

Study Programme: Pharmaceutical Engineering		
Course Unit Title: Instrumental Analysis of Pharmaceutical Products		
Course Unit Code:		
Name of Lecturer(s): Professor Jaroslava Švarc-Gajić, Associate Professor Zorica Stojanović		
Type and Level of Studies: Bachelor Degree		
Course Status (compulsory/elective): Elective		
Semester (winter/summer): Summer		
Language of instruction: English		
Mode of course unit delivery (face-to-face/distance learning): Face-to-face		
Number of ECTS Allocated: 7		
Prerequisites: Analytical Chemistry		
Course Aims: The course aim is to gain knowledge and skills related to the theory of instrumental methods of analysis and their practical application in the analysis and quality control of pharmaceutical products.		
Learning Outcomes: Practical experience in the application of instrumental methods of analysis. Training for the independent application of qualitative and quantitative analysis by using separation methods, electroanalytical and optical methods, together with appropriate sample preparation procedure.		
Syllabus: <i>Theory</i> The significance of pharmaceutical product analysis. Preparation of pharmaceutical products for analysis. Conventional and modern extraction techniques. Microextraction techniques. Basic principles of laminar and column techniques, gas and liquid chromatography. The principles and application of spectroscopic techniques: UV/VIS spectrophotometry, atomic absorption spectrophotometry, flame photometry, mass spectroscopy and coupled inductively plasma techniques. Chromatography coupled with spectroscopic techniques. Basic principles of electroanalytical techniques: potentiometry, voltammetry, electrochemical stripping analysis. Statistical analysis and measurement uncertainty. <i>Practice</i> Independent laboratory exercises and application of chromatographic, optical and electrochemical methods in the analysis of various pharmaceutical products (pills, injections, syrups, etc.). Sample preparations. Calculations and presentations of the results.		
Required Reading: 1. K.J.Hyver: High Resolution Gas Chromatography, 3rd ed., Hewlett-Packard 1989 2. Barbara H. Stuart: Infrared spectroscopy: fundamentals and applications, Wiley, 2004. 3. Wang, J.: Analytical Electrochemistry, 2nd ed., Wiley-VCH, 2000. 4. Corradini, D.: Handbook of HPLC, CRC Press, 2011. 5. Watson, D. G.: Pharmaceutical analysis, Hardcourt publisher limited, 1999.		
Weekly Contact Hours:	Lectures: 3	Practical work: 4
Teaching Methods: Lectures and students group work.		

Knowledge Assessment (maximum of 100 points):			
Pre-exam obligations	points	Final exam	points
Active class participation	5	written exam	
Practical work	25	oral exam	30
Preliminary exam(s)	40		
Seminar(s)			
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			