



MEDICAL UNIVERSITY – PLOVDIV

FACULTY OF PHARMACY

SYLLABUS

IN

INFORMATION

AND DIGITAL TECHNOLOGY

Approved by the Department Council, Protocol №17/23.6.2026

Confirmed by the Faculty Council, Protocol №7/15.07.2026

INFORMATION AND DIGITAL TECHNOLOGY

Syllabus

Discipline	Final exam/ semester	According to the Faculty of Pharmacy curriculum of MU-Plovdiv Academic hours				ECTS	Academic hours in semester			
							I semester		II semester	
		Auditorium	Lectures	Practices	Non-auditorium		L	P	L	P
Information and Digital Technology	II	30	15	15	30	2,0			1	1

DISCIPLINE:

Information and Digital Technology

TYPE OF DISCIPLINE ACCORDING TO THE UNIFORM STATE REQUIREMENTS:

Compulsory

LEVEL OF QUALIFICATION:

Master

FORMS OF TRAINING:

Lectures, seminars, self-training

YEAR OF TRAINING:

First

DURATION OF TRAINING:

One semester

ACADEMIC HOURS:

15 academic hours of lectures, 15 academic hours of seminars

TECHNICAL EQUIPMENT APPLIED IN THE TRAINING:

Multimedia presentations, discussions, demonstrations of software products, development of specific assignments, preparation for solving theoretical tests.

FORMS OF EVALUATION:

Exam in the form of a test, current assessment through the development of coursework.

EVALUATION CRITERIA:

A final grade for the exam is formed from both components (theoretical and practical) as an average grade of the theoretical test and the current assessment.

ASPECTS OF EVALUATION CRITERIA:

True, complete and accurate development of the assigned practical tasks and correct solving of the theoretical tests.

SEMESTER EXAM:

Yes (theoretical test, coursework and discussion to determine the final grade).

STATE EXAM:

No.

LECTURER:

Professor of Mathematics

DEPARTMENT:

Medical Physics and Biophysics

ANNOTATION

The discipline "Information and Digital Technologies" forms basic digital competence, which is inextricably linked to the pharmacist's daily work with digital systems, electronic databases, specialized software, artificial intelligence in healthcare and medical information processing. Digital skills are built mainly through practical work in a software environment, working with databases, electronic resources and specialized applications for statistical data processing.

BASIC AIMS OF THE DISCIPLINE

Acquisition of knowledge and skills for the application of modern information and digital technologies for working with specialized statistical software. The main goal of the educational process is for students to become familiar with basic data processing methods used in modern research in the field of pharmacy.

The discipline is entirely computer-based and introduces students to the main capabilities of a specialized software package for defining and entering variables, graphical presentation and analysis of data. The main topics of modern information and digital technologies used in pharmaceutical sciences are covered, related to descriptive statistics, hypothesis testing, correlation analysis, linear and curvilinear regression, cluster and variance analysis, construction of classification and regression trees. The methods studied are used for analysis, processing and interpretation of data obtained from pharmaceutical studies.

EXPECTED RESULTS

Upon completion of the training, students should have the following knowledge and skills:

- to know basic facts and approaches in biostatistical modelling of processes in the field of pharmacy, in order to solve real problems related to them.
- to know and be able to use analytical approaches that underline the theory of biostatistical modelling and to work with basic methods for conducting research using specialized statistical software.
- to know and be able to conduct further basic research using data in the field of pharmacy.
- to be able to use the basic functions of specialized statistical software and applications for data extraction, processing and analysis.

LECTURES

1. Formation of basic digital competence in pharmacy **(1 h)**
 - 1.1. Working with digital systems, electronic databases, specialized software and applications of artificial intelligence in healthcare
 - 1.2. Types of medical and pharmaceutical data
 - 1.3. Data sources and principles for their organization
2. Fundamentals of biostatistical data and work in a software environment **(3 h)**
 - 2.1. Types of variables and scales of measurement
 - 2.2. Introduction to the environment and familiarization with the interface of specialized statistical software
 - 2.3. Data entry, coding and editing
3. Data analysis and visualization in a specialized software environment **(3 h)**
 - 3.1. Types of graphs and their editing
 - 3.2. Checking for normal distribution
 - 3.3. Hypothesis testing
 - 3.4. Comparing the means of two independent samples
 - 3.5. T-tests and non-parametric chi-square test
4. Digital tools for correlation and regression analysis **(3 h)**
 - 4.1. Correlation analysis
 - 4.2. Modelling using linear univariate regression with the least squares method
 - 4.3. Forecasting with the constructed model
 - 4.4. Interpretation and evaluation of the regression model
5. Methods for discovering structures and patterns in data **(3 h)**
 - 5.1. Data classification
 - 5.2. Hierarchical cluster analysis
 - 5.3. K-means cluster analysis
6. Tree models for classification and prediction **(2 h)**
 - 6.1. Construction and interpretation of classification trees
 - 6.2. Construction and interpretation of regression trees
 - 6.3. Applications of tree models, machine learning and artificial intelligence in pharmacy

SEMINARS

1. Practical work with digital systems and data management in a specialized statistical software environment **(3 h)**
 - 1.1. Familiarization with the interface and basic functionalities of specialized statistical software
 - 1.2. Data entry, organization, coding and editing
 - 1.3. Determining types of variables and measurement scales
 - 1.4. Data transformation and preparation for analysis
2. Data analysis and visualization in a specialized software environment **(3 h)**
 - 2.1. Construction and editing of graphical representations of data
 - 2.2. Study of distributions and descriptive statistical analysis
 - 2.3. Testing statistical hypotheses
 - 2.4. Comparing means of independent samples
 - 2.5. Application of t-tests and chi-square test
3. Digital tools for correlation and regression analysis **(3 h)**
 - 3.1. Conducting and interpreting correlation analysis
 - 3.2. Construction and evaluation of linear regression models
 - 3.3. Forecasting using regression models
 - 3.4. Formatting, visualization and interpretation of results
4. Practical application of methods for discovering structures and patterns in data **(3 h)**
 - 4.1. Hierarchical cluster analysis by cases and variables
 - 4.2. Clustering using the K-means method
 - 4.3. Interpretation of cluster analysis results
5. Tree models for classification and prediction **(3 h)**
 - 5.1. Construction and interpretation of classification trees
 - 5.2. Construction and interpretation of regression trees
 - 5.3. Applications of tree models for data analysis and prediction

BIBLIOGRAPHY

1. **B. Barton, J. Peat**, *Medical Statistics: A Guide to SPSS, Data Analysis and Critical Appraisal*, Wiley-Blackwell, 2014.
2. **J. Pallant**, *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using IBM SPSS (8th ed.)*, McGraw-Hill Education, 2023.

Other textbooks and handbooks intended for non-specialist students in Information Digital Technology with applications in Medicine and Pharmacy can also be used to some extent.

CONSPECTUS

1. Digital technologies in pharmacy and healthcare. Electronic databases, specialized software and applications of artificial intelligence.
2. Types of medical and pharmaceutical data. Data sources and principles for their organization.
3. Types of variables and scales of measurement. Preparation, coding and management of data in a specialized statistical software environment.
4. Basic functionalities of specialized statistical software for data processing and analysis.
5. Data visualization. Types of graphs and application of graphical methods in the analysis of medical and pharmaceutical data.
6. Study of distributions and testing of statistical hypotheses in a software environment.
7. Comparison of independent samples using parametric and non-parametric methods.
8. Correlation analysis and assessment of dependencies between variables.
9. Linear regression models. Construction, evaluation and use for forecasting.
10. Methods for detecting structures and patterns in data. Basic principles of cluster analysis.
11. Hierarchical cluster analysis and clustering using the K-means method.
12. Classification and regression trees – principles, construction and interpretation.
13. Applications of machine learning and artificial intelligence in the analysis of medical and pharmaceutical data.

Prepared by:

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