Course code	
Type and description	**CC** - Core Course
ECTS credits	2
Course name	**Advanced Physical Chemistry**
Course name in Polish	Zaawansowana Chemia Fizyczna
Language of instruction	English
Course level	8 PRK
Course coordinator	prof. dr hab. Piotr Ulański
Course instructors	prof. dr hab. Piotr Ulański, dr hab inż. Adam Sikora, prof. dr hab. Halina Abramczyk, dr hab. inż. Beata Brożek-Płuska, prof. PŁ, prof. dr hab. Dorota Światła-Wójcik, dr hab. inż. Sławomir Kadłubowski, dr hab. inż. Marian Wolszczak, prof. PŁ

Delivery methods and course duration

	Lecture	Tutorials	Laboratory	Project	Seminar	Other	Total of teaching hours during semester
Contact hours	15	0	0	0	0	0	15
E-learning	No	No	No	No	No	No	
Assessment criteria (weightage)	1.0	0.00	0.00	0.00	0.00	0.00	

Course objective	The aim of the course is to introduce students to the concepts, theoretical basics and applicability of advanced techniques of physical chemistry
Learning outcomes	After the course the student: 1. describes and explains fundamental concepts, theoretical basics and applicability of selected advanced techniques and methods of physical chemistry (W1 P8S_EG). 2. selects adequate method or technique for a given task (U1 P8S_UW, K1 P8S_KK)
Assessment methods	Verification methods of learning outcomes: effects W1 P8S_EG, U1 P8S_UW, K1 P8S_KK - written scientific essay The final grade consists of: result of the written essay – 100%
Prerequisites	none
Course content with delivery methods	LECTURES: 1. Advanced chemical kinetics. Rapid chemical kinetic techniques: stopped-flow, flash photolysis and pulse radiolysis technique. Kinetic simulations. 2. Basics of radiation chemistry. Matrix isolation. Radiolysis of water and aqueous solutions. 3. Radiolysis of organic solvents and ionic liquids. 4. Molecular simulation concepts and applications in solution chemistry. 5. Light-scattering techniques for analysis of properties and dynamics of nanomaterials and polymers. Classical (static) Rayleigh light scattering and its analytical applications. Dynamic light scattering and related techniques. 6. Physicochemical methods in the study of organized systems. The design and development of molecular probes. 7. Chemical aspects of photodynamic antitumor therapy and diagnostics. 8. Photoelectrochemistry. Solar to fuels conversions technologies. Thermodynamics of the conversion of solar radiation. 9. Introduction to the advanced spectroscopic techniques used in chemistry, biology and medicine with the particular emphasis on problems solving to determine molecular structure. 10. Advanced imaging techniques with the use of different types of spectroscopic techniques with particular emphasis on vibrational spectroscopy.
Basic reference materials	1. Tutor's materials. 2. M. Spotheim-Maurizot, M. Mostafavi, T. Douki, J.Belloni (Eds.), Radiation Chemistry. from Basics to Applications in Material and Life Sciences, EDP Sciences, France, 2008. 3. Christopher J. Cramer. Essentials of Computational Chemistry. Theories and Models. John Wiley & Sons, LTD 2004. 4. M.P. Allen, D.J. Tildesley, Computer Simulation of Liquids, Oxford University Press, Oxford, 1987.
Other reference materials	Current scientific papers, indicated by the lecturer
Average student workload outside classroom	15 hrs
Comments	-
Last update	2022-01-31