

Program	Level of studies		First cycle	
	Program name		Physics	
Course name	ATOMIC AND MOLECULAR PHYSICS			
Course ID	Semester	Course status	ECTS credits	L+E
PTH7511	VII	ELECTIVE	5	3+1
Lecturer	Prof. dr. Aner Čerkić			
Aims and intended learning outcomes	Aim of the course is to introduce students into the ideas and mathematical apparatus of atomic and molecular physics. Expected outcomes: Getting acquainted with experimental and theoretical basics of atomic and molecular physics. Mastering the mathematical apparatus of atomic and molecular physics. Getting acquainted with practical applications of atomic and molecular physics.			
Course content				
Lifting of the orbital degeneracy in the spectra of alkali atoms. Orbital and spin magnetism, fine structure. Atoms in a magnetic field: Experiments and their semi-classical description. Atoms in a magnetic field: Quantum mechanical treatment. Atoms in an electric field. General laws of optical transitions. Many-electron atoms. X-ray spectra, internal shells. Structure of the Periodic System, ground states of the elements. Nuclear spin, hyperfine structure. The laser. Modern methods of optical spectroscopy. Progress in quantum physics: A deeper understanding and new applications. Fundamentals of the quantum theory of chemical bonding.				
Student workload (hours)		Grading		
Lectures and Exercises	60	Assessment method	Points	
Exam preparation	50			
Assignments	10			
Other	5	Midterm exam	50	
Total	125	Final exam	50	
		Total	100	
Literature				
Mandatory literature: 1. H. Haken, H. C. Wolf, <i>The Physics of atoms and Quanta - Introduction to Experiments and Theory</i> , Springer-Verlag, Berlin, 2005.				
Additional literature: 1. M. Terzić, M. Kurepa, <i>Uvod u fiziku atoma i molekula</i> , Univerzitet u Novom Sadu, Prirodno-matematički fakultet, Studentski trg, Beograd, 1997. 2. P. W. Atkins, R. S. Friedman, <i>Molecular quantum mechanics</i> , Oxford University Press, Oxford, 2005. 3. B. V. Stanić, M. I. Marković, <i>Zbirka rešenih zadataka iz atomske fizike</i> , Nauka, Beograd, 1995. 4. K. Bartschat, <i>Computational atomic physics</i> , Springer-Verlag, Berlin, 1996.				
Remarks				