

Spectroscopy (E721041)

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

Credits 6.0 Study time 180 h Contact hrs 72.0 h

Course offerings and teaching methods in academic year 2018-2019

A (semester 1)	Dutch	lecture	36.0 h
		seminar: coached	24.0 h
		exercises	
		practicum	12.0 h
B (semester 1)		lecture	36.0 h

Lecturers in academic year 2018-2019

Verberckmoes, An TW11 lecturer-in-charge

Offered in the following programmes in 2018-2019

	crdts	offering
Bachelor of Science in Engineering Technology (main subject Chemical Engineering Technology)	6	A
Bachelor of Science in Chemical Engineering Technology	6	A
Linking Course Master of Science in Chemical Engineering Technology	3	B
Preparatory Course Master of Science in Chemical Engineering Technology	6	A

Teaching languages

Dutch

Keywords

IR-spectroscopy, UV-VIS-spectroscopy, NMR-spectroscopy, mass spectrometry, AAS/AES/AFS-spectroscopy

Position of the course

Study of the most important qualitative methods for the identification of primarily organic compounds.
Study of fundamental (physico-)chemical principles to get insight in spectroscopic techniques

Contents

Lectures (Course offerings A en B)

- Rotational spectroscopy (absorption and Raman spectra);
- Vibrational spectroscopy (infrared spectroscopy);
- Electronic spectroscopy (UV- and visible light spectroscopy, luminescence spectroscopy, fluorescence spectroscopy);
- Nuclear magnetic resonance spectroscopy (¹H en ¹³C NMR);
- Mass spectrometry
- Atomic spectroscopy (AAS, AES, AFS)

Exercises (Course offering A)

Seminars: coached exercises (only for Course offering A): during the (theoretical) exercises the structural characteristics of a number of compounds are deduced from the spectra by using tables.
Interpreting of UV-, VIS-, IR-, NMR- and MS-spectra.
Practical information is given about the sample preparation and measurement of the spectra.

Practica (Course offering A)

In the practical exercises (attendance is compulsory) one starts with the basics of UV/VIS-spectroscopy, AAS-spectroscopy and GC-MS.

Initial competences

Sufficient knowledge of general, anorganic and organic chemistry.

Final competences

- 1 Have insight in the most important spectroscopic methods for the identification of primarily organic compounds. Have knowledge of the (physico-)chemical fundamentals and background of the spectroscopy.
- 2 Deduce from the spectra, using tables, the structural characteristics of a series of compounds. Determine the structure of an unknown compound, based on the most important spectra, and explain theoretically how the most important signals have been established.
- 3 Execute spectroscopic analyses and apply them for process and product controls.
- 4 Adequately communicate about and report on information, ideas, problems and solutions related to spectroscopic techniques.
- 5 Think, reason and act in a critical, creative and scientific way.

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, practicum, seminar: coached exercises

Extra information on the teaching methods

Lecture (for course offerings A and B)
Seminar: coached exercises (for course offering A)
Practica (for course offering A)

Learning materials and price

Syllabus for theory, exercises and practica

References

P. Atkins, J. de Paula, Atkins's Physical Chemistry, 8th ed., Oxford University Press, 2006.
D. Williams, I. Fleming, Spectroscopic Methods in Organic Chemistry, 6th ed., McGraw-Hill, 2008.
D.A. Skoog, F. J. Holler, S.R. Crouch, Principles of Instrumental Analysis, 6th ed., Thomson Brooks/Cole, 2007.

Course content-related study coaching

Additional support and explanation is provided by appointment.

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination with open questions, oral examination

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

Written examination with open questions, oral examination

Examination methods in case of permanent evaluation

Open book examination, participation, assignment

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible

Extra information on the examination methods

End-of-term evaluation and continuous assessment (for course offering A)
End-of-term evaluation (for course offering B)

Calculation of the examination mark

Course offering A:

Periodic evaluation: 57% (lecture)

Permanent evaluation: 43% (coached exercises + practica)

For the permanent evaluation, two tests evaluate the skills acquired during the coached exercises.

Course offering B:

Periodic evaluation: 100% (lecture)