GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Physical Chemistry (E029040)

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

Credits 6.0 **Study time 180 h**

Course offerings and teaching methods in academic year 2025-2026

A (semester 2)	Dutch	Gent	
B (semester 2)	English	Gent	lecture seminar

Lecturers in academic year 2025-2026

Moreels, Iwan	WE06	lecturer-in-charge

Offered in the following programmes in 2025-2026	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	B
Master of Science in Electromechanical Engineering(main subject Electrical Power Engineering)	6	B
Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	6	B
Master of Science in Electromechanical Engineering(main subject Mechanical Construction)	6	B
Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)	6	B
European Master of Science in Nuclear Fusion and Engineering Physics	6	B
Master of Science in Engineering Physics	6	A
Master of Science in Engineering Physics	6	B
Master of Science in Photonics Engineering	6	B
Master of Science in Physics and Astronomy	6	B

Teaching languages

English, Dutch

Keywords

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

Position of the course

The physical chemistry course aims at teaching students important aspects of physical chemistry (chemical thermodynamics and kinetics, thermodynamics at surfaces and interfaces, 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, Equilibrium in binary mixtures, Chemical equilibrium, Equilibrium at surfaces
- Charged systems: Ionic solutions, Charged interfaces, electron transfer
- Kinetics: transition state theory, reaction kinetics in the gas phase, reaction

kinetics on solid surfaces

Initial competences

physics I, physics III, chemical thermodynamics I

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

Seminar, Lecture, Independent work

Study material

Type: Syllabus

Name: Physical Chemistry for Engineers
Indicative price: Free or paid by faculty
Optional: no
Language : English
Available on Ufora : Yes
Online Available : Yes
Available in the Library : No
Available through Student Association : No

Type: Syllabus

Name: Chemical Kinetics for Engineers
Indicative price: Free or paid by faculty
Optional: no
Language : English
Available on Ufora : Yes
Online Available : Yes
Available in the Library : No
Available through Student Association : No

Type: Slides

Name: Lecture slides
Indicative price: Free or paid by faculty
Optional: no
Language : English
Available on Ufora : Yes
Online Available : Yes
Available in the Library : No
Available through Student Association : No

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)

Course content-related study coaching

Assessment moments

end-of-term assessment

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

Written assessment with open-ended questions, Written assessment open-book

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

Written assessment with open-ended questions, Written assessment open-book

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

Theory exam: written closed-book exam.
Excercise 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.