

## Analytical Chemistry (E721026)

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

Credits 6.0      Study time 180 h      Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2018-2019

A (semester 1)	Dutch	practicum	24.0 h
		lecture	36.0 h

Lecturers in academic year 2018-2019

Voorspoels, Stefan	TW11	lecturer-in-charge
Diricks, Greta	TW11	co-lecturer

Offered in the following programmes in 2018-2019

	crdts	offering
<a href="#">Bachelor of Science in Engineering Technology (main subject Chemical Engineering Technology)</a>	6	A
<a href="#">Bachelor of Science in Chemical Engineering Technology</a>	6	A
<a href="#">Linking Course Master of Science in Chemical Engineering Technology</a>	6	A
<a href="#">Preparatory Course Master of Science in Chemical Engineering Technology</a>	6	A

Teaching languages

Dutch

Keywords

Chemical analysis - metrology - measurement uncertainty - chemical balance - volumetry - acid/base - redox - precipitation - gravimetry - complexometry

Position of the course

The main objective is to provide a solid and broad scientific basis of all aspects of analytical chemistry. The foundation is an in-depth knowledge of metrology. Further, a solid basis is provided regarding the different wet-chemical analytical tools that are at the disposal of analytical chemists.

These insights will allow to autonomously interpret scientific literature and make a knowledge-based selection of potentially suitable qualitative and/or quantitative analytical techniques. The knowledge will also facilitate setting up experiments or developing chemical processes with the requirements and limitations of analytical chemistry in mind, in order to ensure a fluent project execution.

The different theoretical basic principles need to be integrated into a cohesive toolkit. Knowledge integration will enable linking up problems or challenges with potential different analytical solutions.

The theoretical principles put forward in the course material will be maximally spiced up with practical examples from daily industrial practice.

Contents

In this course Analytical Chemistry the analytic general principles are covered:

- Context and motivation: qualitative and quantitative
- Method selection, representation of analytical results
- Literature sources: library, webinfo, standardisation, ...
- Sampling techniques: requirements, errors, techniques, sampling schemes
- Metrology
- Method validation
- Statistical results processing, significance tests, reporting

- Error processing and rounding of results
- Measurement uncertainty
- Quality assurance and control
- Chemical balance
- Acid-base
- Redox
- Precipitation
- Complexometry
- Gravimetry

Attendance at the practical exercises (performance of chemical qualitative and quantitative techniques) is compulsory.

#### Initial competences

Having followed the courses of General Chemistry, Inorganic chemistry, Organic Chemistry and Chemical Analysis/Standardisation.

#### Final competences

- 1 Attitudes as problem-solving, analytical scientific thinking and critical evaluation are developed.
- 2 To be able to perform chemical and technical analyses and to apply them on scientific and/or engineering problems. Analyses are performed in group or on an individual basis.
- 3 The student must have insight in the different scientific/technical disciplines.
- 4 The student must obtain a clear insight into chemical general knowledge and basic skills and must be able to link the different aspects and apply them in process- and product control.
- 5 Acting environmentally, quality and safety conscious in the common chemical laboratory practice.
- 6 To be able to communicate and to report information and data, ideas, problems and solutions - especially scientific and technical ones .
- 7 Attitudes as problem-solving , analytical scientific thinking and critical evaluation are developed.

#### 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

#### Learning materials and price

Syllabus theory and exercises are available.

#### References

Fundamentals of Analytical Chemistry 9th ed, 2013 (D.A. Skoog - D.M. West -F.J. Holler; Saunders College Publishing) (ISBN 0495558281)  
 Principles of Instrumental Analysis 6th ed, 2006 (D.A. Skoog - D.M. West; Saunders College Publishing) (ISBN 0495012017)  
 Quantitative analysis, 6th ed, 1999 (R.A. Day, Jr and A. L. Underwood; Prentice Hall) (ISBN 086927932)  
 Analytical chemistry, 2th ed,2004 (R. Kellner, J.M. Mermet,...; Wiley - VCH) (ISBN 3527-30590-4)

#### Course content-related study coaching

Supplementary 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

Written examination with open questions, participation, assignment

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Calculation of the examination mark

Theory : 75%

Exercices : 25%

The evaluation and implementation of the final quotation is being established through the mathematical average according to the assigned coefficients. In case however for one of the parts less than 7/20 is being obtained, there is a deviation from the calculated end score in case this is 10 or more and the student gets a 9/20.