Study program: Integrated academic studies of Pharmacy

Type and level of the study program: integrated academic studies

Course title: BIOPHARMACY II (PhV-BPHARII)

Teacher: Mirjana B. Bećarević

Course status: compulsory

ECTS Credits: 2

Condition: Biopharmacy I; Pharmaceutical Technology I, II, III; Immunology

Course aim

The aim of the course is to introduce students with techniques of biopharmaceutics production and purification and with all aspects of their application. Biopharmaceutical aspects of formulation and preparation of therapeutic peptides and proteins will be considered, and the importance of antibodies (as drugs and drugs carriers) and cytokines will be especially emphasized**.**

Expected outcome of the course:

Students will acquire the knowledge that would provide biopharmaceutical aspects for considerations of efficient and safe biopharmaceutics formulation. Students should develop the skill of formulation of therapeutic peptides and proteins in adequate forms that would provide optimal therapy.

Course description

Theoretical education

1. Basic terms and definitions about biopharmaceutics
2. Techniques for proteins production and purification
3. Biopharmaceutical aspects of therapeutic peptides and proteins and their formulations
4. Mechanisms of targeted delivery of therapeutic peptides and proteins
5. Antibodies as drugs (elimination of targeted cells). Structure of antibodies.
6. Antibodies as drugs (elimination of toxic and pathogenic molecules).
7. Antibodies as drugs (human and animal immunoglobulins).
8. Antibodies as drugs (monoclonal antibodies).
9. Antibodies as drug carriers (chemo-immunotherapy)
10. Antibodies as drug carriers (radio-immunotherapy)
11. Cytokines. Structure of cytokines
12. Cytokines and immunotherapy
13. Immunomodulation (therapy of tumors)
14. Immunomodulation (vaccines)
15. Immunomodulation (immunosuppression)
16. Liposomes (methods for production, structure, application)
17. Nanoparticles as therapeutics and diagnostics
18. Safety and efficiency of biopharmaceutics application

Practical education:

Relevant topics presented through essays and interactive discussions will be considered during practical classes.

Literature

Compulsory

1. Crommelin DJA, Sindelar RD, Meibohm B. Pharmaceutical biotechnology. Fundamentals and applications. Informa Healthcare London-New York, 2008.
2. Hillery AM, Lloyd AW, Swarbrick J. Drug delivery and targeting. Taylor & Francis, London-New York, 2001.
3. Banga AK. Therapeutic peptides and proteins. Formulation processing and delivery systems. Technomic Lancaster, Pennsylvania 1995.

Additional

1. Shargel L, Wu-Pong S, Yu ABC. Applied biopharmaceutics and pharmacokinetics. McGraw-Hills Pharmacy 2004.

Number of active classes				Other:
Lectures: 30	Practice: 15	Other types of teaching:	Research related activities:	

Teaching methods: Lectures. Interactive practical classes

Student activity assessment (maximally 100 points)

Pre-exam activities	**points**	**Final exam**	**points**
Lectures	5	Written	60
Practices	5	Oral	
Colloquium		.....	
Essay	30		