Course Specifications
Valid in the academic year 2018-2019

Course

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 principles 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

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• 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

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 exercises. Distribution of scores: 12 for the theory, 8 for the exercises.

(Approved)