Description of an Individual Course Unit

Study program	Chemical Engineering		
Module	Pharmacautical Engineering		
Type and level of studies	Master studies		
Course title	Controlled release		
Professor (for lectures)	Rada Pjanović		
Professor/assistant (for practice)	Rada Pjanović		
Professor/assistant (for LAB)			
Number of ECTS	4	**Type of the course (mandatory/elective)**	Elective
Prerequisit			
Objective of the course	The objective is that student learns about: systems for controlled release, mass transfer in different systems and use of controlled release in different industries e.g. pharmaceutical, food, cosmetics. Student should learn about different ways of production of carriers for actives compounds.		
Learning outcomes of the course	Student acquires basic knowledge about systems for controlled release. Student learns about advantages and weaknesses of new controlled delivery systems comparing to each other and to conventional systems.		
Course Contents			
Theoretical contents	Principles of controlled release. Molecular diffusion – steady and non-steady. Encapsulation of actives in the reservoir type of particles and mass transfer from these particles. Encapsulation of actives in the matrix particles and mass transfer from these particles. Diffusion in polymer systems and use of polymers for controlled release. Micro and nanoparticles as novel systems for controlled release. Emulsions and microemulsions. Mechanism of actives release. Use of controlled release in pharmacy, food industry, cosmetics and pesticide production.		
Practical part (practices, LAB, study research work)	Problem solving. Lab exercise.		
Literature			
1	Handout from lectures.		
2	Jalešnjak I., Jalešnjak V., Filipović-Grčić J., Pharmaceutics (in serbian), Školska knjiga, Zagreb, 1998.		
3	Adrian Williams, Transdermal and Topical Drug Delivery, Pharmaceutical Press, 2003.		
4	Mikael Hedenqvist, Transport Properties of Polymers, Royal Institute of Technology, Stockholm, 2002.		
5	Meyer Rosen, Delivery System Handbook for Personal Care and Cosmetic – Technology, Applications and Formulations, William Andrew Inc, 2005.		
6	James Swarbrick, Encyclopedia of Pharmaceutical Technology, Third Edition, Informa Healthcare USA, Inc., 2007.		

Lessons per week

Lectures	Practices	LAB	Study research work	Other activities
2	2			

Teaching Methods	Lectures, problem solving, lab exercise, consultation.

Grading methods (max. number of points is 100)

Pre-exam assesments	points	Final examination	points
activity during lectures		written exam	30
practical assesments		oral exam	
mid-term exams			
seminars	50		
test	20		