**Ministry of Education and Science of the Kyrgyz Republic**
**Government-run Educational Institution of Higher Professional Education**
**Kyrgyz-Russian Slavic University**
**Institute of Clinical Medicine and Biomedical Technologies**

**ENDORSED BY**
**the Director, Assoc. Prof. Abilova S.S.**

# Medical informatics

Course Outline (Module)

| | |
|---|---|
| Assigned to the department of | **Physics, Medical Informatics and Biology** |
| Academic Curriculum | 560001 – KR General Medicine (for foreign students) |
| Qualification | **Specialist** |
| Mode of Study | **Intramural** |
| Total Credit Value | 3 credit point |
| Course Hours | 90 |
| Semesters: | |
| including: | |
| in-class learning | 36 |
| individual work | 53,7 |

cope of Testing

credit 3

**Course Hours Scheduling (per semester)**

| **Semester Academic Year** | **3(2.1)** | | **Total** | |
|---|---|---|---|---|
| Weeks | 18 | | | |
| Type of Training | EP | WP | EP | WP |
| Practical Session | 36 | 36 | 36 | 36 |
| Face-to-face Learning during the period of theoretical training | 0,3 | 0,3 | 0,3 | 0,3 |
| Including interactive | 4 | 4 | 4 | 4 |
| Total in class Session | 36 | 36 | 36 | 36 |
| Face-to-face Learning | 36,3 | 36,3 | 36,3 | 36,3 |
| Individual work | 53,7 | 53,7 | 53,7 | 53,7 |
| Total | 90 | 90 | 90 | 90 |

**The Course outline developed by:**
*Kurmanbakeev Iu. M.* _____,
*candidate of physical and mathematical sciences Kondrateva E. I.*_____

**Reviewers:**

*Doctor of medical sciences, professor, Institute of Mountain Physiology and Medicine of the National Academy of Sciences Kyrgyz Republic chief researcher Shanazarov A. S.*_____

*Candidate of biological sciences, associated professor of the department of Department of Physics, Medical Informatics and Biology Sorokin A. A.* _____

The Course Outline
**Medical informatics**

in accordance with Academic Curriculum:
Specialty 560001 - KR – General Medicine (for foreign students)
confirmed by KRSU board of academics in 26.06.2026 y. record № 11

The Course Outline endorsed by
**Physics, Medical Informatics and Biology Department Meeting**

Record of 26.08.2026 y. № 1
Valid for: 2026-2031 academic years
The Head of Department,
candidate of physical and mathematical sciences Kondrateva E. I. _____

Approved by the HEP: _____

# AMENDMENT REGISTRATION SHEET
# to the Course Outline (Module)

## Medical informatics

| No. item | Basis for introducing the amendment | Section / item | Content of amendment |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |

## 1. COURSE OUTLINE OBJECTIVES

1.1 To provide students with a basic understanding of computer science, personal computer architecture, operating systems, file systems, and the principles of storing, processing, and presenting digital information.
1.2 To develop practical skills in using Microsoft Word, PowerPoint, and Excel for educational and professional medical tasks, and to introduce databases, health information systems, electronic health records, interoperability standards, information security, responsible use of AI tools, and basic rule-based clinical decision support.

## 2. PLACE OF THE COURSE IN THE EDUCATIONAL PROGRAM

| | |
|---|---|
| Educational Program Unit: | Б1.О.02 |
| **2.1** | **Students' Preliminary Training Requirements:**<br>General secondary education; basic medical terminology; elementary skills in using a computer or mobile device are desirable but not mandatory. |
| **2.2** | **Course Units and Practical Sessions for which this course (module) is required as a prerequisite:**<br>Evidence-Based Medicine; Epidemiology; Clinical Pharmacology; and clinical disciplines in which students work with electronic medical information, data, and digital educational resources. |

## 3. STUDENTS' COMPETENCIES RESULTING FROM THE COURSE UNIT (MODULE)

**GC-3: Able to independently acquire new knowledge and apply it in practice using modern information technologies in professional activities.**

| | |
|---|---|
| **Know:** | |
| Level 1 | Basic principles of computer hardware and software, operating systems, file systems, and common file formats. |
| Level 2 | Basic principles of working with office applications, databases, electronic health records, and medical information systems |
| Level 3 | Principles of organization, processing, exchange, and protection of medical information; basic concepts of clinical decision support systems and medical data standards. |
| **Ability:** | |
| Level 1 | To perform basic operations with files and folders and use standard computer applications for entering, editing, storing, and presenting information |
| Level 2 | To create and format medical and academic documents, presentations, tables, charts, and structured datasets using Microsoft Word, PowerPoint, and Excel |
| Level 3 | To apply information technologies to solve basic professional medical tasks, including processing medical data and implementing simple rule-based clinical decision support models |
| **Skills:** | |
| Level 1 | Skills in working with a personal computer, operating system, file system, and standard office software |
| Level 2 | Skills in creating, organizing, processing, visualizing, and presenting medical and educational information using modern information technologies |
| Level 3 | Skills in independent acquisition and practical application of digital tools for working with medical information, databases, health information systems, and basic clinical decision support tasks |

**Final Students' Competences**

| | |
|---|---|
| **3.1** | **Know:**<br>• basic principles of computer hardware, operating systems, file systems, and common file formats;<br>• principles and purposes of Word, PowerPoint, and Excel in educational and professional work;<br>• basic concepts of databases, EHR, hospital information systems, LIS/RIS, PACS, HL7/FHIR/DICOM, information security, and clinical decision support systems. |
| **3.2** | **Ability:**<br>• organize files and digital information and create properly formatted academic and medical documents;<br>• create presentations and structured spreadsheets, use formulas, sorting, filtering, charts, and PivotTables/PivotCharts;<br>• apply logical functions to medical examples and build a simple rule-based clinical decision support model using synthetic or anonymized data. |
| **3.3** | **Skills:**<br>• practical work with desktop and mobile office applications;<br>• independent search, organization, processing, visualization, and presentation of medical and educational information;<br>• responsible use of digital and AI tools with verification of information, protection of confidential data, and appropriate interpretation of results. |

## 4. COURSE (MODULE) STRUCTURE AND CONTENT

| Class Code | Subject Name /Type of Class/ | Semester / Academic Year | Hours | Competencies | Literature | Interactive | Pr. prep. | Notes |
|---|---|---|---|---|---|---|---|---|
| | **Subject 1. Working with word processor MS Word. Creating presentations in PowerPoint.** | | | | | | | |
| 1.1 | Microsoft Word. Text Entry and Formatting. /Pr/ | 4 | 2 | GC-3 | E1 | 0 | 0 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1.2 | Microsoft Word. Working with Tables. Creating a Medical Certificate Form. /Pr/ | 4 | 2 | GC-3 | E1 | 0 | 0 | |
| 1.3 | Microsoft Word. Preparing an Abstract on a Selected Disease Using AI Tools. /Pr/ | 4 | 2 | GC-3 | E1, E4 | 2 | 0 | Interactive workshop: AI-assisted drafting, source checking, and academic integrity. |
| 1.4 | Microsoft Word. Formatting an Academic Paper: Title Page, Table of Contents, Page Numbering, etc. /Pr/ | 4 | 2 | GC-3 | E1 | 0 | 0 | |
| 1.5 | Completing Class Assignments Using the Mobile Version of Microsoft Word. /Iw/ | 4 | 10 | GC-3 | E1 | 0 | 0 | |
| 1.6 | Microsoft PowerPoint. Creating a Simple Presentation Based on an Abstract. /Pr/ | 4 | 2 | GC-3 | E1 | 0 | 0 | |
| 1.7 | Microsoft PowerPoint. Animation Effects: Entrance, Exit, and Emphasis. /Pr/ | 4 | 2 | GC-3 | E1 | 0 | 0 | |
| 1.8 | Microsoft PowerPoint. Motion Path Animations. /Pr/ | 4 | 2 | GC-3 | E1 | 0 | 0 | |
| 1.9 | Microsoft PowerPoint. Creating a Presentation Using AI Tools. /Pr/ | 4 | 2 | GC-3 | E1, E4 | 0 | 0 | |
| 1.10 | Completing Class Assignments Using the Mobile Version of Microsoft PowerPoint. /Iw/ | 4 | 10 | GC-3 | E1 | 0 | 0 | |
| | **Subject 2. Introduction to Medical Informatics. Databases and Health Information Systems. Microsoft Excel.** | | | | | | | |
| 2.1 | Microsoft Excel. Workbook Structure, Cell Referencing, Data Types, and Formulas. /Pr/ | 4 | 2 | GC-3 | E1 | 0 | 0 | |
| 2.2 | Microsoft Excel. Working with Large Datasets: Sorting, Filtering, and Data Management. /Pr/ | 4 | 4 | GC-3 | E1 | 0 | 0 | |
| 2.3 | Microsoft Excel. Chart Types and Data Visualization. /Pr/ | 4 | 2 | GC-3 | E1 | 0 | 0 | |
| 2.4 | Microsoft Excel. PivotTables and PivotCharts. /Pr/ | 4 | 2 | GC-3 | E1 | 0 | 0 | |
| 2.5 | Microsoft Excel. Logical Functions and Conditional Expressions. /Pr/ | 4 | 2 | GC-3 | E1 | 0 | 0 | |
| 2.6 | Microsoft Excel. Simulation of a Rule-Based Clinical Decision Support System. /Pr/ | 4 | 4 | GC-3 | L1.2, E1 | 2 | 0 | Case-based simulation using synthetic or anonymized medical data. |
| 2.7 | Completing Class Assignments Using the Mobile Version of Microsoft Excel. /Iw/ | 4 | 16 | GC-3 | E1 | 0 | 0 | |
| | **Subject 3. Introduction to computer science. Introduction to Medical Informatics. Databases and Health Information Systems.** | | | | | | | |
| 3.1 | Basic Structure of a Personal Computer. Main Components of a Personal Computer: CPU, RAM, Motherboard, Storage Devices, and Peripheral Devices. Input and Output Devices. /Iw/ | 4 | 4 | GC-3 | L1.1 | 0 | 0 | |
| 3.2 | Operating Systems: Functions and Basic Principles. Files, Folders, Directories, and File Paths. File Extensions and Common File Formats. File Systems: FAT32, exFAT, and NTFS. /Iw/ | 4 | 6 | GC-3 | L1.1 | 0 | 0 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 3.3 | Databases and Database Management Systems. Electronic Health Records (EHR). Hospital Information Systems. Laboratory and Radiology Information Systems. PACS. Medical Data Exchange Standards: HL7, FHIR, and DICOM. Information Security. Clinical Decision Support Systems. /Iw/ | 4 | 11,7 | GC-3 | L1.2, L1.3, E2, E3 | 0 | 0 | |

## 5. ASSESSMENT FUND

### 5.1. Advancement Questions and Assignments

**Questions for checking the level of KNOWLEDGE:**

• Structure and main components of a personal computer; input, output, and storage devices.
• Functions of operating systems; files, folders, paths, extensions, and common file systems.
• Basic functions of Microsoft Word and principles of formatting academic and medical documents.
• Basic principles of creating effective presentations in Microsoft PowerPoint, including animation.
• Databases and DBMS; EHR; hospital, laboratory, and radiology information systems; PACS.
• Purpose of HL7, FHIR, and DICOM; basic principles of interoperability and information security.
• Workbook structure, cell referencing, data types, formulas, sorting, filtering, charts, PivotTables/PivotCharts, and logical functions in Microsoft Excel.
• Basic principles of rule-based clinical decision support systems.

**Assignments for checking the level of ABILITY and SKILLS:**

• Create and format an academic/medical document and a medical certificate form in Word.
• Prepare a short evidence-based abstract and a presentation on a selected disease; AI tools may be used under instructor guidance with mandatory verification of information and sources.
• Create and manage a structured Excel dataset; apply formulas, sorting, filtering, charts, PivotTables/PivotCharts, and logical functions.
• Build and explain a simple rule-based clinical decision support model in Excel using synthetic or anonymized data.

### 5.2. Course Papers Themes (Projects)

The discipline does not include a course paper or course project.

### 5.3. Assessment Fund

**INTEGRATED SITUATIONAL ASSIGNMENT**

The student selects a common disease and prepares an electronic learning package without using identifiable patient data:
1. Microsoft Word: a properly formatted abstract (1–2 pages) with title, structured text, a table or medical certificate form, and a list of reliable sources.
2. Microsoft PowerPoint: a 7–10 slide presentation based on the abstract, with appropriate visual material and consistent design.
3. Microsoft Excel: a dataset of at least 20 synthetic patients and 8–12 variables; sorting/filtering; at least one chart; one PivotTable or PivotChart; and logical formulas.
4. Clinical decision support simulation: at least three transparent decision rules implemented with IF/AND/OR and, where appropriate, conditional formatting.
5. The student briefly explains how databases, EHR/HIS, interoperability standards, and information security relate to the completed work.

**Assessment criteria (100%):**

• correctness and completeness of content – 30%; technical execution in Word/PowerPoint/Excel – 30%; data organization and visualization – 20%; CDSS logic and interpretation – 10%; independent work, source verification, and information security – 10%.

### 5.4. List of Assessment Tools

**Assessment tools:**

Practical assignments; independent work; oral questioning; testing; integrated situational assignment; graded credit.

**General evaluation scale:**

85–100% – excellent: confident knowledge and independent, accurate application of digital tools; 70–84% – good: generally correct performance with minor errors; 60–69% – satisfactory: basic knowledge and performance with significant instructor support; below 60% – unsatisfactory: learning outcomes are not demonstrated.

For practical work, assessment considers task completion, correctness of operations, quality of formatting/visualization, interpretation of results, and compliance with information security and academic integrity requirements.

## 6. COURSE (MODULE) METHODOLOGICAL AND INFORMATIONAL SUPPORT

### 6.1. Recommended Reading

**Required open-access literature:**

L1.1 Franchitti J.-C. Introduction to Computer Science. Houston, TX: OpenStax; 2024. Open access: https://openstax.org/books/introduction-computer-science/pages/1-introduction
L1.2 Winter A., Ammenwerth E., Haux R., Marschollek M., Steiner B., Jahn F. Health Information Systems: Technological and Management Perspectives. 3rd ed. Cham: Springer; 2023. Open access: https://www.ncbi.nlm.nih.gov/books/NBK602586/
L1.3 World Health Organization; International Telecommunication Union. Digital Health Platform Handbook: Building a Digital Information Infrastructure (Infostructure) for Health. Geneva: WHO/ITU; 2020. Open access: https://www.who.int/publications/i/item/9789240013728

**Online resources:**

E1 Microsoft Support. Microsoft 365 Help & Learning: Word, PowerPoint, Excel, and mobile applications. https://support.microsoft.com/microsoft-365/
E2 HL7 International. FHIR Specification, Release 5. https://hl7.org/fhir/
E3 DICOM Standards Committee. DICOM Standard. https://www.dicomstandard.org/
E4 Miao F., Holmes W. Guidance for Generative AI in Education and Research. UNESCO; 2023. https://www.unesco.org/en/articles/guidance-generative-ai-education-and-research

### 6.3. List of Information and Educational Technologies

**6.3.1 Competence-based Educational Technologies**

Practical computer-based exercises; case-based and problem-based tasks; independent work with open educational resources; guided use of desktop and mobile versions of Microsoft Office; interactive workshops; creation of educational documents and presentations; work with structured medical datasets; and simulation of a rule-based clinical decision support system.

Generative AI may be used as an auxiliary learning tool for drafting and idea generation. Students are required to verify factual information, use reliable sources, disclose AI assistance when requested by the instructor, and never enter identifiable patient information into public AI services.

**6.3.2 List of Information Reference Systems and Software**

Microsoft Word, Microsoft PowerPoint, Microsoft Excel (desktop, web, and/or mobile versions); Microsoft Windows or another operating system providing equivalent file-management functions; modern web browser; Internet access; access to Microsoft Support/learning resources; HL7 FHIR and DICOM online specifications; open-access NCBI Bookshelf and WHO resources. A generative AI assistant may be used for designated assignments under instructor guidance.

## 7. COURSE (MODULE) LOGISTICS

7.1 Computer classroom equipped for practical sessions and independent work, with Internet access.
7.2 Personal computers or laptops with current office software (Word, PowerPoint, Excel) and a web browser.
7.3 Multimedia equipment: instructor computer/laptop, projector or interactive display, and screen.
7.4 Wi-Fi or other Internet access supporting work with mobile versions of office applications and open educational resources.
7.5 Marker board and/or multimedia board.

## 8. COURSE (MODULE) PROFICIENCY METHODICAL GUIDELINES (FOR STUDENTS)

Methodical recommendations for independent work in the discipline “Medical Informatics”.
Independent study is intended to consolidate practical skills, develop digital literacy, and support the independent acquisition and application of new knowledge in accordance with GC-3.
Students should:
• study the recommended open-access literature and official online resources before or after the corresponding practical class;
• complete independent topics on computer hardware, operating systems, file systems, databases, EHR/HIS, LIS/RIS, PACS, interoperability standards, information security, and clinical decision support;
• complete practical assignments in Word, PowerPoint, and Excel, including assignments in mobile versions where specified;
• use clear file names and folder structures, keep backup copies, and submit files in the format required by the instructor;
• when using AI tools, verify generated information against authoritative sources, correct errors, and comply with academic integrity requirements;
• use only synthetic, anonymized, or instructor-provided medical data in spreadsheets and CDSS simulations; identifiable patient information must not be entered into public cloud or AI services;
• understand that the Excel CDSS exercise is an educational simulation of transparent rule-based decision support and must not be used for real clinical decisions.
Preparation for assessment includes review of theoretical concepts, repeated completion of practical tasks, and the ability to explain the purpose of each operation and interpret the resulting output.

*Attachment 3*

**The planning sheet of medical informatics**

| Title of module according to WPD | Type of control | Forms of control | Minimal credit points | Maximal credit points | Week of control |
|---|---|---|---|---|---|
| **Module 1** | | | | | |
| Module 1. Creation of medical file in SPSS program. Descriptive statistic of biomedical information. | Formative assessment | Activity, attendance, lecture notes, performance and presentation of lab works, individual work with tables, discussion of situational tasks | 11 | 21 | 6 |
| | Midterm examination | Evaluation test | 6 | 9 | |
| **Module 2** | | | | | |
| Module 2. Comparison of averages. | Formative assessment | Activity, attendance, lecture notes, performance and presentation of lab works, individual work with tables, discussion of situational tasks, writing of reports | 4 | 8 | 11 |
| | Midterm examination | Evaluation test | 8 | 12 | |
| **Module 3** | | | | | |
| Module 3. Correlation coefficient and regression. | Formative assessment | Activity, attendance, lecture notes, performance and presentation of lab works, individual work with tables, discussion of situational tasks, reports | 3 | 6 | 16 |
| | Midterm examination | Tests | 8 | 14 | |
| Total | | | 40 | 70 | 18 |
| Midpoint assessment | | | 20 | 30 | |
| Summative assessment | | | 60 | 100 | |