

## Analytical Raman Spectroscopy (C004160)

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

**Credits 3.0**                      **Study time 75 h**

**Course offerings and teaching methods in academic year 2024-2025**

A (semester 2)                      English                      Gent                      lecture

**Lecturers in academic year 2024-2025**

Vandenabeele, Peter                      WE06                      lecturer-in-charge

**Offered in the following programmes in 2024-2025**

	crdts	offering
<a href="#">Master of Science in Teaching in Science and Technology(main subject Chemistry)</a>	3	A
<a href="#">Master of Science in Chemistry(main subject Analytical and Environmental Chemistry)</a>	3	A
<a href="#">Exchange Programme in Chemistry (master's level)</a>	3	A

**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 UV-fluorescence 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

This course unit assumes responsible use of generative artificial intelligence (GAI).

Unpublished data nor the course notes should be entered into GAI tools.

**Study material**

Type: Slides

Name: course slides

Indicative price: Free or paid by faculty

Optional: no

**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