TELEMEDICINE

CLINICAL MEDICINE

FIFTH YEAR OF STUDIES

school year 2023/2024

Subject:

TELEMEDICINE

The subject is evaluated with 3 ECTS. There are 3 hours of active teaching per week (2 hours of lectures and 1 hour of work in a small group).

TEACHERS AND ASSOCIATES:

No	Name and surname	Email	title
1.	Natasa Zdravkovic	natasasilvester@gmail.com	Associate Professor
2.	Tomislav Nikolic	nikolic.s.tomislav@gmail.com	Assistant
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SUBJECT STRUCTURE:

Module	Module name	Duration (week)	Lectures per week	Practical lessons per week	Teacher-leader of the module
1	Introductory chapter	5	2	1	Prof. dr Natasa Zdravkovic
2	Innovations in medicine, large databases, data protection, computational intelligence, machine learning, neural networks, artificial intelligence, sensors and micro and nanotechnologies in medicine	5	2	1	Prof. dr Natasa Zdravkovic
3	Telemedicine, mobile and internet health, virtual and augmented reality, entrepreneurship and the future of digital and telemedicine	5	2	1	Prof. dr Natasa Zdravkovic
					∑ 15+15=30

EVALUATION:

ACTIVITY DURING THE LECTURES: In this way, the student can earn up to 30 points. In the last class of work in a small group, the student answers 2 exam questions from that week of classes and, in accordance with the demonstrated knowledge, gains 0-2 points. Attendance at lectures is mandatory.

FINAL TEST: In this way, the student solves a test with 35 questions where each question carries 2 points, and in this way the student can gain up to 70 points.

CONSULTATIVE TEACHING: Consultations can be scheduled with the subject head, prof. dr Nataša Zdravković (natasasilvester@gmail.com)

The final grade is formed as follows:

In order to pass the course, the student must obtain a minimum of 51 points and pass all modules.
To pass the module the student must:
1. obtain more than 50% points in that module
2. acquire more than 50% of the points provided for the activity in teaching in each module
3. pass the module test, i.e. have more than 50% correct answers.

the number of points earned	grade
0 - 50	**5**
51 - 60	**6**
61 - 70	**7**
71 - 80	**8**
81 - 90	**9**
91 - 100	**10**

LITERATURE:

the name of the textbook	authors	publisher	the library
The Elements of Statistical Learning	T. Hastie, R. Tibshirani, J. Friedman	Springer	Available
Commercialization of Nanotechnologies - A Case Study Approach	Brabazon D., Pellicer E., Zivic F., Sort J., Baró M.D., Grujovic N	Springer Nature	Available
All lectures are available on the website of the Faculty of Medical Sciences : www.medf.kg.ac.rs			

THE PROGRAM

TEACHING UNIT 1 (FIRST WEEK):

INTRODUCTION TO THE BASIC CONCEPTS OF DIGITAL AND TELEMEDICINE

lectures 2 hours

- Introducing the student to the basic concepts and principles of digital and telemedicine

The student should learn the following:

- The concept of digital medicine
- The concept of telemedicine
- Concept of ethics and practical implications of ethics in digital and telemedicine
- Basic concepts of digital medicine
- Basic principles of telemedicine

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practical teaching 1 hour

- Training students to use the basic principles and concepts of digital and telemedicine

The student should learn the following:

- The concept of digital medicine
- The concept of telemedicine
- Concept of ethics and practical implications of ethics in digital and telemedicine
- Basic concepts of digital medicine
- Basic principles of telemedicine

TEACHING UNIT 2 (SECOND WEEK):

COMPUTER LITERACY IN MEDICINE

lectures 2 hours

- Introducing students to the basics of computer literacy in medicine

The student should learn the following:

- Working with operating systems
- Basics of computer literacy in medicine
- Software and hardware in medicine
- Basic software programs (Word, Excel, PowerPoint)
- Basic hardware devices in medicine
- Using video conferencing tools
- Search and evaluation of information

practical teaching 1 hour

- Use of computers and the basics of computer literacy in medicine

The student should learn the following:

- Working with operating systems
- Basics of computer literacy in medicine
- Software and hardware in medicine
- Basic software programs (Word, Excel, PowerPoint)
- Basic hardware devices in medicine
- Using video conferencing tools
- Search and evaluation of information

TEACHING UNIT 3 (THIRD WEEK):

INNOVATIONS IN MEDICINE AND THEIR SIGNIFICANCE

lectures 2 hours

- Introducing students to the innovations in medicine and their importance

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The student should learn the following:

- Definition of innovations in medicine
- Different forms of innovations in medicine (technological, pharmaceutical, innovations in access and organization, innovations in research)
- The importance of innovation
- Challenges of innovation in medicine
- The concept of continuous learning

practical teaching 1 hour

- Training students with the innovations in medicine

The student should learn the following:

- Definition of innovations in medicine
- Different forms of innovations in medicine (technological, pharmaceutical, innovations in access and organization, innovations in research)
- The importance of innovation
- Challenges of innovation in medicine
- The concept of continuous learning

TEACHING UNIT 4 (FOURTH WEEK):

LARGE HEALTHCARE DATABASES

lectures 2 hours

- Introducing the student to the development and use of large databases in healthcare

The student should learn the following:

- Definition of large databases
- Types of data in large databases
- The importance of big data in healthcare
- Challenges related to large databases
- Ethics and regulatory aspects

practical teaching 1 hour

- Training the students to use large databases in healthcare

The student should learn the following:

- Definition of large databases
- Types of data in large databases
- The importance of big data in healthcare
- Challenges related to large databases
- Ethics and regulatory aspects

TEACHING UNIT 5 (FIFTH WEEK):

PROTECTION OF DIGITAL DATA AND ETHICS IN DIGITAL MEDICINE

lectures 2 hours

- Introducing the student to the basics of digital data protection and the basics of ethics in digital medicine

The student should learn the following:

- Getting to know the basics of digital data protection
- Introducing students to the basics of patient privacy
- Getting to know the basics of ethics in digital medicine

practical teaching 1 hour

- Introducing the student to the basics of digital data protection and the basics of ethics in digital medicine

The student should learn the following:

- Getting to know the basics of digital data protection
- Introducing students to the basics of patient privacy
- Getting to know the basics of ethics in digital medicine

TEACHING UNIT 6 (SIXTH WEEK):

COMPUTER INTELLIGENCE IN MEDICINE

lectures 2 hours

- Introducing the student to the basics of computer intelligence in medicine

The student should learn the following:

- Acquaintance with the definition of computational intelligence in medicine
- Getting to know the application of computer intelligence in medicine
- Introducing students to the advantages and disadvantages of computer intelligence
- Challenges and considerations for the use of computational intelligence in medicine

practical teaching 1 hour

- Training students for the correct use of computer intelligence in medicine

The student should learn the following:

- Acquaintance with the definition of computational intelligence in medicine
- Getting to know the application of computer intelligence in medicine
- Introducing students to the advantages and disadvantages of computer intelligence
- Challenges and considerations for the use of computational intelligence in medicine

TEACHING UNIT 7 (SEVENTH WEEK):

MACHINE LEARNING

lectures 2 hours

- Introducing the student to the basics of machine

practical teaching 1 hour

- Training the students in the basic use of machine

learning

The student should learn the following:

- Definition of machine learning in medicine
- Types of Machine Learning
- Applications of map learning in medicine
- Advantages of machine learning in medicine

learning

The student should learn the following:

- Definition of machine learning in medicine
- Types of Machine Learning
- Applications of map learning in medicine
- Advantages of machine learning in medicine
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TEACHING UNIT 8 (EIGHTH WEEK):

INTRODUCTION, DEFINITION AND APPLICATION OF NEURON NETWORKS

lectures 2 hours

- Introducing the student to the basics, definition and application of neural networks

The student should learn the following:

- Basic concepts of neural networks
- Structure of neural networks
- Types of neural networks
- Learning neural networks
- Applications of neural networks in medicine

practical teaching 1 hour

- Introducing the student to the basics, definition and application of neural networks

The student should learn the following:

- Basic concepts of neural networks
- Structure of neural networks
- Types of neural networks
- Learning neural networks
- Applications of neural networks in medicine

TEACHING UNIT 9 (NINTH WEEK):

ARTIFICIAL INTELLIGENCE IN MEDICINE

lectures 2 hours

- Introducing the student to artificial intelligence in medicine

The student should learn the following:

- Definition of artificial intelligence
- Applications of artificial intelligence in medicine (diagnostics, personalized medicine, prediction and monitoring, telemedicine, robotics)
- Artificial intelligence techniques
- Benefits and challenges of artificial intelligence in medicine

practical teaching 1 hour

- Training students for the correct use of artificial intelligence in medicine

The student should learn the following:

- Definition of artificial intelligence
- Applications of artificial intelligence in medicine (diagnostics, personalized medicine, prediction and monitoring, telemedicine, robotics)
- Artificial intelligence techniques
- Benefits and challenges of artificial intelligence in medicine

TEACHING UNIT 10 (TENTH WEEK):

MICRO AND NANOTECHNOLOGIES AND THEIR APPLICATION IN MEDICINE

lectures 2 hours

- Introducing students to the basics of micro and nanotechnology and their application in medicine

The student should learn the following:

- Definition of micro and nanotechnology
- Application of micro and nanotechnologies in medicine

practical teaching 1 hour

- Introducing students to the basics of micro and nanotechnology and their application in medicine

The student should learn the following:

- Definition of micro and nanotechnology
- Application of micro and nanotechnologies in medicine

TEACHING UNIT 11 (ELEVENTH WEEK):

USE OF SENSORS IN DIGITAL MEDICINE

lectures 2 hours

- Introducing the student to the basics of using sensors in digital medicine

The student should learn the following:

- Definition of sensors in medicine
- Types of sensors in digital medicine
- Applications of sensors in digital medicine
- Advantages of using sensors in medicine

practical teaching 1 hour

- Introducing the student to the basics of using sensors in digital medicine

The student should learn the following:

- Definition of sensors in medicine
- Types of sensors in digital medicine
- Applications of sensors in digital medicine
- Advantages of using sensors in medicine

TEACHING UNIT 12 (Twelfth Week):

TELEMEDICINE

lectures 2 hours

- Introducing the student to the basics of telemedicine

The student should learn the following:

- Definition of telemedicine
- Components of telemetry in medicine
- Application of telemetry in medicine
- Advantages of telemetry in medicine
- The challenges of telemedicine

practical teaching 1 hour

- Training students to use telemedicine

The student should learn the following:

- Definition of telemedicine
- Components of telemetry in medicine
- Application of telemetry in medicine
- Advantages of telemetry in medicine
- The challenges of telemedicine

TEACHING UNIT 13 (THIRTEEN WEEK):

MOBILE AND INTERNET HEALTH - mHealth and eHealth

lectures 2 hours

- Introducing the student to the basics of mobile and internet health

The student should learn the following:

- Definitions and basic concepts of mobile health
- Internet health definitions and terms
- Application of mobile and internet health (access to information, e-health records, mobile health applications, alerts and reminders)
- Advantages and disadvantages of mobile and internet health

practical teaching 1 hour

- Introducing the student to the basics of mobile and internet health

The student should learn the following:

- Definitions and basic concepts of mobile health
- Internet health definitions and terms
- Application of mobile and internet health (access to information, e-health records, mobile health applications, alerts and reminders)
- Advantages and disadvantages of mobile and internet health

TEACHING UNIT 14 (FOURTEENTH WEEK):

VIRTUAL AND AUGMENTED REALITY TECHNIQUES, VIRTUAL AND AUGMENTED REALITY APPLICATIONS IN MEDICINE AND REHABILITATION

lectures 2 hours

- Introducing students to virtual and augmented reality techniques, applications of virtual and

practical teaching 1 hour

- Introducing students to virtual and augmented reality techniques, applications of virtual and

augmented reality in medicine and rehabilitation

The student should learn the following:

- Virtual reality
- Augmented reality
- Applications of virtual and augmented reality in patient rehabilitation
- Advantages of using virtual and augmented reality in patient rehabilitation

augmented reality in medicine and rehabilitation

The student should learn the following:

- Virtual reality
- Augmented reality
- Applications of virtual and augmented reality in patient rehabilitation
- Advantages of using virtual and augmented reality in patient rehabilitation

TEACHING UNIT 15 (FIFTEENTH WEEK):

ENTREPRENEURSHIP IN DIGITAL MEDICINE AND THE FUTURE OF DIGITAL AND TELEMEDICINE

lectures 2 hours

- Introducing students to the basics of entrepreneurship in digital medicine and the future of digital and telemedicine

The student should learn the following:

- Entrepreneurship in digital medicine
- Key points of entrepreneurship in digital medicine
- The future of digital and telemedicine
- Challenges and opportunities of digital and telemedicine

practical teaching 1 hour

- Introducing students to the basics of entrepreneurship in digital medicine and the future of digital and telemedicine

The student should learn the following:

- Entrepreneurship in digital medicine
- Key points of entrepreneurship in digital medicine
- The future of digital and telemedicine
- Challenges and opportunities of digital and telemedicine

WEEKLY COURSE SCHEDULE

COURSE	TUESDAY
TELEMEDICINE (2+1)	**LECTURES AND SEMINAR** **11:10-12:50** **(H45)**

TEACHING SCHEDULE FOR THE SUBJECT OF TELEMEDICINE

module	week	type	name of method unit	teacher
1	**1**	**L**	Introduction to the basic concepts of digital and telemedicine	Prof. dr Natasa Zdravkovic
1	**1**	**P**	Training students to use the basic principles and concepts of digital and telemedicine	dr Stefan Simovic (x2) dr Zeljko Todorovic (x2) dr Rada Vucic (x2)
1	**2**	**L**	Computer literacy in medicine	Prof. dr Nebojsa Zdravkovic
1	**2**	**P**	Use of computers and the basics of computer literacy in medicine	prof. dr Nebojsa Zdravkovic doc. dr Vladislava Stojic Jelena Dimitrijevic (x2) Sara Mijailovic (x2)
1	**3**	**L**	Innovations in medicine and their importance	Prof. dr Natasa Zdravkovic
1	**3**	**P**	Training students with the innovations in medicine	dr Stefan Simovic (x2) dr Zeljko Todorovic (x2) dr Rada Vucic (x2)
1	**4**	**L**	Large databases in healthcare	Prof. dr Nebojsa Zdravkovic
1	**4**	**P**	Training the students to use large databases in healthcare	prof. dr Nebojsa Zdravkovic doc. dr Vladislava Stojic Jelena Dimitrijevic (x2) Sara Mijailovic (x2)
1	**5**	**L**	Digital data protection and ethics in digital medicine	Prof. dr Nebojsa Zdravkovic
1	**5**	**P**	Introducing the student to the basics of digital data protection and the basics of ethics in digital medicine	prof. dr Nebojsa Zdravkovic doc. dr Vladislava Stojic Jelena Dimitrijevic (x2) Sara Mijailovic (x2)
2	**6**	**L**	Computational intelligence in medicine	Prof. dr Nebojsa Zdravkovic

TEACHING SCHEDULE FOR THE SUBJECT OF TELEMEDICINE

module	week	type	name of method unit	teacher
2	**6**	**P**	Training students for the correct use of computer intelligence in medicine	prof. dr Nebojsa Zdravkovic doc. dr Vladislava Stojic Jelena Dimitrijevic (x2) Sara Mijailovic (x2)
2	**7**	**L**	Machine learning	Prof. dr Nebojsa Zdravkovic
2	**7**	**P**	Training the students in the basic use of machine learning	prof. dr Nebojsa Zdravkovic doc. dr Vladislava Stojic Jelena Dimitrijevic (x2) Sara Mijailovic (x2)
2	**8**	**L**	Introduction, definition and application of neural networks	Prof. dr Nebojsa Zdravković
2	**8**	**P**	Introducing the student to the basics, definition and application of neural networks	prof. dr Nebojsa Zdravkovic doc. dr Vladislava Stojic Jelena Dimitrijevic (x2) Sara Mijailovic (x2)
2	**9**	**L**	Artificial intelligence in the medicine	Prof. dr Nebojsa Zdravković
2	**9**	**P**	Training students for the correct use of artificial intelligence in medicine	prof. dr Nebojsa Zdravkovic doc. dr Vladislava Stojic Jelena Dimitrijevic (x2) Sara Mijailovic (x2)
2	**10**	**L**	Micro and nanotechnologies and their application in medicine	Prof. dr Nebojsa Zdravković
2	**10**	**P**	Introducing students to the basics of micro and nanotechnology and their application in medicine	prof. dr Nebojsa Zdravkovic doc. dr Vladislava Stojic Jelena Dimitrijevic (x2) Sara Mijailovic (x2)
3	**11**	**L**	Use of sensors in digital medicine	Prof. dr Nebojsa Zdravković

TEACHING SCHEDULE FOR THE SUBJECT OF TELEMEDICINE

module	week	type	name of method unit	teacher
3	**11**	**P**	Introducing the student to the basics of using sensors in digital medicine	prof. dr Nebojsa Zdravkovic doc. dr Vladislava Stojic Jelena Dimitrijevic (x2) Sara Mijailovic (x2)
3	**12**	**L**	Telemedicine	Doc. dr Rada Vucic
3	**12**	**P**	Training students to use telemedicine	dr Stefan Simovic (x2) dr Zeljko Todorovic (x2) dr Rada Vucic (x2)
3	**13**	**L**	Mobile and internet health - mHealth and eHealth	Prof. dr Natasa Zdravkovic
3	**13**	**P**	Introducing the student to the basics of mobile and internet health	dr Stefan Simovic (x2) dr Zeljko Todorovic (x2) dr Rada Vucic (x2)
3	**14**	**L**	Virtual and augmented reality techniques, virtual and augmented reality applications in medicine and rehabilitation	Doc. dr Vesna Grbovic
3	**14**	**P**	Introducing students to virtual and augmented reality techniques, applications of virtual and augmented reality in medicine and rehabilitation	doc. dr Vesna Grbovic (x2) dr Ana Divjak (x2) Jelena Milosevic (x2)
3	**15**	**L**	Entrepreneurship in digital medicine. The future of digital and telemedicine	Prof. dr Natasa Zdravkovic
3	**15**	**P**	Introducing students to the basics of entrepreneurship in digital medicine and the future of digital and telemedicine	dr Stefan Simovic (x2) dr Zeljko Todorovic (x2) dr Rada Vucic (x2)
		FT	**FINAL TEST**	
		E	**EXAM (january)**	