

60379 - Geothermics and its applications

Syllabus Information

Academic year: 2023/24

Subject: 60379 - Geothermics and its applications

Faculty / School: 100 - Facultad de Ciencias

Degree: 624 - Master's in Geology: Techniques and Applications

ECTS: 3.0

Year: 1

Semester: Second semester

Subject type: Optional

Module:

1. General information

The objective of this subject is to introduce the student to the basic and applied aspects of geothermal energy and geothermal resources. To this end, it is essential that the student learns how a geothermal system works, the different types of geothermal systems, the different ways of using geothermal energy and its environmental impact, and the different methodologies for prospecting geothermal resources.

Sustainable Development Goals (SDGs): SDG 4, SDG 7, SDG 9, SDG 11, SDG 12 and SDG 13.

2. Learning results

Upon completion of the subject, the student will be able to:

- Quantify the most important processes operating in a geothermal system, both physical (heat transfer by conduction and convection) and chemical (composition of geothermal fluids).
- Know the different types of geothermal systems, their energy use and environmental impact.
- Apply the acquired knowledge to solve practical problems related to the exploration and the estimation of the geothermal potential of an area as well as its possible exploitation.

3. Syllabus

Theory:

Topic 1. Fundamentals of geothermal energy.

Topic 2. Classification of geothermal systems.

Topic 3. High temperature hydrothermal systems. Geothermal power plants.

Topic 4. Petrothermal systems.

Topic 5. Medium and low temperature geothermal systems. Shallow geothermal energy.

Topic 6. Exploration and prospecting of geothermal systems.

Topic 7. Evaluation of geothermal potential.

Topic 8. Impacts of geothermal energy use.

Practical classes:

Practice 1. Heat flow maps.

Practice 2. EGS potential in Spain.

Practice 3. Geothermometric calculations.

Practice 4. Calculation of heat flux in Aragon springs.

Seminar:

Assessment of geothermal energy utilization in the world.

4. Academic activities

Activity 1: master classes(14h). Development of the theoretical bases of the subject, according to the program detailed in section 3.

Activity 2: cabinet and computer practices(12h). Solving problems related to the contents of activity 1, using both specific programs and general applications.

Activity 3: seminars(4h). Preparation by the students of a summary or brief presentation on a topic or problem proposed in advance by the teachers followed by a group discussion.

Activity 4: student's personal work(45h non face-to-face). Time needed to consolidate knowledge and prepare reports.

5. Assessment system

Activity 1(master classes). Assessment by means of an individual theoretical-practical questionnaire at the end of the subject (**20%** of the subject grade).

Activity 2 (cabinet practices and case studies). Assessment of the reports of each practical session, written and delivered within the established deadline (**50%** of the subject's grade).

Activity 3 (seminars). Assessment based on the work (individual or group) presented in written and oral form (**30%** of the subject's grade).

Final grade of the subject: weighted average of the grades of each activity, provided that the grade of each one is equal to or higher than 5.

Overall assessment

For those students who have not opted for continuous assessment or who have not passed the subject through continuous assessment activities, a written theoretical-practical examination will be taken to assess the acquisition of the same competencies as through continuous assessment. The exam may include questions related to scientific texts whose references will be provided at least one week prior to the date of the exam.