GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2024-2025

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**

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	English	Gent	lecture
			seminar
			practical

Lecturers in academic year 2024-2025

Cnudde, Veerle	WE13	lecturer-in-charge
Bultreys, Tom	WE13	co-lecturer

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Master of Science in Teaching in Science and Technology(main subject Geology)	6	A
International Master of Science in Sustainable and Innovative Natural Resource Management	6	A
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 A general understanding of the concepts and processes which are occurring, when using one of the discussed imaging techniques.
2 Developing a research plan for the structural and chemical investigation of a rock.
3 Critically and scientifically report experimental results and characterization data.

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

Seminar, Lecture, Practical

Study material

Type: Syllabus

Name: Course notes
Indicative price: Free or paid by faculty
Optional: no
Language : English
Available on Ufora : Yes

Type: Slides

Name: powerpoint
Indicative price: Free or paid by faculty
Optional: no
Available on Ufora : Yes

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 Ufora (emails)
Personal contact after appointment

Assessment moments

end-of-term and continuous assessment

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

Professional practice, Written assessment with open-ended questions, Assignment

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

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Professional practice, Participation, Assignment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

Participation to the practica is obligatory. You are evaluated during all practica as well as on the content and quality of your assignment.

Calculation of the examination mark

Written examination with open questions: 80 %
Assignment + evaluation during the year 20%