GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

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**
Master of Science in Teaching in Science and Technology(main subject Chemistry)	3	A
Master of Science in Chemistry(main subject Analytical and Environmental Chemistry)	3	A
Exchange Programme in Chemistry (master's level)	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