GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2015-2016

Chemistry 2: Reactivity of Matter (I001831)

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 2)	Dutch	lecture	36.25 h
		seminar: coached exercises	11.25 h
		practicum	25.0 h

Lecturers in academic year 2018-2019

Strubbe, Katrien	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

Reaction speed, chemical equilibrium, chemical thermodynamics, acids, bases, salts, buffers, redox, biosphere, chemical industry

Position of the course

To acquire a general overview of and the necessary insight in the basic concepts of the reactivity 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 (organic, analytical chemistry and biochemistry).
To gain insight in the factors determining "why" and "how" chemical processes take place.
As the emphasis is made on the thermodynamic driving forces for chemical changes, 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. Chemical kinetics: reaction order, reaction mechanism, catalysts
2. Chemical equilibrium: equilibrium condition, Le Châtelier's principle
3. Chemical thermodynamics: internal energy, enthalpy, entropy, Gibb's free energy, spontaneous processes, useful work of a chemical process
4. Applications of chemical equilibria in aqueous solutions: acids, bases, salts, pH, buffers, redox reactions, batteries, electrolysis
5. Elements and compounds in the biosphere; inorganic products in industry

Initial competences

No explicite prerequisite knowledge of chemistry is required. Secundary school chemistry knowledge corresponding to two chemistry classes per week is an asset. Taking into account the acquired insight in the structure of matter (Chemistry 1: Structure of matter), the course builds to the level required for more complete understanding of chemical equilibria phenomena.

Final competences

1 The student has acquired the necessary insight in the fundamental concepts governing the reactivity of matter (see Contents).
2 He has acquired insight in the driving forces for chemical reactions.
3 The student is able to estimate the theoretical yield of a chemical process.
4 As a future bio-engineer of living matter he has sufficient understanding of the chemical behaviour of a variety of products in aqueous medium.
5 He 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 illustrating chemical equilibria

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 Minerva

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, %) + 0,10x(mark practicum, %)
Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examinator.

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.