GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2018-2019

Physical Chemistry (E029040)

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 2)	Dutch	lecture	30.0 h
		seminar: coached exercises	30.0 h
B (semester 2)	English	lecture	30.0 h
		seminar: coached exercises	30.0 h

Lecturers in academic year 2018-2019

Moreels, Iwan	WE06	lecturer-in-charge

Offered in the following programmes in 2018-2019	crdts	offering
Bridging Programme Master of Science in Engineering Physics	6	B
Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)	6	A
Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)	6	A
Master of Science in Electromechanical Engineering (main subject Maritime Engineering)	6	A
Master of Science in Electromechanical Engineering (main subject Mechanical Construction)	6	A
Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)	6	A
European Master of Science in Nuclear Fusion and Engineering Physics	6	B
European Master of Science in Photonics	6	B
European Master of Science in Nuclear Fusion and Engineering Physics	6	B
Master of Science in Engineering Physics	6	B
Master of Science in Engineering Physics	6	A

Teaching languages

Dutch, English

Keywords

chemical thermodynamics, chemical potential, physical equilibrium, chemical equilibrium, equilibrium at surfaces, electrochemical equilibrium, electron transfer

Position of the course

This course aims at teaching students important aspects of physical chemistry (chemical thermodynamics, surfaces and interfaces and electrochemistry). The course focuses on a solid knowledge of the basic princples and insight into their applications. Important are the interpretation of thermodynamic quantities on a molecular level and a knowledge of theoretical models and their experimental basis. The course aims at stimulating a scientific way of thinking, focusing on the construction of models starting from experimental observations.

Contents

- Principles of chemical thermodynamics: Gases - Intermolecular forces, Energy - Thermochemistry, Entropy, Gibbs free energy - Change and equilibrium

- Uncharged systems: Equilibrium in one-component systems, Evenwicht in binaire mengsels, Chemical equilibrium, Equilibrium at surfaces, Thermodynamics of light
- Charged systems: Ionic solutions, Charged interfaces
- Elektron transfer: Homogeneous electron transfer, Heterogeneous electron transfer

Initial competences

physics 1, physics 3, general chemistry

Final competences

1 Interpret important quantities of chemical thermodynamics and their molecular background: enthalpy, entropy, free energy, chemical potential.
2 To have insight in the thermodynamic and statistical meaning of entropy.
3 Determine equilibrium lines on phase diagrams, and equilibrium in binary mixtures.
4 Connect chemical equilibrium with reaction kinetics.
5 Calculating enthalpy and entropy changes of physicochemical reactions in a practical context (chemical reactions, phase transitions, electrodes and charge transport).

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, seminar: coached exercises

Extra information on the teaching methods

Classroom lectures; Classroom problem solving sessions

Learning materials and price

References

- P.W. Atkins, J. de Paula, 'Physical Chemistry', Oxford University Press (2001)
- R.J. Silbey, R.A. Alberty, M.G. Bawendi, Physical Chemistry, Fourth Edition, Wiley (2004)
- Ken A. Dill, S. Bromberg, 'Molecular Driving Forces', Garland Science (2003)

Course content-related study coaching

Evaluation methods

end-of-term evaluation

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

Written examination, open book examination, oral examination

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

Written examination, open book examination, oral examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

During examination period: oral exam; written open-book exam

Calculation of the examination mark

Special conditions: two exams, theory and excercises. Distribution of scores: 12 for the theory, 8 for the excercises.