

26415 - Statistical and IT Analyses of Geological Data

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	296 - Degree in Geology
ECTS	6.0
Course	2
Period	First semester
Subject Type	Basic Education
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning process designed for this subject is based on the following aspects:

- Computer lab classes in small groups (30 hours)
- Brief description of concepts and development of case-studies on geological data (30 hours).

26415 - Statistical and IT Analyses of Geological Data

- Personal work (90 hours). Starting from the other indicated activities, the student must take responsibility in the creation and consolidation of a structured work program. Personal work includes individual study, individual work preparation, team work and tutorial sessions.

We propose a learning process based on critical reflection of concepts, not acquired by memory. In order to achieve these objectives, problem and project based learning with geological data is used. The aim of these learning processes is to encourage personal initiative and creativity, management of documentary sources, reflection on previously learned theoretical aspects, and structuring a logical discourse from the problem statement to its resolution. The realization of group projects enhances the responsibility and commitment of each member of the group.

Scripts and data sets for the practical sessions and any other appropriate material will be available on the MOODLE platform (<http://moodle.unizar.es>)

5.2.Learning activities

Activity 1: Descriptive Statistics

Methodology. Computer lab classes. Description of theoretical concepts and case-studies on geological data. Personal study. (1.5 ECTS)

Skills

To know the different types of data

To identify the different descriptive tools for each type of data

To summarize the information in a dataset using frequency tables and graphs

To summarize the information in a dataset using location, dispersion and shape measures

To analyze the relationship between two variables

To describe geological datasets using a statistical software (Rcmdr)

To interpret results of descriptive statistical analysis (tables graphs and numerical measures)

To write reports on basic statistical analysis of geological datasets.

Assessment . An analysis of a real dataset and a report on that analysis (group work). A test using Rcmdr.

Activity 2: Basic probability concepts

26415 - Statistical and IT Analyses of Geological Data

Methodology . Computer lab classes. Brief description of theoretical concepts and case-studies on geological data. Personal study. (0.5 ECTs)

Skills

To know and distinguish the different types of random variables

To know and identify the most common probability distributions

To solve simple probability problems and to interpret the results.

Assessment. A test using Rcmdr. Class exercises.

Activity 3: Basic statistical inference

Methodology . Computer lab classes. Brief description of theoretical concepts and case-studies on geological data. Personal study. (1.5 ECTs)

Skills

To distinguish the concepts of sample and population

To distinguish descriptive and statistical inference analysis

To estimate unknown parameters from a sample.

To calculate and interpret confidence intervals

To calculate and interpret hypotheses tests and how to apply them to statistical decision problems

To read and understand statistical inference analysis of geological datasets

To write a report on a simple statistical inference analysis of a geological dataset.

Assessment. A test using Rcmdr.

Activity 4: Analysis of geological data by means of application software

Methodology . Computer lab classes. Brief description of theoretical concepts and case-studies on geological data. (2

26415 - Statistical and IT Analyses of Geological Data

ECTs)

Skills

To Know IT tools that can be used by a Geology professional.

To solve geological information processing problems by means of spreadsheets and databases.

To import / export information between different IT tools.

To develop self-learning ability to adapt to the evolution of tools specific of their professional environment.

To assume the need and usefulness of information technologies in professional practice.

Assessment. Solving a set of problems with geological data. Computer test.

5.3.Program

Chapter 1: Descriptive statistics

- Objectives of descriptive statistics
- Different types of geological data
- Univariate analysis: frequency tables, graphs and position and variability measures
- Bivariate descriptive data analysis

Chapter 2: Basic concepts in probability

- Basic concepts
- Some probability distributions

Chapter 3: Statistical Inference

- Objectives of statistical inference
- Point estimation of parameters

26415 - Statistical and IT Analyses of Geological Data

- Confidence intervals
- Tests of hypothesis
- Other statistical techniques applied on Geology

Chapter 4: Information Technology

- Introduction to Computer Science and basic notions
- Spreadsheets: Computer calculations and graphical representation of results.
- Table-based database model.
- Database Management Systems
- Database Query Languages.

5.4.Planning and scheduling

The course includes 30 lecture classes and 15 two-hour computer lab sessions in small groups.

Lecture classes and computer lab sessions are held during the first term. Timetable is available at <https://ciencias.unizar.es/consultar-horarios>

End of Activity 2: first test (continuous assessment option) and deadline to hand in the report of the group work.

End of Activity 3: second test (continuous assessment option).

February 2017: Final Exam. First call.

September 2017: Final Exam. Second call.

5.5.Bibliography and recommended resources

BB

Davis, John C.. Statistics and data analysis in geology / John C. Davis . - 3th ed. New York [etc] : Wiley, 2002

BB

Koch, George S. , Jr.|q(George Schneider). Statistical analysis of

26415 - Statistical and IT Analyses of Geological Data

geological data / George S. Koch, Jr. and
Richard F. Link . Mineola, N.Y. : Dover
Publications , 2002

BB

Peña Sánchez de Rivera, Daniel.
Fundamentos de estadística / Daniel Peña
. - 1ª ed., 1ª reimp. Madrid : Alianza, 2005

BB

Prieto Espinosa, Alberto. Introducción a la
informática / Alberto Prieto Espinosa,
Antonio Lloris Ruiz, Juan Carlos Torres
Cantero . 4ª ed. Madrid [etc.] :
MacGraw-Hill, D.L. 2006