

# Course Specifications

Valid in the academic year 2023-2024

# Analytical Raman Spectroscopy (COO4160)

Course size	(nominal values; actual values may depend on programme)				
Credits 3.0	Study time 75 h				
Course offerings and t	eaching methods in academic	year 2023-2024			
A (semester 2)	English	Gent	lecture		
Lecturers in academic	year 2023-2024				
Vandenabeele, Peter			WE06	lecturer-in-charge	
Offered in the following programmes in 2023-2024				crdts	offering
Master of Science in Teaching in Science and Technology(main subject Chemistry)				3	А
Master of Science in Chemistry(main subject Analytical and Environmental Chemistry)				3	А
Exchange Programme in Chemistry (master's level)				3	Α

#### **Teaching languages**

English

# Keywords

Raman spectroscopy, applications of laser spectroscopy in research and industry, analytical instrumentation, spectral interpretation.

#### Position of the course

Optional course in the master of chemistry.

#### Contents

- Introduction to Raman spectroscopy (principle, interferences and side effects, quantitative aspects, enhancement of the Raman signal (Resonance Raman, SERS));
- Applications of Raman spectroscopy in research labs and in an industrial context: problems and pitfalls, calibration, introduction to the interpretation of Raman spectra;
- Raman instrumentation (lasers, detectors, optical components, monster chambers, dispersive and Fourier transform (FT) Raman spectroscopy);
- Principles of chemical imaging (point, surface and bulk analysis, mapping vs. imaging, spatial resolution, confocality);
- Construction of a light microscope and principles of IR- Raman and UVfluorescence microscopy;
- Instrumentation for molecular spectroscopic imaging methods; fibre optics;
- Numerical data processing and digital filters

# Initial competences

# **Final competences**

- 1 Understanding the principles of Raman spectroscopy and related techniques (such as Resonance Raman and surface-enhanced Raman spectroscopy (SERS)).
- 2 By using applications of Raman spectroscopy of organic and inorganic components (in research labs as well as in industrial labs) learning to recognize problems and learning to propose problem solving strategies.
- 3 Knowing the advantages and limitations of some important molecular spectroscopic imaging techniques (IR-, Raman and U.V.-fluorescence microscopy).
- 4 Acquiring understanding in the set-up of chemical imaging instrumentation and learn to know the characteristics of some important optical components.

#### 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

#### Extra information on the teaching methods

Lectures, seminar, independent work

# Learning materials and price

- 1 A reader will be provided.
- 2 Total cost: ca. 10€

#### References

• P. Vandenabeele, Practical Raman Spectroscopy – an introduction, J. Wiley, 2013. ISBN: 9780470683194

#### Course content-related study coaching

Upon request

# Assessment moments

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

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

#### Examination methods in case of permanent assessment

#### Possibilities of retake in case of permanent assessment

not applicable

#### Calculation of the examination mark

- 25% Permanent evaluation
- 75% Oral exam