SUPERVISOR/TEAM/ DECLARING/CONDUCTING COURSE: dr hab. Marta Kopaczyńska, Prof. ucz.
DEPARTMENT Biomedical Engineering

COURSE CARD

Course name in Polish: Badania mikroskopowe w inżynierii biomedycznej
Course name in English: Microscopic studies in biomedical engineering
Course language Polish / English*:

University-wide general course type*:
1) basic science course (mathematics, physics, chemistry, computer science or other): ……………………………………………………………………………
2) humanities course: ……………………………………………………………………………
3) management course: ……………………………………………………………………………
4) English language: ……………………………………………………………………………
5) didactics of higher education course: ………………………………………………………………………

Specialized courses for PhD students receiving education in discipline*: ……………………………………………………………………………
1) specialized course in discipline: ……………………………………………………………………………
2) interdisciplinary course in the field of several disciplines: biocybernetic and biomedical engineering……
3) seminar in discipline or interdisciplinary: ………………………………………………………

Subject code: FTP009003W………

* delete as applicable

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Foreign language course</th>
<th>Seminar</th>
<th>Mixed forms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of hours of organized classes in university (ZZU)</td>
<td>30</td>
<td>Exam</td>
<td>Exam, inspection, evaluation classes</td>
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<tr>
<td>Grading</td>
<td>Exam</td>
<td>Exam</td>
<td>Oral presentation</td>
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<tr>
<td>Number of ECTS points</td>
<td>3</td>
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PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of physics
2. Basic knowledge of medical imaging techniques

COURSE OBJECTIVES

C1 acquire knowledge of the techniques that are used in microscopic studies of biomaterials and tissues
C2 obtain basic knowledge of the structure and principles of the various microscopes used for imaging biomaterials and tissue
C3 Solving technical and design problems in the laboratory. Students obtain a knowledge about staining techniques used in nanoscopic measurement methods
## PROGRAM CONTENTS

### Form of classes – lecture (Lec) | Number of hours
--- | ---
Lec1 | An introduction to the newest examination methods of biological materials | 2
Lec2 | The application of measurement techniques in tissue engineering. | 2
Lec3 | The methods of stem cells characterization. | 2
Lec4 | The introduction to fluorescence microscopy - techniques of visualization. | 2
Lec5 | Preparation of the samples for microscopic examination. Methods of fixation and staining. | 2
Lec6 | Fluorescence microscopy: FRET, FLIC, TIRFM, FLIM. | 2
Lec7 | Fluorescence nanoscopy. Introduction. | 2
Lec8 | Fluorescence nanoscopy. STED. | 2
Lec9 | Fluorescence nanoscopy. PALM. | 2
Lec10 | Fluorescence nanoscopy. STORM. | 2
Lec11 | Hydrid techniques of micro- and nanoscopy part 1. | 2
Lec12 | Hydrid techniques of micro- and nanoscopy part 2. | 2
Lec13 | Techniques of nanomanipulation: optical tweezers. | 2
Lec14 | The application of nanomanipulation techniques for the characterization of biological materials part 1. | 2
Lec15 | The application of nanomanipulation techniques for the characterization of biological materials part 2. | 2

Total hours:

### Form of classes – foreign language course (Lng) | Number of hours
--- | ---
Lng1 |  | 
Lng2 |  | 
Lng3 |  | 
... |  | 

Total hours:

### Form of classes – seminar (Sem) | Number of hours
--- | ---
Sem1 |  | 
Sem2 |  | 
Sem3 |  | 
... |  | 

Total hours:

### Form of classes – mixed forms (mix) | Number of hours
--- | ---
Mix1 |  | 
Mix2 |  | 
Mix3 |  |
DOCTORAL SCHOOL OF WROCŁAW UNIVERSITY OF SCIENCE AND TECHNOLOGY

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<th>Total hours</th>
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TEACHING TOOLS USED

N1. lecture with multimedia presentation
N2. project with multimedia presentation and discussions

<table>
<thead>
<tr>
<th>ACHIEVED SUBJECT LEARNING OUTCOMES</th>
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</thead>
<tbody>
<tr>
<td>Type of learning outcome</td>
</tr>
<tr>
<td>Knowledge</td>
</tr>
<tr>
<td>Knowledge</td>
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<tr>
<td>Skills</td>
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<tr>
<td>Skills</td>
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<tr>
<td>Social competence</td>
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PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:


SECONDARY LITERATURE:

[1] Articles from journals: Science, Biomaterials, Biomolecular Engineering, Biotechnology, Bioscience, Biomechanics and Modeling in Nanotechnology, Polymer Composites, Nanotechnology, Biophysics, Molecular Imaging, Tissue Engineering

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. Marta Kopaczyńska, Prof. ucz.

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