



SE-829-GS1

GEOHERMAL SCIENCE I

5 ECTS

Year of study: First year MSc.

Semester: Spring.

Level of course: 4. Second cycle, introductory.

Type of course: *Taught in the Iceland School of Energy.* Elective for all MSc programs in engineering.

Prerequisites: None.

Schedule: Taught during the 12-week teaching period. Schedule will be introduced in the learning management system Canvas at the beginning of the semester.

Supervisor: Juliet Newson.

Lecturer: Guðni Axelsson, Juliet Newson.

Learning outcome:

Knowledge: The student should be able to demonstrate knowledge in the following:

- Types of Geothermal systems and geologic environments
- Surface Manifestation & Environments
- Geothermal fluid geochemistry and fluid-rock interaction
- Geothermal Production Challenges & Environmental impact
- Basic understanding of geophysical exploration techniques for geothermal systems
- The role of, the processes, and the information from, an exploration drilling program.
- Resource assessment and conceptual modeling of geothermal systems

Skills: The student can:

- Perform simple geochemical calculations.
- Read fluid component diagrams and understand the significance of the geochemical groups.
- Describe the significance of different types of geothermal surface features
- Describe the significance of types of geophysical surveys in geothermal exploration
- Collect and manage data for geological modeling and conceptual modeling
- Build geological and geothermal conceptual models

Competence: Understanding and applying basic principles of:

- Map and report on geothermal surface manifestations
- Apply geochemical knowledge to analysis of geothermal systems
- Contribute as a member of the geothermal exploration team to geophysical projects
- Building geological and conceptual 3-D models

Content:

This course is an introduction to the science of geothermal systems. It builds an understanding of how a geothermal system works, and how to assess the available energy in order that it may be used in a sustainable manner. The first part of the course is an introduction to types of geothermal systems and the tectonic setting, and the important hydraulic and thermal rock parameters. Special attention is paid to the characteristics of Icelandic geothermal systems. Following this the course contains material on geothermal surface features, geochemistry and fluid-rock interaction in high-temperature geothermal systems and geophysical exploration techniques. The last section of the course consists of exploration well siting, conceptual modeling and methods of resource assessment. There is at least one field visit.

Reading material; Teaching and learning activities; Assessment methods: Will be introduced in Learning Management System Canvas at the beginning of the semester.

Language of instruction: English.

All course descriptions may be subject to change. Revised information will be introduced in the learning management system Canvas before the beginning of the semester.