Aims and scope

This is the first course in which new students get in touch with Geology. Therefore, it is designed to make the student understand planet Earth as a dynamic system and Geology as an applied, multidisciplinary and also dynamic science. The student has to learn the basics of Geology (principles, terminology and basic concepts) and the skills to read both topographic and geological maps, to understand the information they contain and to extract sections from them. The course also includes three one-day field trips in which the student is instructed in the methodology of observation, description and data collection in the field and also in the translation of that information to a topographic map, making a geological map.

This course consists of four 50-minute lectures and one 2-hours practical session per week; the field trips are also part of the practical sessions of the course.

Successful students will learn to:

- Apply and explain the fundamentals of Geology and cartographic representation of geological elements.
- Identify and describe common geological samples (minerals, rocks, fossils), both in the laboratory and in the field.
- Understand topographic and geological maps, in order to extract information from them and to represent geological information into them.
- Apply the theoretical and practical knowledge to the observation and data acquisition in the field, using the basic instruments (lens, compass and hammer) and compiling their own field notes and map.

Program

Lessons (each one develops in one or several lectures)

- Lesson 1. Introduction to Geology.
- Lesson 2. Planet earth: location in the Solar system, shape, structure and composition. Introduction to global dynamics.
- Lesson 4. Igneous rocks. Features, classification and processes that create them.
• Lesson 6. Metamorphic rocks. Concept, factors and main types of metamorphism.
• Lesson 7. The topographic map.
• Lesson 8. Cartographic projection systems. Coordinates and orientation.
• Lesson 9. The geological map and geological sections.
• Lesson 10. Geological mapping of beds and units: calculation of their orientation and thickness.
• Lesson 11. Geological mapping of folds.
• Lesson 12. Geological mapping of faults.
• Lesson 13. Plate tectonics. Development of basins and mountain ranges.
  Introduction to structural geology.
  Sedimentary environments and structures
• Lesson 15. Surface and subsurface waters. Geomorphological processes and landforms.
• Lesson 16. Time in geology. Absolute and relative dating methods.
  Biostratigraphy.
• Lesson 17. Introduction to Historical Geology. The rock record in Earth’s history.
  Evolution of biological groups and of the fossil record.
• Lesson 18. Introduction to regional geology. Natural resources and geological heritage.

Practical sessions

Practical sessions are divided in laboratory classes and field work.

Part I. Identification and description of minerals, rocks and fossils
• Practice 1. Identification and description of minerals (I): non silicates.
• Practice 2. Identification and description of minerals (II) and rocks (I): silicates, igneous and metamorphic rocks.
• Practice 3. Identification and description of rocks (II): siliciclastic rocks
• Practice 4. Identification and description of rocks (III): carbonate rocks and other minor groups (evaporites, silexites, coals and hybrid rocks).
• Practice 5. Identification and description of fossils.

Part II. Reading, understanding and making geological maps
• Practice 6. The topographic map (I)
• Practice 7. The topographic map (I)
• Practice 8. Geological mapping of horizontal and vertical stratigraphic sequences.
• Practice 9. Geological mapping of dipping stratigraphic sequences.
• Practice 10. Geological mapping of stratigraphic sequences and discontinuities.
- Practice 11. Geological mapping of stratigraphic sequences and simple geological structures

Field work
Three all-day field trip are scheduled in this course to study:
- The Paleozoic and Triassic sequences around Montalbán (Teruel). Introduction to structure and field observation and measurements.
- The Triassic to Cretaceous sequences around Ariño (Teruel). Cartographic-scale structure.
- The Jurassic sequences around Aguilón (Zaragoza). Geological mapping of the Aguilón anticline.

Attendance to these field trips is compulsory as the results and reports are used in the practical sessions and are evaluated.

Assessment details
In this course there are two forms of assessment: continuous assessment and end of term examination

Continuous assessment
Student performance will be evaluated during the semester on the basis of field trip reports and practical mapping assignments. Grades for this assessment will constitute 10% of the final grade.

End of semester examination
All the students should attend the end of Semester Examination, which consists of three parts:
- A theoretical written exam (mainly short answer questions) on the topics addressed in the course (40% of the final grade).
- A theoretical-practical exercise on geological mapping concepts and skills (40% of the final grade).
- A practical exercise of identification and classification of geological samples (10% of the final grade).

All these parts are evaluated from 0 to 10 points and weighted to obtain the final grade. Students must obtain at least 5 points in their final grade to pass the course.

Bibliography
Course materials will consist of class notes, lecture notes (PDF files of lecture slides will be provided) and handouts. Recommended textbooks are: