Medical University – Plovdiv
Faculty of Pharmacy
Department of Medical Physics and Biophysics

Approved by the Department Council №7 on 08.10.2025

Head of Department: ……..
/ Prof. V. Turiyski, PhD /

Syllabus in Models in Pharmacy

1. Concept of model. Objects, goals, and methods of modelling. Models in different sciences. Examples of models.
2. Types of models: physical, mathematical, and computer. Modern classification of mathematical models in biology and medicine. Regression and simulation models.
3. Principles of simulation modelling. Basic stages in building simulation models.
4. Specificity in the modelling of real processes and living systems. Complex, reproduction, and open systems.
5. Models of living systems described by a first-order differential equation. Concept of solution of an autonomous differential equation.
6. State of equilibrium of a differential equation of the first order. Stability and analytical method for studying stability. Linearization.
7. Population models. Equations for exponential and bounded growth. Critical community size model. Population models with growth arrest.
8. Models of living systems described by a system of two autonomous differential equations. Phase plane and phase portrait. Method of isoclines.
9. Steady-state stability of a system of two autonomous differential equations. Types of special points.
10. Lyapunov method for linearization of an ODE system and method of Lyapunov functions.
11. Investigation of the steady-state stability in models of living systems.
12. Examples of studying steady-state stability in models of living systems. Lotka equations. Volterra equations.
13. Analysis of modelling results. Generative models for discrete data: Poisson, binomial, multinomial.
14. Statistical modelling. Mixed model. Data clustering.
15. Hypothesis testing. A scientific process. Categorization of experiments.
16. Design and analysis of experiments. Creating an effective workflow design.
17. Models in pharmacy. Modelling techniques in pharmaceutical science and industry.
18. Models in drug discovery and in the creation of different pharmaceutical forms.
19. Models in pharmacokinetics and pharmacodynamics and for the effect of pH.

07.10.2025 ……..

/ Assoc. Prof. Hristo Manev, PhD /