

# Physical Chemistry

Module assigned to 1<sup>st</sup> semester

Identification Code	2288870110
ECTS-Points	4
Credit Hours	2
Language	english
Length of the Module	1 semester
Date and Capacity	winter term 60 students
Responsible Lecturer	NN
Further Lecturer	NN
Study Programme	Master degree in Advanced Materials Master degree in Energy Science and Technology compulsory
Prerequisites	BSc degree
Study Objectives	The students should
Module Contents	<p><b>A) Quantum Chemistry</b></p> <ol style="list-style-type: none"> <li>1. Problems with Newton's Classical World</li> <li>2. The properties of waves and the wave-nature of matter</li> <li>3. Quantum mechanical description of a simple system -The particle in a box</li> <li>4. Extension of the model to examples closer to reality</li> </ol> <p>- a. The harmonic oscillator (basic model for a vibrating molecule) - b. The hydrogen atom, hydrogen-like ions and atomic orbitals</p> <ol style="list-style-type: none"> <li>5. Molecular orbitals</li> </ol> <p><b>B) Practical Aspects of the Laws of Thermodynamics</b></p> <ol style="list-style-type: none"> <li>1. The first law: Enthalpy</li> <li>2. The second law: Entropy, Free-energy and Chemical equilibrium</li> </ol> <p>- The third law</p> <p><b>C) Reaction Kinetics</b></p> <ol style="list-style-type: none"> <li>1. The order of a reaction</li> <li>2. Temperature, the rate of reaction and the position of equilibrium</li> <li>3. Catalyzed reactions, enzyme reactions</li> </ol>
Literature	Handouts
Teaching Methods	Physical Chemistry (L), 2 h/week
Estimation of working load	28 h lecture (presence) 76 h preparation and postprocessing lecture 16 h exam preparation Total: 120 h
Examinations	written examination
Grade Composition	exam result
Usability	MSc course of studies Energy Science and Technology