FACULTY OF CHEMISTRY

SUBJECT CARD

Name of subject in English: Biomaterials and Biomedical Devices
Main field of study (if applicable): Chemical and Process Eng.
Specialization (if applicable): Chemical Nanoengineering
Profile: academic
Level and form of studies: 2nd level , full-time
Kind of subject: obligatory
Subject code: ICC025006
Group of courses: NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	15				15
Number of hours of total student workload (CNPS)	60				30
Form of crediting	crediting with grade				crediting with grade
For group of courses mark (X) final course					
Number of ECTS points	2				1
including number of ECTS points for practical (P) classes					1
including number of ECTS points for direct teacher-student contact (BK) classes	0,5				0,5

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of chemical engineering

SUBJECT OBJECTIVES

C1 - Getting acquainted with the types of drug carriers and the basic mechanisms of drug release.
C2 - Familiarization with the structure and principle of operation of nanosensors used in medicine.
C3 - Getting acquainted with the method of producing drug carriers and the method of determining the release rate of drugs.

SUBJECT EDUCATIONAL EFFECTS

Related to knowledge:
The person who passed the subject:
PEK_W01 - has basic knowledge about nanosensors and their applications.
PEK_W02 - knows the basic applications of nanostructures for drug dosing.
PEK_W03 - knows the methods for the modification of nanostructures with biological molecules - enzymes, DNA.

Relating to skills:
The person who passed the subject:
PEK_U01 - is able to perform and interpret experiments carried out on polymers used in drug dosing.
PEK_U02 - is able to determine the parameters of the equation describing the mass transport from the drug carrier.

In the field of social competences:
The person who passed the subject:
PEK_K01 - can work in a group of several people, both during experiments and computer processing of results

PROGRAMME CONTENT

Lectures		**Number of hours**
Lec 1	Introduction to the course. The idea of drug dosing in long-term local therapy.	2
Lec 2	(Bio)biocompatible polymers.	2
Lec 3	Diffusive transport of drugs from homo- and heterogenous drug carriers. Description of the release rate controlled by diffusion and dissolution	2
Lec 4	Hydrogels applied externally and internally.	2
Lec 5	Enzymatic release of drugs.	2
Lec 6	Bioluminescent sensors	2
Lec 7	Biosensors based on DNA.	2
Lec 8	Credits in writing.	1
		15
Seminar		**Number of hours**
Sem 1	Transport of drugs through membranes of different thickness and porosity.	5
Sem 2	Production of homo- and heterogeneous carriers with the use of an encapsulator.	5
Sem 3	Experimental determination of drug release rates from homo- and heterogeneous carriers. Determination of transport coefficients for selected substances.	5
Sem 4		

TEACHING TOOLS USED

N1. Lecture with multimedia presentation
N2. Laboratory
N3. Description of experimental results using computer graphics programs
N4. Consultations

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 (lecture)	PEK_W01 - PEK_W03	Final test (max. 10 points)

P(lecture) = F1

9.5 - 10 pkt. + bdb
9.0 – 9.4 pkt. bdb
8.0 – 8.9 pkt. + db
7.0 – 7.9 pkt. db
6.0 – 6.9 pkt. + dst
5.0 - 5.9 pkt. dst

F2 (seminar)	PEK_U01 – PEK_U04 PEK_K01	Attendance at the classroom (4.5 points)
F3 (seminar)	PEK_U01 – PEK_U04 PEK_K01	Final report. (5.5 points)

P (laboratory) = (F1+F2)

9.5 - 10 pkt. + bdb
9.0 – 9.4 pkt. bdb
8.0 – 8.9 pkt. + db
7.0 – 7.9 pkt. db
6.0 – 6.9 pkt. + dst
5.0 - 5.9 pkt. dst

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

Biomedical Engineering - W.M. Saltzman

Applied Biophysics for drug discovery - D.Huddler, E.R.Zartler

Advanced Biomaterials and Biodevices - A.Tivari, A.N.Nordin

SECONDARY LITERATURE:

Biosensors Nanotechnology - A.Tivari, A.P.F.Turner

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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