

Imaging Techniques of consolidated and unconsolidated Sediments (C003693)

Course size (nominal values; actual values may depend on programme)

Credits	6.0	Study time	176 h	Contact hrs	74.0 h
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Course offerings and teaching methods in academic year 2017-2018

A (semester 1)	English	lecture	25.0 h
		practicum	38.75 h
		integration seminar	10.0 h

Lecturers in academic year 2017-2018

Cnudde, Veerle	WE13	lecturer-in-charge
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Offered in the following programmes in 2017-2018

	crdts	offering
Master of Science in Geology	6	A
Master of Science in Geology	6	A
Exchange programme in Geology (master's level)	6	A

Teaching languages

English

Keywords

Digital imaging techniques, optical microscopy, SEM/EDX, FIB/SEM, XRF, XAS, X-ray and neutron CT, image processing and analysis

Position of the course

The aim of the course is to provide the students with an overview of a selection of imaging techniques which can be used to study rocks both structurally as well as chemically. Attention will be given towards a realistic outcome of the use of these techniques in order to answer specific geological questions. Important recent developments in these technologies will be discussed and illustrations will be given on how these techniques can be applied to solve geological problems.

Contents

Basic principles of digital thin section analysis by optical microscopy, including image processing (preparing images for measurements) and 2D image analysis.
 Basic principles and different imaging and analytical modes of SEM; SEM/EDX and its use as mineral liberation analyser; Combined focused ion beam/SEM-TEM techniques: advanced tools to resolve microstructures and mineral phases in rocks; ESEM
 Chemical imaging by XRF and X-ray absorption spectroscopy (XAS) using synchrotron radiation.
 X-ray computed tomography: in laboratory and at synchrotron facilities
 Neutron computed tomography

Initial competences

The student has a basic knowledge in geology, sedimentology, mineralogy, petrology and optical mineralogy & petrography.

Final competences

- 1 The student has gained a general understanding of the concepts and processes which are occurring, when using one of the discussed imaging techniques.
- 2 The student is able to develop a research plan for the structural and chemical investigation of a rock.
- 3 The student is able to report critically the results of the characterization research into a scientific report.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, integration seminar, practicum

Learning materials and price

Course notes and documentation, photocopies of relevant study material will be spread by minerva as well as references to text books and literature.

References

Russ, J.C., 2011. The Image Processing Handbook, Sixth Edition
Brandon D., Kaplan, W., 2008. Microstructural Characterization of Materials
K. Tsuji, J. Injuk, R. E. Van Grieken (eds.), "X-Ray Spectrometry: Recent Technological Advances", John Wiley & Sons Ltd., Chichester, 2004.

Course content-related study coaching

Theory: interaction during lectures. Possibility to ask lecturer (or assistant) questions in person and by e-mail

Practice and seminars: guidance and feed-back during the practice and seminars.

Interactive support by Minerva (emails)

Personal contact after appointment

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Written examination with open questions, assignment, job performance assessment

Examination methods in case of periodic evaluation during the second examination period

Written examination with open questions

Examination methods in case of permanent evaluation

Assignment, job performance assessment

Possibilities of retake in case of permanent evaluation

not applicable

Calculation of the examination mark

Written examination with open questions: 80 %

Assignment + evaluation during the year 20%