

Institut für Chemie und Biochemie  
Module descriptions for the bachelor program Chemistry  
for teacher candidates

<b>Module: Quantum Theory for Atoms and Molecules</b>			
<b>University/Department/Institute:</b> Freie Universität Berlin/Department of Biology, Chemistry, Pharmacy/Institute of Chemistry and Biochemistry			
<b>Module supervisors:</b> Lecturers of the module			
<b>Entrance Requirements:</b> none			
<b>Goals of qualification:</b> Students have basic knowledge of the quantum theory and its application on simple, chemically relevant examples. They can describe the electronic structure of atoms and small molecules and are acquainted with atomic models and quantum mechanical basics of spectroscopic measurements. They are able to solve simple assignments independently, can work them out didactically and present them gender- and diversity specific.			
<b>Contents:</b> Introduction to the quantum nature of matter and energy, basics of quantum theory, quantum mechanical solutions for the time-independent Schrödinger equation for chemically relevant model systems, quantum theory of the orbital angular momentum and spin. Quantum mechanics of the hydrogen atom, multiple electron atoms, spin-orbit-coupling, theory of the chemical bond, elementary quantum theory of simple molecules; historic background of quantum theory, with minor focus on gender-specific aspects.			
Teaching methods	Hours of attendance (semester periods per week)	Forms of active participation	Work effort (hours)
Lecture	4	-	Presence (L) 60 Pre-, post-preparation (L) 60
Tutorials	2	Solving assignments, Contributing to topic related discussions	Presence (T) 30 Pre-, post-preparation (T) 30 Presence (S) 15
Seminar	1	Presentation of a quantum theoretical topic	Pre-, post-preparation (S) 45 Exam preparation and examination 60
<b>Language spoken in lecture</b>		German	
<b>Compulsory regular attendance</b>		Lecture: attendance is recommended, tutorial: yes	
<b>Work effort (total)</b>		300 hours	10 CP
<b>Length of module</b>		One semester	
<b>Examination</b>		Exam (180 minutes); The exam can also be conducted electronically	
<b>Lecture is offered</b>		Every semester	
<b>Applicability</b>		Bachelor study program Chemistry for Teaching Training Students, 60-CP-Module offer Chemistry	