

University of Rijeka, Faculty of Medicine

## Curriculum 2023/2024

Compulsory course

# Medical Informatics

|                     |  |
|---------------------|--|
| Study program:      | <b>Medical Studies in English (R)</b>  |
| [Razina studija]:   | <b>Integrirani prijediplomski i diplomski sveučilišni studiji</b>              |
| Department:         | <b>Katedra za bioinformatika i razvoj djelatnika i studenata</b>               |
| Course coordinator: | <b>prof. dr. sc Bilić-Zulle Lidija, dipl. inž., specijalist med. biokemije</b> |
| Year of study:      | <b>2</b>   |
| ECTS:               | <b>1.50</b>  |
| Incentive ECTS:     | <b>0.00 (0.00%)</b>  |
| Foreign language:   | <b>Possibility of teaching in a foreign language</b>                           |

## Course information:

The course "Medical Informatics" is attended during the 2nd turn of the 2nd year of study of medicine, with a total duration of 20 school hours. Students are divided into 2 seminar groups for seminar classes. Each seminar group is in two training subgroups for practicals and has 10-14 students. Teaching is held in lecture halls of the faculty's main building and in the Computer Classroom (ground floor, left). Part of the seminar course is held for all students as demonstration lessons.

The student computer classroom is equipped with fifteen personal computers, and the practicals cover work with programs running in the Windows 7 operating environment. All computers are networked and connected to the Internet and equipped with headphones. During the practical each student is working independently on the computer.

### Course content:

Basic IT concepts, medical data management, theory and information processing and communication. Application of medical informatics procedures. Importance, organization and use of medical language, coding and classification. The structure and importance of electronic health records. Computer analysis of biological signals and medical images. The construction and use of medical databases and databases with biomedical scientific papers. Strategies of Management and Classification of Medical Knowledge. Evidence-Based Medicine. Health Information Systems in Primary and Hospital Health Care. Clinical decision support system and their use in treating patients and in acquiring, processing and displaying medical knowledge. The role and role of medical models, modeling and simulations. Safety and confidentiality of medical data.

### Assessment method:

Students are evaluated during each class at each seminar and practical unit. During the seminars, each student is assessed on the basis content from the textbooks and selected online content. Students prepare final seminar work on the given topics and present them in the lesson. The content, scope and knowledge of the topic of the final seminar, the presentation and the quality of the presentation are evaluated. The total number of score points for seminars is 20 points. Practicals are organized in 5 units. Accuracy and quality of the practical assignment are evaluated on each practical. Practical assignments are performed in the computer classroom and each student independently prepares assignments on the computer.

A maximum of 30 score points is achieved on the practicals.

The maximum number of score points achieved in class is 50.

## List of assigned reading:

1. Coiera E. Guide to health informatics. Boca Raton: Taylor & Francis Group, (3rd edition), 2015.

## List of optional reading:

1. Shortliffe EH, Perreault LE. Medical Informatics. New York - Tokyo: Springer, (2nd edition), 2001.
2. van Bommel JH, Musen MA. Handbook of Medical informatics. New York - Tokyo: Springer, 1997.
3. Degoulet P, Fieschi M. Introduction to clinical informatics. New York-Tokyo: Springer, 1997.
4. Warner HR, Sorenson DK, Bouhaddou O. Knowledge engineering in health informatics. New York-Tokyo: Springer, 1997.
5. Kern J, Petrovečki M, ur. Medicinska informatika. Medicinska naklada: Zagreb; 2009.

## Curriculum:

### Seminari list (with titles and explanation):

#### **S1. Introduction to Medical Informatics/Information system security**

Seminar 1 is an introductory course seminar. The students will receive basic information about the course, schedule, teaching and assessment. They are acquainted with the definition and emergence of informatics as a scientific discipline and medical informatics as its derivative. Students are familiarized with the structure and scope of the topics covered by the course.

The seminar in the field of Information systems security according to the instructions of the Ministry of Science, Education and Sports is an integral part of the course in the field of Information and Communication Sciences where students will be introduced to the content of the field.

**Learning Outcomes:** Define and describe the concept of information security. Describe the basic concepts of threat, vulnerability, attack, protective measure. Implement activities for the purpose of information systems data protection.

#### **S2. Structure of medical data**

**Learning Outcomes:** Understand the basic concepts that define the structure of medical data. Explain the purpose and use of non-medical data in medicine. Learn the basics of communication in computerized systems. Learn the structure and use of basic medical documents. Identify and list the basic standards and quality system in health care.

#### **S3. Basic Terms and Medical Classification**

**Learning outcomes:** Learn the meaning and application of basic IT concepts (information, knowledge, system, medical language, information theory, overwhelming, cybernetics). Understand classification systems and identify and define the most common medical classification (MKB-10, MKB-O, SNOMED, ATK, MeSH, DTS).

#### **S4/5. Application of information technology in medicine**

**Learning outcomes:** Learn and understand the basics of applying IT technology in medicine, especially in the field of collecting and processing biomedical signals, social network in medicine, modeling and simulation, telehealth and mobile health.

#### **S6. Final Considerations on Medical Informatics**

The seminar is interactive discussion, students and teacher are gathered together at the end of the course, guidance for further learning and development in the application of information technology in medicine are provided.

### Vježbe list (with titles and explanation):

#### **P1. Electronic health record in primary care**

**Learning Outcomes:** Students will get insight into program support for electronic health records management - Medicus.net (<http://www.mcs.hr/en/proizvodi-i-usluge/medicus.net/12>). Simple functions in Medicus.net network support for family medicine practitioners will be taught. Students will be able to create health records (anamnesis, referral, prescription, medical report) and browse the electronic health records (history of the disease, prescriptions, referrals, cases, diagnostic-therapeutic procedures (DTP)).

#### **P2. Medical Content and Network Communication**

**Learning Outcomes:** Students will understand basic concepts of online databases, understand the organization of scientific literature in medicine, will be able to independently search the Medical Subject Headings (MeSH) and the Medline bibliographic database through PubMed service (<https://www.ncbi.nlm.nih.gov/pubmed/>), and other online sources of trusted medical contents will be introduced.

#### **P3. Medical decision-making based on (scientific) evidence**

**Learning Outcomes:** Students will learn about evidence-based medicine and medical decision-making. They will be able to use UptoDate database - clinical decision support resource associated with improved outcomes. They will learn to set up clinical inquiries via online service under the PICO scheme (P - patient, problem or population, I - intervention, C - comparison, control or comparator, O - outcome).

#### **P4. Hospital Information System (HIS)**

**Learning Outcomes:** Students will learn the basic functionalities of HIS (medical, financial and business processes management), familiarize with application features and independently view patient guidance through HIS (electronic health records management, electronic ordering, electronic therapy) and e with the possibilities of integration with external applications (laboratory and radiological information systems).

#### **P5. Managing and displaying medical data - final practical**

**Learning Outcomes:** self-search Medline database using PubMed (using Thesaurus MeSH), and compile search results in Ms PowerPoint. Self-search of UpToDate database and compile results in in Ms Word's using text formatting instructions (inserting pages, editing font types and fonts, edges, edges, tables, images, literary lists, content editing).

#### **Student obligations:**

- regular attendance
- project work, presentation of seminar work

**Exam (exam taking, description of the written/oral/practical part of the exam, point distribution, grading criteria):**

**ECTS Grading System:**

Student grading will be conducted according to the current Ordinance on Studies of the University of Rijeka (approved by the Senate) and the Ordinance on Student Grading at the Faculty of Medicine in Rijeka (approved by the Faculty Council). Student work will be assessed and graded during the course and on the final exam. During the course, a student may achieve up to 50% of the grade, while at the final exam up to 50% of the grade. Students are graded according to the ECTS credit (A-E) and numeric (1-5) system. Students are obliged to attend all forms of teaching during the course and may be absent from 30% of the classes. If a student is absent for more than 30% of the classes, he will not receive a signature and will have to re-enter the course.

**I. Assessment and grading in class**

The student must collect at least 25 credits in order to gain access to the final exam. A student who collects less than 25 credits during class is classified as E (unsuccessful) meaning that he did not meet the criteria and must re-enroll the course.

The final exam is a written test, consisting of 25 questions. The number of exact answers on the exam is converted into the credits (shown in the table). The student passed the exam if he answered exactly 13 questions and more.

| Number of correct answers on the exam | Credits |
|---------------------------------------|---------|
| 13                                    | 0       |
| 13                                    | 26      |
| 14                                    | 28      |
| 15                                    | 30      |
| 16                                    | 32      |
| 17                                    | 34      |
| 18                                    | 36      |
| 19                                    | 38      |
| 20                                    | 40      |
| 21                                    | 42      |
| 22                                    | 44      |
| 23                                    | 46      |

|    |    |
|----|----|
| 24 | 48 |
| 25 | 50 |

The marks awarded on the exam are summed up with the points earned in the class and the sum represents the total score.

| Grade               | Credits  |
|---------------------|----------|
| A (excellent, 5)    | 90-100   |
| B (very good, 4)    | 75-89,99 |
| C (good, 3)         | 60-74,99 |
| D (sufficient, 2)   | 50-59,99 |
| F (unsufficient, 1) | 0-49,99  |

**Other notes (related to the course) important for students:**

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## COURSE HOURS 2023/2024

### Medical Informatics

| <b>Vježbe</b><br>(Place and time or group)  | <b>Seminari</b><br>(Place and time or group)  |
|---|---|
| <b>21.11.2023</b>   |   |
|   | S1. Introduction to Medical Informatics/Information system security: <ul style="list-style-type: none"><li>• P01 (11:00 - 11:45) [217]<ul style="list-style-type: none"><li>◦ M-I</li></ul></li></ul>   |
| prof. dr. sc Bilić-Zulle Lidija, dipl. inž., specijalist med. biokemije [217]   |   |
| <b>22.11.2023</b>   |   |
| P1. Electronic health record in primary care: <ul style="list-style-type: none"><li>• P09 - NASTAVA NA ENGLESKOM JEZIKU (08:30 - 10:00) [216]<ul style="list-style-type: none"><li>◦ MI-P3</li></ul></li></ul>  |   |
| izv. prof. dr. sc. Baždarić Ksenija, dipl. psih. - prof. [216]  |   |
| <b>23.11.2023</b>   |   |
| P1. Electronic health record in primary care: <ul style="list-style-type: none"><li>• P09 - NASTAVA NA ENGLESKOM JEZIKU (08:30 - 10:00) [216]<ul style="list-style-type: none"><li>◦ MI-P2</li></ul></li><li>• P09 - NASTAVA NA ENGLESKOM JEZIKU (12:00 - 13:30) [216]<ul style="list-style-type: none"><li>◦ MI-P1</li></ul></li></ul> |   |
| izv. prof. dr. sc. Baždarić Ksenija, dipl. psih. - prof. [216]  |   |
| <b>27.11.2023</b>   |   |
|   | S2. Structure of medical data: <ul style="list-style-type: none"><li>• ONLINE (11:00 - 12:30) [217]<ul style="list-style-type: none"><li>◦ MI-S2</li></ul></li></ul>  |
| prof. dr. sc Bilić-Zulle Lidija, dipl. inž., specijalist med. biokemije [217]   |   |
| <b>30.11.2023</b>   |   |
|   | S2. Structure of medical data: <ul style="list-style-type: none"><li>• ONLINE (12:00 - 13:30) [217]<ul style="list-style-type: none"><li>◦ MI-S1</li></ul></li></ul>  |
| prof. dr. sc Bilić-Zulle Lidija, dipl. inž., specijalist med. biokemije [217]   |   |
| <b>11.12.2023</b>   |   |
|   | S3. Basic Terms and Medical Classification: <ul style="list-style-type: none"><li>• ONLINE (08:00 - 09:30) [217]<ul style="list-style-type: none"><li>◦ MI-S1</li></ul></li><li>• ONLINE (11:00 - 12:30) [217]<ul style="list-style-type: none"><li>◦ MI-S2</li></ul></li></ul> |
| prof. dr. sc Bilić-Zulle Lidija, dipl. inž., specijalist med. biokemije [217]   |   |
| <b>12.12.2023</b>   |   |

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|---|---|
| <p>P2. Medical Content and Network Communication:</p> <ul style="list-style-type: none"> <li>• P09 - NASTAVA NA ENGLESKOM JEZIKU (08:00 - 09:30) [215] <ul style="list-style-type: none"> <li>◦ MI-P3</li> </ul> </li> </ul>  |   |
| <p>doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]</p>  |   |
| <p><b>13.12.2023</b></p>  |   |
| <p>P2. Medical Content and Network Communication:</p> <ul style="list-style-type: none"> <li>• P09 - NASTAVA NA ENGLESKOM JEZIKU (08:00 - 09:30) [215] <ul style="list-style-type: none"> <li>◦ MI-P2</li> </ul> </li> </ul>  |   |
| <p>doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]</p>  |   |
| <p><b>14.12.2023</b></p>  |   |
| <p>P2. Medical Content and Network Communication:</p> <ul style="list-style-type: none"> <li>• P09 - NASTAVA NA ENGLESKOM JEZIKU (09:30 - 11:00) [215] <ul style="list-style-type: none"> <li>◦ MI-P1</li> </ul> </li> </ul>  |   |
| <p>doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]</p>  |   |
| <p><b>19.12.2023</b></p>  |   |
| <p>P3. Medical decision-making based on (scientific) evidence:</p> <ul style="list-style-type: none"> <li>• ONLINE (08:30 - 10:00) [215] <ul style="list-style-type: none"> <li>◦ MI-P1</li> </ul> </li> <li>• ONLINE (10:00 - 11:30) [215] <ul style="list-style-type: none"> <li>◦ MI-P2</li> </ul> </li> </ul> |   |
| <p>doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]</p>  |   |
| <p><b>20.12.2023</b></p>  |   |
| <p>P3. Medical decision-making based on (scientific) evidence:</p> <ul style="list-style-type: none"> <li>• ONLINE (09:00 - 10:30) [215] <ul style="list-style-type: none"> <li>◦ MI-P3</li> </ul> </li> </ul>  |   |
| <p>doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]</p>  |   |
| <p><b>10.01.2024</b></p>  |   |
|   | <p>S4/5. Application of information technology in medicine:</p> <ul style="list-style-type: none"> <li>• ONLINE (13:00 - 16:00) [216] <ul style="list-style-type: none"> <li>◦ MI-S2</li> </ul> </li> </ul> |
| <p>izv. prof. dr. sc. Baždarić Ksenija, dipl. psih. - prof. [216]</p>   |   |
| <p><b>11.01.2024</b></p>  |   |
|   | <p>S4/5. Application of information technology in medicine:</p> <ul style="list-style-type: none"> <li>• ONLINE (12:00 - 15:00) [216] <ul style="list-style-type: none"> <li>◦ MI-S1</li> </ul> </li> </ul> |
| <p>izv. prof. dr. sc. Baždarić Ksenija, dipl. psih. - prof. [216]</p>   |   |
| <p><b>15.01.2024</b></p>  |   |



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|--|---|
| P4. Hospital Information System (HIS):   |   |
| <ul style="list-style-type: none"> <li>• KBC Rijeka (10:00 - 11:30) [218] <ul style="list-style-type: none"> <li>◦ MI-P2</li> </ul> </li> <li>• KBC Rijeka (11:30 - 13:00) [218] <ul style="list-style-type: none"> <li>◦ MI-P3</li> </ul> </li> </ul>   |   |
| naslovna asistentica Šupak Smolčić Vesna, mag. med. biochem. [218]   |   |
| <b>16.01.2024</b>  |   |
| P4. Hospital Information System (HIS):   |   |
| <ul style="list-style-type: none"> <li>• KBC Rijeka (09:00 - 10:30) [218] <ul style="list-style-type: none"> <li>◦ MI-P1</li> </ul> </li> </ul>  |   |
| naslovna asistentica Šupak Smolčić Vesna, mag. med. biochem. [218]   |   |
| <b>22.01.2024</b>  |   |
| P5. Managing and displaying medical data - final practical:  |   |
| <ul style="list-style-type: none"> <li>• P09 - NASTAVA NA ENGLESKOM JEZIKU (11:30 - 13:00) [215] <ul style="list-style-type: none"> <li>◦ MI-P3</li> </ul> </li> </ul>   |   |
| doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]  |   |
| <b>23.01.2024</b>  |   |
| P5. Managing and displaying medical data - final practical:  |   |
| <ul style="list-style-type: none"> <li>• P09 - NASTAVA NA ENGLESKOM JEZIKU (09:30 - 11:00) [215] <ul style="list-style-type: none"> <li>◦ MI-P1</li> </ul> </li> <li>• P09 - NASTAVA NA ENGLESKOM JEZIKU (11:00 - 12:30) [215] <ul style="list-style-type: none"> <li>◦ MI-P2</li> </ul> </li> </ul> |   |
| doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]  |   |
| <b>26.01.2024</b>  |   |
|  | S6. Final Considerations on Medical Informatics: <ul style="list-style-type: none"> <li>• P01 (10:00 - 10:45) [217] <ul style="list-style-type: none"> <li>◦ M-I</li> </ul> </li> </ul> |
| prof. dr. sc Bilić-Zulle Lidija, dipl. inž., specijalist med. biokemije [217]  |   |

### List of lectures, seminars and practicals:

| VJEŽBE (TOPIC)   | Number of hours | Location                          |
|--|-----------------|-----------------------------------|
| P1. Electronic health record in primary care               | 2               | P09 - NASTAVA NA ENGLESKOM JEZIKU |
| P2. Medical Content and Network Communication              | 2               | P09 - NASTAVA NA ENGLESKOM JEZIKU |
| P3. Medical decision-making based on (scientific) evidence | 2               | ONLINE                            |
| P4. Hospital Information System (HIS)                      | 2               | KBC Rijeka                        |
| P5. Managing and displaying medical data - final practical | 2               | P09 - NASTAVA NA ENGLESKOM JEZIKU |
| SEMINARI (TOPIC)   | Number of hours | Location                          |

|   |   |        |
|---|---|--------|
| S1. Introduction to Medical Informatics/Information system security | 1 | P01    |
| S2. Structure of medical data                                       | 2 | ONLINE |
| S3. Basic Terms and Medical Classification                          | 2 | ONLINE |
| S4/5. Application of information technology in medicine             | 4 | ONLINE |
| S6. Final Considerations on Medical Informatics                     | 1 | P01    |

**EXAM DATES (final exam):**

|    |             |
|----|-------------|
| 1. | 29.01.2024. |
| 2. | 12.02.2024. |
| 3. | 09.07.2024. |
| 4. | 05.09.2024. |
| 5. | 19.09.2024. |