NAVOI STATE UNIVERSITY

TAT11208-1.09 INFORMATION TECHNOLOGIES IN MEDICINE (PEDIATRICS) — COURSE SYLLABUS

Faculty of Mathematics & Informatics - 60910300 Pediatrics

COURSE PASSPORT & ACADEMIC METADATA

Course Title: Information Technologies in Medicine (TAT11208-1.09)

Course Type: Mandatory (Compulsory)

Field of Study: 900000 Healthcare & Social Security

Program: 60910300 Pediatrics

Academic Year: 2025–2026

Semester: 2

Form of Education: Full-time

Language of Instruction: Uzbek

Total Workload: 120 Hours

Credits: 4 ECTS | Weekly Hours: 4 hrs/week

Assessment: Examination

Aligned UN SDGs: SDG 3 (Good Health and Well-Being), SDG 4 (Quality Education)





1. Course Description & SDG Integration

The Information Technologies in Medicine course for Pediatrics provides specialized training in medical informatics, electronic health record (EHR) management, pediatric health data processing, VR-based computational anatomy, telemedicine architectures, and cloud computing in clinical environments.

In alignment with SDG 3 (Good Health and Well-Being) and SDG 4 (Quality Education), the course enables future pediatric specialists to analyze biomedical data, utilize Python algorithms for physiological modeling, manage automated physician workstations, and secure patient record confidentialities.

2. Course Aims & Learning Outcomes

Course Aim: To provide solid theoretical foundation and hands-on digital skills in retrieving, processing, modeling, and securing pediatric and clinical health data using advanced software and telecommunication tools.

- Knowledge: Understand national healthcare digitalization policies in Uzbekistan, hardware/software specifications, medical multimedia systems, telemedicine frameworks, and health data security.
- Skills: Execute statistical pediatric data processing in MS Excel, build relational clinical databases in MS Access, program biomedical algorithms in Python, and utilize VR computational anatomy tools.
- Practical Competency: Use cloud platforms (Google Workspace, Dropbox) for collaborative health documentation, design pediatric medical forms, and implement electronic digital signatures (EDS).
- SDG Competencies: Leverage digital tools to enhance pediatric care delivery, diagnostic precision, and child healthcare administration (SDG 3).

3. Prerequisites

Prerequisites: Informatics and Information Technologies, Computer Hardware Systems, Basics of Computer Programming.

4. Course Structure & Workload Allocation

Activity Type	Semester 2 Hours	Total Hours Allocation
Lectures	12 Hours	12 Hours
Practical Classes	32 Hours	32 Hours
Laboratory Classes	16 Hours	16 Hours
Independent Study	60 Hours	60 Hours
Total Workload	120 Hours	120 Hours (4 ECTS)

5. Detailed Course Curriculum Outline

5.1 Lecture Syllabus Outline

• **L1: Healthcare Digitalization & Medical Informatics:** Digitalization of Uzbekistan's healthcare system. Role of computer hardware and software in solving clinical problems.

• **L2: Office Automation & Medical Data Analysis:** Office automation technologies in medical practice. Processing and statistical analysis of digital clinical data.

• **L3: Multimedia, Telemedicine & Information Security:** Graphic and animated clinical process modeling, telecommunication infrastructure, web-based medical resources, and cybersecurity.

• **L4: Modeling Medical Systems & Object-Oriented Programming:** Physical and mathematical modeling in healthcare, object-oriented programming concepts in medical software development.

• **L5: Digital Health Technologies & VR Computational Anatomy:** Historical milestones of digital medicine, VR-based computational anatomy, and pediatric mobile health applications.

• **L6: Cloud Computing & Collaborative Healthcare Systems:** Google, Dropbox, and Yandex cloud platforms, cloud-based medical document and dataset management.

5.2 Practical & Laboratory Outline

- Positional number systems, binary arithmetic, logic gates, and medical data encoding.
- Computer system architecture, primary hardware units, and auxiliary medical peripherals.
- Developing multimedia presentations and clinical animations in MS PowerPoint.
- Automated Physician Workstation: Building relational databases (forms, queries, reports) in MS Access.
- Statistical medical data processing and spreadsheet modeling in MS Excel.
- Simulating physiological processes and Python programming for clinical decision support.
- Exploring VR-based computational anatomy platforms and medical data visualization tools.
- Cloud services in healthcare: Collaborative clinical document and spreadsheet management in Google Workspace (Docs, Sheets).

5.3 Independent Study (Mustaqil Ta'lim) Topics

- Formulating and solving differential equations in biological and medical systems.
- Developing mathematical modeling methods for clinical diagnostic processes.
- Designing standardized clinical forms, medical certificates, and patient chart templates in MS Office.
- Database creation and statistical analysis of patient health datasets.
- Modern digital health technologies: Smart gadgets, Internet of Things (IoT), Wi-Fi 6 / 5G, and 3D printing in pediatrics.
- Virtual Reality (VR) components, concepts, and clinical simulation models.
- Cloud computing models and secure cloud storage architectures in health management.

6. Recommended Literature & Information Sources

- Bazarbayev M.I. et al. Information Technologies in Medicine. Sano-standart Publishing, Tashkent, 2018.
- Turakulov V.N., Isroilova L.S., Otaqulova D.R., Nuraliyeva P.E. Information Technologies in Medicine (Textbook). Navoiy, 2023.
- Carlo Combi, Elpida Keravnou, Yuval Shahar. Temporal Information Systems in Medicine. Springer Nature, 2010.
- Eyal Wirsansky. Applying Genetic Algorithms to Solve Real-World Deep Learning and AI Problems. Packt Publishing, 2020.