

## 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 2023-2024

A (semester 1)

English

Gent

lecture

practical

seminar

### Lecturers in academic year 2023-2024

Cnudde, Veerle

WE13

lecturer-in-charge

Bultreys, Tom

WE13

co-lecturer

### Offered in the following programmes in 2023-2024

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

#### **Learning materials and price**

Course notes and documentation will be spread by Ufora 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 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%