Module Nr.	Credits	Workload	Semester	Frequency	Duration
SE-O-7	5 CP	150 h	2	Yearly (SS)	1 semester
Courses			**Contact time**	**Self-study**	**Group size**
Digital Rock Physics			3 SWS	105 h	20

Digital Rock Physics

Learning outcomes

The students will learn the fundamentals of digital rock physics. This broad range of knowledge will be taught with a special emphasis on geothermal and hydrocarbon exploration.

After successful completion of this module, the students will:

- know the fundamentals of digital rock physics:
  - e.g. use of high-performance computer systems
  - e.g. understand the resolution limits of CT devices
- be able apply the fundamentals of digital rock physics:
  - to predict effective material properties
  - to improve digital images with respect to the real rock
- be able to apply the fundamentals of digital rock physics to scientific projects:
  - to upscale elastic properties to understand field scale observations
  - to interpret uncertainties in the digital rock physics workflow

Content

- The basics of the digital rock physics workflow will be introduced: CT-imaging, reconstruction, segmentation, calculation of physical properties.
- The basics of parallel computing on high-performance computer systems will be introduced.
- The basics of finite-different-schemes to solve the elastodynamic wave equation will be introduced.
- The parallel computer program "Heidimod" to model elastic waves in highly heterogeneous and anisotropic media will be introduced in detail and will be applied to problems in the field of digital rock physics

Teaching Methods

lectures (1h) and (computer) exercises (2h) / English

Modes of assessment

final report: Home Assignment (30h)

Requirements for the award of credit points

Pass the final report

Module applicability (in other programs)

Master Geosciences

Weight of the mark for the final score

4.17 %

Module coordinator and lecturer(s)
Prof. Dr. Erik H. Saenger
Other information