After you complete the reading, you can start working on Module 1 Assignment – Topographic Maps.
Module 1 Quiz

10 points

Module 1 Quiz has 10 multiple-choice questions and is based on the content of the Module 1 readings and Assignment 1.

The quiz is worth a total of 10 points (1 points per question). You will have only 10 minutes to complete the quiz, and you may take this quiz only once. Note: that is not enough time to look up the answers!

Make sure that you fully understand all of the concepts presented and study for this quiz as though it were going to be proctored in a classroom, or you will likely find yourself running out of time.

Keep track of the time, and be sure to look over your full quiz results after you have submitted it for a grade.

Your Questions and Concerns…

Please contact me if you have any questions or concerns.

General course questions: If your question is of a general nature such that other students would benefit from the answer, then go to the discussions area and post it as a question thread in the “General course questions” discussion area.

Personal questions: If your question is personal, (e.g. regarding my comments to you specifically), then send me an email from within this course.