

Chemistry 1: Structure of Matter (I001826)

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	36.25 h
		practicum	25.0 h
		seminar: coached exercises	11.25 h

Lecturers in academic year 2018-2019

Van Hecke, Kristof	WE06	lecturer-in-charge
Van Deun, Rik	WE06	co-lecturer

Offered in the following programmes in 2018-2019

	crdts	offering
Bachelor of Science in Bioscience Engineering (main subject Agricultural Sciences)	6	A
Bachelor of Science in Bioscience Engineering (main subject Cell and Gene Biotechnology)	6	A
Bachelor of Science in Bioscience Engineering (main subject Chemistry and Food Technology)	6	A
Bachelor of Science in Bioscience Engineering (main subject Environmental Technology)	6	A
Bachelor of Science in Bioscience Engineering (main subject Land and Forest Management)	6	A
Joint Section Bachelor of Science in Bio-Engineering	6	A

Teaching languages

Dutch

Keywords

Atom, ion, molecule, Periodic System, chemical reaction, chemical bonding, state of matter

Position of the course

To acquire a general overview of and the necessary insight in the basic concepts of the structure of matter (see Contents) which is needed as basic knowledge for the future bio-engineer and as a prerequisite for more specialized and applied chemistry courses (inorganic, organic, analytical chemistry and biochemistry).

To gain insight in the fundamental differences between physical and chemical processes is a main objective.

As the emphasis is made on physical chemistry, the course is well suited to attribute to the development of scientific skills such as analytical reasoning, ability to critical reflection and problem solving capability as future bio-engineer.

Contents

1. Stoichiometry: element, compound, chemical reaction, mole, titration
2. Atomic structure: Bohr-model, introduction to wave mechanical model, electron configurations
3. Chemical bonding: ionic bonding, covalent bonding (Lewis theory, valence bond theory, introduction to molecular orbital theory), metallic bonding
4. Intermolecular forces of attraction: states of matter, condensed phases, vapor pressure, phase diagram
5. Solutions: concentration, vapor pressure of solutions, distillation, osmosis

Initial competences

No explicit prerequisite knowledge of chemistry is required. Secondary school chemistry knowledge corresponding to two chemistry classes per week is an asset. The chemistry course starts with the fundamentals of elementary chemistry. After a brief introductory section, the course builds to the level required for more complete understanding.

Final competences

- 1 The student must have acquired the necessary insight in the fundamental concepts governing the organisation and the structure of matter (see Contents).
- 2 The student must have acquired clear insight in the specific characteristics of chemical processes versus physical ones.
- 3 The student must be capable to interpret the physical properties of a substance at the macroscopic level based on the molecular structure of that substance.
- 4 The student has started to master a scientific attitude and must be able to analyse chemical problems and to propose appropriate strategies for their solution.

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

Theory: oral presentations, seminars (guided exercises), ELO
Exercises: guided laboratory exercises in elementary chemistry

Learning materials and price

Dutch written syllabus Cost: 25 EUR

References

English reference textbook "Chemical Principles", S.S. Zumdahl, Houghton Mifflin Cy, 2002, ISBN 0-618-12078-5
Electronic learning environment (ELO): documents available from the UG-net (<https://Minerva.UGent.be>)

Course content-related study coaching

- Seminars (guided exercises) to develop the chemical problem solving skills
- Individual learning assistance by lecturer or assistant, at appropriate times
- Interactive assistance by ELO: frequently asked questions, fora, ...

Evaluation methods

end-of-term evaluation

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

Written examination

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

Written examination

Examination methods in case of permanent evaluation

Skills test, job performance assessment, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible

Extra information on the examination methods

Theory: period aligned evaluation (90%)
Exercises: non-period aligned evaluation (10%)
Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.
Theory: oral (closed book) examination
Open questions: insight test for the basic concepts (see Contents) by application oriented theory questions; test for acquisition of the basic concepts in chemical problem solving by integrative exercises.
Exercises: evaluation of the development of a scientific attitude: sense for critical investigation and result assessment; evaluated by means of weekly lab reports

Calculation of the examination mark

Final mark (%) = 0,9x(mark theory, %) + 0,1x(mark practicum, %)
Students who eschew period aligned and/or non-period aligned evaluations for this

course unit may be failed by the examiner.

A student who is unfoundedly absent or does not participate in all of the evaluations of the non-period aligned evaluation will receive a non-deliberatable end score.

The marks for the non-period aligned evaluation are automatically kept for the second exam period, which only contains a period aligned exam.