Кукашинкова

# UPDATES TO THE EDUCATIONAL PROGRAM FOR THE COURSE «INFORMATICS IN MEDICINE»

for the major 7-07-0912-01 «Pharmacy»
for the 2026/2027 academic year

| № | Amendments | Reference |
|---|---|---|
| 1. | The following literature to be used in the educational process<br>**Main:**<br>1. Medical Informatics in Modules: образ. пособие/И.Е.Булах, Л.П.Войтенко, О.С. Алита и др. – К. : ВСВ «Медицина», 2014. – 152 с.<br>**Supplementary:**<br>2. Shelamova, M. A. Organization of calculation and graphical representation of biomedical data in EXCEL : teaching manual / M. A. Shelamova, V. G. Leschenko. Minsk : BSMU, 2017. - 48 c.<br>3. Shelamova, M. A. Organization and processing of medical databases in Excel: teaching manual / Minsk : BSMU, 2018. - 48 c. | Department meeting |
| 2. | Amendments have been made to the thematic plan and to the teaching and methodological chart (Appendices 1 and 2). | Department meeting<br>Policy on the Use of Artificial Intelligence in the Educational Process at Belarusian State Medical University (BSMU), dated September 29, 2025 |
| 3. | The course has been supplemented with the following section:<br>Содержание учебной дисциплины дополнено разделом:<br>**10. «Introduction into Artificial Intelligence»**:<br>Basic principles of artificial intelligence (AI). Data and machine learning algorithms (classification and regression), neural networks. Pattern recognition and computer vision in medicine (medical image analysis, pathology detection). AI risks (errors, hallucinations, fakes, data security). AI capabilities (big data processing, acceleration of the support for decision making). Legal regulation and ethics of AI application in healthcare. Development of human consciousness and intelligence to manage AI technologies for the greater good of humanity. | Department meeting<br><br>Policy on the Use of Artificial Intelligence in the Educational Process at Belarusian State Medical University (BSMU), dated September 29, 2025 |

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| 4. | Amendments have been made to the list of practical skills (Appendix 3) | Department meeting Policy on the Use of Artificial Intelligence in the Educational Process at Belarusian State Medical University (BSMU), dated September 29, 2025 |

Educational program has been revised and approved at a meeting of the Department of Medical and Biological Physics (Minutes No. 9 dated May 21, 2026)

Head of the of the Medical and Biological Physics Department _____ M.V.Goltsev

APPROVED BY
Dean of the Medical Faculty of Foreign Students _____ O.S. Ishutin

Appendix 1

## THEMATIC PLAN

| Section (topic) name | Number of classroom hours | |
|---|---|---|
| | Lectures (incl. guided-independent work) | practical |
| **1. Methods and techniques for preparing text documents using the MS Word word processor** | **-** | **3** |
| 1.1.Creation, formatting, and editing of administrative medical text documents. Embedded graphics<br>1.2.Automation of the creation of complex-structure documents | - | 3 |
| **2. Methods and techniques for working with MS Excel spreadsheets** | **-** | **6** |
| 2.1. Creation, editing, and formatting of spreadsheets. Processing of scientific research data sets. Using templates to prepare professional documents | - | 3 |
| 2.2. Graphical representation of medical data arrays | - | 3 |
| **3. Statistical Analysis of Medical Research Data Using MS Excel** | **1,5** | **6** |
| 3.1. Methods of descriptive statistics. | 1,5 | 3 |
| 3.2. Graphical representation of the statistical distribution of a sample. | | 3 |
| 3.3. Correlation analysis methods. Statistical hypothesis testing criteria | | 3 |
| **4. Basic techniques for working with medical databases** | **-** | **6** |
| 4.1. Database design principles. Creation and processing of medical databases | - | 3 |
| 4.2. Working with a medical database. Query-based information retrieval and data filtering | - | 3 |
| **5. Preparing a scientific presentation using MS PowerPoint** | **-** | **3** |
| 5.1. Creating and saving a presentation. Managing objects<br>5.2. Importing content from other Office suite documents into the presentation file | - | 3 |
| **6. Specialized medical software used in pharmacy. Medical information resources on local area networks and the Internet. Information security issues.** | **1,5** | **15** |
| 6.1. Local and global networks. Medical Internet resources. Online information search tools. Methods for protecting | 1,5 | 3 |

| Section (topic) name | Number of classroom hours | |
|---|---|---|
| | Lectures (incl. guided-independent work) | practical |
| information resources. Specialized software. Operating principles of the "Belarusian Pharmacy" software suite. | | |
| 6.2. Operation in the administrator mode of the "Belarusian Pharmacy" software suite | - | 3 |
| 6.3. Operation in cashier mode within the "Belarusian Pharmacy" software suite. | - | 3 |
| 6.4. Report generation using the "Belarusian Pharmacy" software suite | - | 3 |
| 6.5. Analysis, planning, and forecasting of pharmacy operations | - | 3 |
| **7. Introduction to Artificial Intelligence** | - | **6** |
| 7.1. Fundamentals of AI in Medicine | - | 3 |
| 7.2. Use of AI in Pharmacy | - | 3 |
| **Total hours** | 3 | **48** |

# THEMATIC PLAN

## PART-TIME/CORRESPONDENCE MODE OF STUDY

| Section (topic) name | Number of classroom hours | | Independent student work |
|---|---|---|---|
| | Lectures | practical | |
| **1. Methods for preparing text documents using the MS Word word processor** | **-** | **1** | **5** |
| 3.1.Creation, formatting, and editing of administrative medical text documents. Embedded graphics<br>1.2.Using styles. Creating a table of contents. Creating document templates. | - | 1 | 5 |
| **4. Methods and techniques for working with MS Excel spreadsheets** | **-** | **1** | **10** |
| 4.1 Creation, editing, and formatting of spreadsheets. Processing of scientific research data sets. Using templates to prepare professional documents | - | - | 5 |
| 4.2 Graphical representation of medical data arrays | - | 1 | 5 |
| **5. Statistical Analysis of Medical Research Data Using MS Excel** | **1,5** | **2** | **15** |
| 3.1. Methods of descriptive statistics. | 1,5 | 2 | 5 |
| 3.2. Graphical representation of the statistical distribution of a sample. | - | - | 5 |
| 3.3. Correlation analysis methods. Statistical hypothesis testing criteria | - | - | 5 |
| **4. Basic techniques for working with medical databases** | **-** | **1** | **10** |
| 4.1. Database design principles. Creation and processing of medical databases | - | - | 5 |
| 4.2. Working with a medical database. Query-based information retrieval and data filtering | - | 1 | 5 |
| **5. Preparing a scientific presentation using MS PowerPoint** | **-** | **3** | |
| 5.1. Creating and saving a presentation. Managing objects<br>5.2. Importing content from other Office suite documents into the presentation file | - | 3 | |
| **6. Specialized medical software used in pharmacy. Medical information resources on local area networks and the Internet. Information security issues.** | **1,5** | **4** | **27** |

| Section (topic) name | Number of classroom hours | | Independent student work |
|---|---|---|---|
| | Lectures | practical | |
| 6.1. Local and global networks. Medical Internet resources. Online information search tools. Methods for protecting information resources. Specialized software. Operating principles of the "Belarusian Pharmacy" software suite. | 1,5 | 1 | 7 |
| 6.2. Operation in the administrator mode of the "Belarusian Pharmacy" software suite | - | 1 | 5 |
| 6.3. Operation in cashier mode within the "Belarusian Pharmacy" software suite. | - | 1 | 5 |
| 6.4. Report generation using the "Belarusian Pharmacy" software suite | - | 1 | 5 |
| 6.5. Analysis, planning, and forecasting of pharmacy operations | - | - | 5 |
| **7. Introduction to Artificial Intelligence** | - | **1** | **10** |
| 7.1. Fundamentals of AI in Medicine | - | 1 | 5 |
| 7.2. Use of AI in Pharmacy | - | - | 5 |
| **Total hours** | **3** | **10** | **82** |

Appendix 2

**CURRICULUM AND INSTRUCTIONAL MAP FOR THE COURSE «INFORMATICS IN PHARMACY» MODULE «INFORMATION TECHNOLOGIES IN HEALTHCARE»**

**(FULL-TIME MODE OF STUDY)**

| Section or topic number | Section of topic title | Number of classroom hours | | Literature | Practical skill | Forms of assessment | |
|---|---|---|---|---|---|---|---|
| | | Lectures | practical | | | Practical skill | current / interim assessment |
| | **Lectures** | **3** | - | | | | |
| 3.1. | Methods of descriptive statistics. | 1,5 | - | 1 – 3 | | | |
| 3.2. | Graphical representation of the statistical distribution of a sample. | | - | 1 – 3 | | | |
| 3.3. | Correlation analysis methods. Statistical hypothesis testing criteria | | - | 1 – 3 | | | |
| 6.1. | Local and global networks. Medical Internet resources. Online information search tools. Methods for protecting information resources. Specialized software. Operating principles of the "Belarusian Pharmacy" software suite. | 1,5 | - | 1 | | | |
| | **Practical sessions** | - | **48** | - | | | |
| 1.1. 1.2. | Creation, formatting, and editing of administrative medical text documents. Embedded graphics | - | 3 | 1 | Preparing text documents using the MS Word processor | Electronic Workbook | |

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|---|---|---|---|---|---|---|---|
| | Automation of the creation of complex-structure documents | | | | | | |
| 2.1. | Creation, editing, and formatting of spreadsheets. Processing of scientific research data sets. Using templates to prepare professional documents | - | 3 | 1 | Performing calculations using formulas and functions. Creating charts in MS Excel. | Electronic Workbook | |
| 2.2. | Graphical representation of medical data arrays | - | 3 | 1 | Creating charts in MS Excel. | Electronic Workbook | |
| 3.1. | Methods of descriptive statistics | - | 3 | 1-3 | Statistical processing of biomedical data: determination of statistical characteristics for the sample and the population. | Test | |
| 3.2. | Graphical representation of the statistical distribution of a sample | - | 3 | 1-3 | Statistical processing of biomedical data using built-in MS Excel statistical functions and specialized data analysis tools | Test | |
| 3.3. | Correlation analysis methods. Statistical hypothesis testing criteria | - | 3 | 1-3 | Statistical processing of biomedical data: identification of relationships | Analyzing the results and formulating conclusions, followed by an oral test | |
| 4.1. | Database design principles. Creation and processing of medical databases | - | 3 | 1 | Editing and viewing database table contents | Analyzing the results and formulating conclusions, followed by an oral test | |

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| 4.2. | Working with a medical database. Query-based information retrieval and data filtering | - | 3 | 1 | Using queries to retrieve data from databases Using PivotTables for Data Analysis | Analyzing the results and formulating conclusions, followed by an oral test Electronic Workbook | Test* |
| 5.1. 5.2. | Creating and saving a presentation. Managing objects Importing content from other Office suite documents into the presentation file | - | 3 | 1 | Creation and presentation of multimedia presentations for showcasing scientific work using MS PowerPoint | Electronic Workbook | Test* |
| 6.1. | Local and global networks. Medical Internet resources. Online information search tools. Methods for protecting information resources. Specialized software. Operating principles of the "Belarusian Pharmacy" software suite | - | 3 | 1 | Use of educational and scientific information resources on local networks and the Internet. Proficiency in methods for protection against unauthorized data access and the impact of malicious software in medical information systems | Oral quiz on the topic | |
| 6.2. | Operation in the administrator mode of the "Belarusian Pharmacy" software suite | - | 3 | 1 | Working with the specialist's automated workstation software | Electronic Workbook | |
| 6.3. | Operation in cashier mode within the "Belarusian Pharmacy" software suite. | - | 3 | 1 | Working with the specialist's automated workstation software | Electronic Workbook | |
| 6.4. | Report generation using the "Belarusian Pharmacy" software suite | - | 3 | 1 | Working with the specialist's automated workstation software | Electronic Workbook | |

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|---|---|---|---|---|---|---|---|
| 6.5. | Analysis, planning, and forecasting of pharmacy operations | - | 3 | 1 | Working with the specialist's automated workstation software | Interview | |
| 7.1. | Fundamentals of AI in Medicine | - | 3 | 1 | Preparing medical data for AI.<br>Solving a classification problem in machine learning. | Electronic Workbook | |
| 7.2. | Use of AI in Pharmacy | - | 3 | 1 | Solution to the problem of determining drug dosage based on medical history | Electronic Workbook | Test Credit |
| | **Total hours** | **3** | **48** | | | | |

* It is a mandatory form of ongoing assessment

## CURRICULUM AND INSTRUCTIONAL MAP FOR THE COURSE «INFORMATICS IN PHARMACY» MODULE «INFORMATION TECHNOLOGIES IN HEALTHCARE»

## (PART-TIME/CORRESPONDENCE MODE OF STUDY)

| № | Section of topic title | Number of classroom hours | | Guided independent work | Independent student work | Literature | Practical skill | Forms of assessment | |
|---|---|---|---|---|---|---|---|---|---|
| | | lectures | Practical *(laboratory / seminars)* | | | | | Practical skill | current / interim assessment |
| **Inaugural session** | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Lectures** | **3** | - | - | - | | | | |
| 3.1 | Methods of descriptive statistics | 1,5 | - | - | - | 1 - 3 | | | |
| 6.1 | Local and global networks. Medical Internet resources. Online information search tools. Methods for protecting information resources. Specialized software. Operating principles of the "Belarusian Pharmacy" software suite | 1,5 | - | - | - | 1 | | | |
| | **Practical sessions** | | **2** | | | | | | |
| 1.1<br>1.2 | Creation, formatting, and editing of administrative medical text documents. Embedded graphics Using styles. Creating a table of contents. Creating document templates | - | - | - | 2 | 1 | | | |
| 2.1 | Creation, editing, and formatting of spreadsheets. Processing of scientific research data sets. Using templates to prepare professional documents | - | - | - | 2 | 1 | | | |
| 2.2 | Graphical representation of medical data arrays | - | - | - | 3 | 1 | | | |
| 3.1 | Methods of descriptive statistics | - | 2 | - | 2 | 1 | Statistical processing of biomedical data: determination of statistical characteristics for the sample and the population. | Test | |
| 3.3 | Study of correlation analysis methods. Criteria for testing statistical hypotheses | - | - | - | 3 | 1 | | | |

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| 4.1 | Database design principles. Creation and processing of medical databases | - | - | - | 3 | 1 | | | |
| 5.1 | Creating and saving a presentation. Managing objects | - | - | - | 1 | 1 | | | |
| 6.1 | Local and global networks. Medical Internet resources. Online information search tools. Methods for protecting information resources. Specialized software. Operating principles of the "Belarusian Pharmacy" software suite | - | - | - | 2 | 1 | | | |
| 7.1 | Fundamentals of AI in Medicine | | - | - | 3 | 1 | | | |
| | **Total** | **3** | **2** | | **21** | 1 | | | |
| | | | | | **1st semester** | | | | |
| | **Practical sessions** | - | **8** | - | **61** | | | | |
| 1.1<br>1.2 | Creation, formatting, and editing of administrative medical text documents. Embedded graphics Using styles. Creating a table of contents. Creating document templates | - | 1 | - | 3 | 1 | Preparing text documents using the MS Word processor | Electronic Workbook | |
| 2.1 | Creation, editing, and formatting of spreadsheets. Processing of scientific research data sets. Using templates to prepare professional documents | - | - | - | 3 | 1 | Performing calculations using formulas and functions. Creating charts in MS Excel. | Electronic Workbook | |
| 2.2 | Graphical representation of medical data arrays | - | 1 | - | 2 | 1 | Creating charts in MS Excel. | Electronic Workbook | |
| 3.1 | Methods of descriptive statistics | - | - | - | 3 | 1-3 | | | |

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| 3.2 | Graphical representation of the statistical distribution of a sample | - | - | - | 5 | 1-3 | Statistical processing of biomedical data using built-in MS Excel statistical functions and specialized data analysis tools | Test | |
| 3.3 | Study of correlation analysis methods. Criteria for testing statistical hypotheses | - | - | - | 2 | 1-3 | Statistical processing of biomedical data: identification of relationships | Analyzing the results and formulating conclusions, followed by an oral test | |
| 4.1 | Database design principles. Creation and processing of medical databases | - | - | - | 2 | 1 | Editing and viewing database table contents | Analyzing the results and formulating conclusions, followed by an oral test Electronic Workbook | |
| 4.2 | Working with a medical database. Query-based information retrieval and data filtering | - | 1 | - | 5 | 1 | Using queries to retrieve data from databases Using PivotTables for Data Analysis | Analyzing the results and formulating conclusions, followed by an oral test Electronic Workbook | Test* |
| 5.1 5.2 | Creating and saving a presentation. Managing objects Importing content from other Office suite documents into the presentation file | - | - | - | 4 | 1 | Creation and presentation of multimedia presentations for showcasing scientific work using MS PowerPoint | Electronic Workbook | Test* |
| 6.1 | Local and global networks. Medical Internet resources. Online information search tools. | - | 1 | - | 5 | 1 | Use of educational and scientific information resources on local networks and the Internet. | Oral quiz on the topic | |

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| | Methods for protecting information resources. Specialized software. Operating principles of the "Belarusian Pharmacy" software suite | | | | | | Proficiency in methods for protection against unauthorized data access and the impact of malicious software in medical information systems | | |
| 6.2 | Operation in the administrator mode of the "Belarusian Pharmacy" software suite | - | 1 | - | 5 | 1 | Working with the specialist's automated workstation software | Electronic Workbook | |
| 6.3 | Operation in cashier mode within the "Belarusian Pharmacy" software suite. | - | 1 | - | 5 | 1 | Working with the specialist's automated workstation software | Electronic Workbook | |
| 6.4 | Report generation using the "Belarusian Pharmacy" software suite | - | 1 | - | 5 | 1 | Working with the specialist's automated workstation software | Electronic Workbook | |
| 6.5 | Analysis, planning, and forecasting of pharmacy operations | - | - | - | 5 | 1 | Working with the specialist's automated workstation software | Interview | |
| 7.1 | Fundamentals of AI in Medicine | - | 1 | - | 2 | 1 | Preparing medical data for AI. Solving a classification problem in machine learning. | Electronic Workbook | |
| 7.2 | Use of AI in Pharmacy | - | - | - | 5 | 1 | Solution to the problem of determining drug dosage based on medical history | Electronic Workbook | Test Credit |
| | **Total** | **-** | **8** | **-** | **61** | | | | |
| | **Total hours for the academic discipline** | **3** | **10** | **-** | **82** | | | | |

* It is a mandatory form of ongoing assessment

Appendix 3

## LIST OF PRACTICAL SKILLS

| Name of practical skill | Form of assessment |
|---|---|
| 1. Preparing text documents using the MS Word processor | Electronic Workbook |
| 2. Performing calculations using formulas and functions. Creating charts in MS Excel. | Electronic Workbook |
| 3. Statistical processing of biomedical data: determination of statistical characteristics for the sample and the population, identification of relationships, using built-in MS Excel statistical functions and specialized data analysis tools | Analyzing the results and formulating conclusions, followed by an oral test |
| 4.Editing and viewing database table contents. Using queries to retrieve data from databases. Using PivotTables for Data Analysis | Analyzing the results and formulating conclusions, followed by an oral test Electronic Workbook |
| 5.Creation and presentation of multimedia presentations for showcasing scientific work using MS PowerPoint | Electronic Workbook |
| 6.Working with the specialist's automated workstation software | Oral quiz on the topic |
| 7.Use of educational and scientific information resources on local networks and the Internet. | Oral quiz on the topic |
| 8.Proficiency in methods for protection against unauthorized data access and the impact of malicious software in medical information systems | Oral quiz on the topic |
| 9.Preparing medical data for AI | Electronic Workbook |
| 10. Solving a classification problem in machine learning | Electronic Workbook |
| 11.Solving the detection problem using neural networks | Electronic Workbook |