[Medicinski fakultet u Rijeci]

Curriculum
2024/2025

[Za kolegij]

Medical Informatics

Study program:	**Medical Studies in English (R)** [Sveučilišni integrirani prijediplomski i diplomski studij]
Department:	**[Katedra za biomedicinsku informatiku]**
Course coordinator:	**prof. dr. sc Bilić-Zulle Lidija, dipl. inž., specijalist med. biokemije**
Year of study:	**2**
ECTS:	**1.5**
Incentive ECTS:	**0 (0.00%)**
Foreign language:	**Possibility of teaching in a foreign language**

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 28 points. Practicals are organized in 5 units. Accuracy and quality of the practical assignment are evaluated on each practical. Practicals are performed in the computer classroom and each student independently prepares assignments on the computer. A maximum of 42 score points is achieved on the practicals.
The maximum number of score points achieved in class is 70.

Student Assessment method

	Topics	**Credits**
S1	Introduction to Medical Informatics Information system security	-
S2	Structure of medical data	2+3
S3	Basic concepts and medical classifications	2+3
S4/5	Application of information technology in medicine, student presentations	18
P1	Electronic health record in primary care	3
P2	Medical content and network communication	3

	Topics	Credits
P3	Evidence-based medical decision making	3
P4	Hospital Information System (HIS)	3
P5	Final exercise	30
S6	Concluding Considerations on Medical Informatics	-
Total score:		70

List of assigned reading:

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

List of optional reading:

1. Shortlife EH, Perreault LE. Medical Informatics. New York - Tokyo: Springer, (2nd edition), 2001.
2. van Bemmel 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

Students will get insight into program support for electronic health records management on the example of a software solution 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 tought. 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

Students will understand basic concepts of online databases as well as the basics of computer knowledge related to faster and more efficient computer work, 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 wil be introduced.

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

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). They will compare the answers to clinical queries of evidence-based medicine

databases and artificial intelligence tools.

P4. Hospital Information System (HIS)

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. Final practical

Self-search Medline database using PubMed (using Thesaurus MeSH), find answers to clinical questions using databases of evidence-based medicine as well as artificial intelligence tools, and format the search results in the selected data presentation tool. 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 70% of the grade, while at the final exam up to 30% 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

Assessment method:

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The maximum number of score points achieved in class is 70.

	Topics	**Credits**
S1	Introduction to Medical Informatics Information system security	-
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S3	Basic concepts and medical classifications	2+3
S4/5	Application of information technology in medicine, student presentations	18
P1	Electronic health record in primary care	3
P2	Medical content and network communication	3
P3	Evidence-based medical decision making	3
P4	Hospital Information System (HIS)	3
P5	Final exercise	30

	Topics	Credits
S6	Concluding Considerations on Medical Informatics	-
Total score:		70

The student must collect at least 35 credits in order to gain access to the final exam. A student who collects less than 35 credits during class is classified as F (unsufficient) meaning that he did not meet the criteria and must re-enroll the course. The final exam is a written test, consisting of 30 questions. The student passed the exam if he answered exactly 15 questions or more.

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 2024/2025

Medical Informatics

[Vježbe] (Place and time or group)	**[Seminari]** (Place and time or group)
19.11.2024	
	S1. Introduction to Medical Informatics/Information system security: • [ONLINE] (11:00 - 11:45) [217] ○ M-I
prof. dr. sc Bilić-Zulle Lidija, dipl. inž., specijalist med. biokemije [217]	
20.11.2024	
P1. Electronic health record in primary care: • [P09 - NASTAVA NA ENGLESKOM JEZIKU] (08:30 - 10:00) [216] ○ MI-P3	
izv. prof. dr. sc. Baždarić Ksenija, dipl. psiholog [216]	
21.11.2024	

P1. Electronic health record in primary care:
• [P09 - NASTAVA NA ENGLESKOM JEZIKU] (08:30 - 10:00) [216]
  ○ MI-P1
• [P09 - NASTAVA NA ENGLESKOM JEZIKU] (12:00 - 13:30) [216]
  ○ MI-P2	

izv. prof. dr. sc. Baždarić Ksenija, dipl. psiholog [216]	
25.11.2024	
	S2. Structure of medical data: • [ONLINE] (11:00 - 12:30) [217] ○ MI-S2
prof. dr. sc Bilić-Zulle Lidija, dipl. inž., specijalist med. biokemije [217]	
03.12.2024	
	S2. Structure of medical data: • [ONLINE] (17:00 - 18:30) [217] ○ MI-S1
prof. dr. sc Bilić-Zulle Lidija, dipl. inž., specijalist med. biokemije [217]	
09.12.2024	

	S3. Basic Terms and Medical Classification:
	• [ONLINE] (08:00 - 09:30) [217]
	  ○ MI-S1
	• [ONLINE] (11:00 - 12:30) [217]
	  ○ MI-S2

prof. dr. sc Bilić-Zulle Lidija, dipl. inž., specijalist med. biokemije [217]	
10.12.2024	

P2. Medical Content and Network Communication: • [P09 - NASTAVA NA ENGLESKOM JEZIKU] (09:30 - 11:00) [215] ○ MI-P3	
doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]	
11.12.2024	
P2. Medical Content and Network Communication: • [P09 - NASTAVA NA ENGLESKOM JEZIKU] (08:00 - 09:30) [215] ○ MI-P2	
doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]	
12.12.2024	
P2. Medical Content and Network Communication: • [P03 - INFORMATIČKA UČIONICA] (09:30 - 11:00) [215] ○ MI-P1	
doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]	
17.12.2024	

P3. Medical decision-making based on (scientific) evidence:
• [ONLINE] (08:30 - 10:00) [215]
  ○ MI-P1
• [ONLINE] (10:00 - 11:30) [215]
  ○ MI-P2	

doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]	
18.12.2024	
P3. Medical decision-making based on (scientific) evidence: • [P09 - NASTAVA NA ENGLESKOM JEZIKU] (09:00 - 10:30) [215] ○ MI-P3	
doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]	
08.01.2025	
	S4/5. Application of information technology in medicine: • [P03 - INFORMATIČKA UČIONICA] (13:00 - 16:00) [215] ○ MI-S2
doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]	
09.01.2025	
	S4/5. Application of information technology in medicine: • [P09 - NASTAVA NA ENGLESKOM JEZIKU] (12:00 - 15:00) [215] ○ MI-S1
doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]	
13.01.2025	

P4. Hospital Information System (HIS):
• [P03 - INFORMATIČKA UČIONICA] (10:00 - 11:30) [218]
  ○ MI-P2
• [KBC Rijeka] (11:30 - 13:00) [218]
  ○ MI-P3	

asistentica Šupak Smolčić Vesna, mag. med. biochem. [218]	
14.01.2025	
P4. Hospital Information System (HIS): • [KBC Rijeka] (09:00 - 10:30) [218] ○ MI-P1	
asistentica Šupak Smolčić Vesna, mag. med. biochem. [218]	
20.01.2025	
P5. Final practical: • [P09 - NASTAVA NA ENGLESKOM JEZIKU] (11:30 - 13:00) [215] ○ MI-P3	
doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]	
21.01.2025	

P5. Final practical:
• [P09 - NASTAVA NA ENGLESKOM JEZIKU] (09:30 - 11:00) [215]
  ○ MI-P1
• [P09 - NASTAVA NA ENGLESKOM JEZIKU] (11:30 - 13:00) [215]
  ○ MI-P2	

doc. dr. sc. Gligora Marković Maja, prof. mat. i inf. [215]	
23.01.2025	
	S6. Final Considerations on Medical Informatics: • [P08] (08:00 - 08:45) [217] ○ M-I
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	[P03 - INFORMATIČKA UČIONICA] [P09 - NASTAVA NA ENGLESKOM JEZIKU]
P3. Medical decision-making based on (scientific) evidence	2	[ONLINE] [P09 - NASTAVA NA ENGLESKOM JEZIKU]
P4. Hospital Information System (HIS)	2	[KBC Rijeka] [P03 - INFORMATIČKA UČIONICA]
P5. Final practical	2	[P09 - NASTAVA NA ENGLESKOM JEZIKU]

[SEMINARI] (TOPIC)	Number of hours	Location
S1. Introduction to Medical Informatics/Information system security	1	[ONLINE]
S2. Structure of medical data	2	[ONLINE]
S3. Basic Terms and Medical Classification	2	[ONLINE]
S4/5. Application of information technology in medicine	4	[P03 - INFORMATIČKA UČIONICA] [P09 - NASTAVA NA ENGLESKOM JEZIKU]
S6. Final Considerations on Medical Informatics	1	[P08]

EXAM DATES (final exam):

1.	28.01.2025.
2.	10.02.2025.
3.	08.07.2025.
4.	04.09.2025.
5.	18.09.2025.