Faculty of Medicine in Rijeka

**Curriculum**
**2023/2024**

For course

# Robotics in Medicine

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|---|---|
| Study program: | **Medical Studies in English (R)** (elective)<br>University integrated undergraduate and graduate study |
| Department: | **Centre for Biomodeling and Innovations in Medicine** |
| Course coordinator: | **izv. prof. dr. sc. Maričić Sven** |
| Year of study: | **3** |
| ECTS: | **1.5** |
| Incentive ECTS: | **0 (0.00%)** |
| Foreign language: | **Possibility of teaching in a foreign language** |

## Course information:

Utilizing robotic systems in biomedicine and pharmaceutical manufacturing, along with the integration of cutting-edge information and communication technologies within the virtual space of preclinical environments. Acquainting students with a several robotic systems, providing an technology introduction to biotechnological applications and robotics laws. The structure and operational principles of robotic systems, developing skills in their use and navigating within virtual 3D space.

## List of assigned reading:

## List of optional reading:

## Curriculum:

**Seminars list (with titles and explanation):**

**Introduction to the course. A brief overview of robotics and technology.**

Basic terms and concepts of robotic systems in medicine. 3D space mapping.

**Coordinates, measurement units and their conversion.**

Use and navigation in coordinate space. Analysis and presentation of the used measurement units. Conversion.

**Parts of the robotic system.**

Structure of the robotic system. Principles and working principles. Control structure. Overview of standards and usage protocols.

**Application in biomedicine.**

Presentation and analysis of the application of robotics in biomedicine. Fundamentals of virtualization in a laboratory environment.

**Computer assistance**

- Computer development environments.
- Principles of operation.
- Overview of used solutions.
- Demonstration of the operation of a manipulative robotic arm with 4 degrees of freedom of movement (DoF).

**Computer assistance, continued.**

Application of artificial intelligence (AI). Presentation of different technological solutions. Planning and designing robotic systems in the biomedical field.

**The development trend of robotic systems.**

Overview and development guidelines. The future of robotics in medicine. Advanced forms of use - thought control.

## Student obligations:

Regular attendance of classes, writing of a seminar paper.

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

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

Uporaba robotskih sustava u biomedicini i proizvodnji lijekova. Razvoj informacijskih i komunikacijskih tehnologija virtualnog prostora u predkliničkom okruženju. Upoznavanje studenata s različitim robotskim sustavima. Upoznavanje s biotehnološkim smjernicama i zakonima robotike. Građa i načela rada robotskih sustava te vještine korištenja i snalaženje u 3D prostoru.

## COURSE HOURS 2023/2024

Robotics in Medicine

| **Seminars**<br>(Place and time or group) |
|---|
| **04.03.2024** |
| Introduction to the course. A brief overview of robotics and technology.:<br>• P08 (16:00 - 19:00) [1626]<br>  ○ RiM |
| izv. prof. dr. sc. Maričić Sven [1626] |
| **05.03.2024** |
| Coordinates, measurement units and their conversion.:<br>• P04 (16:00 - 18:15) [1626]<br>  ○ RiM |
| izv. prof. dr. sc. Maričić Sven [1626] |
| **11.03.2024** |
| Parts of the robotic system.:<br>• P04 (16:00 - 19:00) [1626]<br>  ○ RiM |
| izv. prof. dr. sc. Maričić Sven [1626] |
| **12.03.2024** |
| Application in biomedicine.:<br>• P04 (16:00 - 19:00) [1626]<br>  ○ RiM |
| izv. prof. dr. sc. Maričić Sven [1626] |
| **18.03.2024** |
| Computer assistance:<br>• P04 (16:00 - 19:00) [1626]<br>  ○ RiM |
| izv. prof. dr. sc. Maričić Sven [1626] |
| **19.03.2024** |
| Computer assistance, continued.:<br>• P04 (16:00 - 18:15) [1626]<br>  ○ RiM |
| izv. prof. dr. sc. Maričić Sven [1626] |
| **25.03.2024** |
| The development trend of robotic systems.:<br>• P04 (16:00 - 18:15) [1626]<br>  ○ RiM |
| izv. prof. dr. sc. Maričić Sven [1626] |

### List of lectures, seminars and practicals:

| SEMINARS (TOPIC) | Number of hours | Location |
|---|---|---|

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|---|---|---|
| Introduction to the course. A brief overview of robotics and technology. | 4 | P08 |
| Coordinates, measurement units and their conversion. | 3 | P04 |
| Parts of the robotic system. | 4 | P04 |
| Application in biomedicine. | 4 | P04 |
| Computer assistance | 4 | P04 |
| Computer assistance, continued. | 3 | P04 |
| The development trend of robotic systems. | 3 | P04 |

**EXAM DATES (final exam):**