Study program: Integrated academic studies of Pharmacy

Type and level of the study program: integrated academic studies

Course title: MATHEMATICAL MODELS IN PHARMACY (PhIV-MTMOD)

Teacher: Mihalj M. Poša, Nataša P. Milošević

Course status: elective

ECTS Credits: 3

Condition: Biophysics; Biomathematics

Course aim

To understand and apply mathematical modeling in the design of new drugs and determining dosage regimen for the implementation of rational pharmacotherapy.

Expected outcome of the course:

After passing the exam students are expected to know the different approaches to mathematical modeling of data and to present the factors that affect the variability of therapeutic response, as adequately as possible, by using parameters of mathematical models.

Upon completion of the course, the student is expected to be able to apply both in the pharmaceutical theory and practice the appropriate mathematical model and calculate the unknown parameters of the model.

Course description

Theoretical education

1. Modeling in pharmacy
2. Mathematical modeling methods in pharmacy
3. The method of least squares
4. System approach in pharmaceutical research and practice
5. Laplace and Fourier transformation
6. Complete Laplace transformation, the concept of subsystems and partial Laplace transform
7. Application of spline functions
8. Interpolation and approximation of functions
9. The principle of convolution
1. 10.Heaviside's development and general theorem on partial fractions in solving mathematical models via Laplace transform
10. General compartment theory
11. The method of successive terminals
12. The method of frequency response of linear dynamic systems
13. The method based on the concept of artificial neural networks
14. Method based on the fuzzy logic of the theory of groups
15. The method based on the concept of fractal
16. Application of partial linear differential equations, their sum and integrals

Practical education: exercises, other forms of education, research related activities

1. Wagner-Nelson and Lu-Rigelman's methods
2. Theory of pharmacy
3. Identification System
4. Modeling the frequency response
5. Structural model
6. System with time delay and Santo
7. Places and patterns of application of theory in biology, medicine and pharmacy
8. Systemic setting of the biological usability, with examples
9. Systemic determining of the amount and rate of formation of drug metabolites
10. Systemic determining of drug dissolution in vivo
11. Systemic determination of absorption from protection coated granules
12. Systemic modeling and testing of similarity in dissolving of drug formulations in vitro

Literature

Compulsory

1. Ritschel W. Kearns G, Handbook of Basic Pharmacokinetics. APhA Publications, 6th edition, 2004.

Additional

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

Teaching methods

Lectures, Interactive Lectures, usage the Internet, e-learning, practical classes, workshops, learning based on computational problems, the analysis of cases from the practice, participation in research and development projects

Student activity assessment (maximally 100 points)

Pre-exam activities	**points**	**Final exam**	**points**
Lectures	25	Written	50
Practices	25	Oral	
Colloquium		.....	
Essay			