Załącznik nr 2 do Zarządzenia Nr 16/2022 Rektora PB

**COURSE DESCRIPTION CARD**

<table>
<tr><td colspan="10">Bialystok University of Technology<br><br>Faculty of Mechanical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6">Biomedical Engineering</td><td>Degree level and programme type</td><td>Full-time second degree studies</td></tr>
<tr><td>Specialisation/ diploma path</td><td colspan="6">Joint course</td><td>Study profile</td><td>General academic</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Biocybernetics</td><td>Course code</td><td>MYIB2S0102</td></tr>
<tr><td>Course type</td><td>obligatory</td></tr>
<tr><td rowspan="2">Forms and number of hours of educational activities</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>1</td></tr>
<tr><td>30</td><td></td><td></td><td>30</td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>4</td></tr>
<tr><td>Entry requirements</td><td colspan="9">-</td></tr>
<tr><td>Course objectives</td><td colspan="9">The objective of the course is to introduce students to the modelling of living organisms, social mechanisms and the creation of technical and IT devices based on them.</td></tr>
<tr><td>Course content</td><td colspan="9">Lecture:<br>Fundamentals of biocybernetics. Information processing systems in humans. Forms of biomedical signals. Model description of reality - concepts of model and system in biocybernetics. The role of modelling and simulation in biocybernetics. Construction of simple and complex models of biological objects and processes. Inference from biocybernetics models. Biological basis of evolutionary computing. Prospects for the development of biocybernetics.<br><br>Project:<br>Construction of simple and complex models of biological objects and processes. Dynamic models using the development of a selected disease entity and its treatment as an example. Biocybernetics models of large scale systems - epidemic disease model. Models of biocybernetics systems: locomotor system and biomechanics. Inference from biocybernetics models.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Informative lecture, project method.</td></tr>
<tr><td>Assessment method</td><td colspan="9">Lecture – written test.<br>Project – projects execution and defence.</td></tr>
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| Symbol of learning outcome | Learning outcomes | Reference to the learning outcomes for the field of study |
|---|---|---|
| | **Knowledge: the graduate knows and understands** | |
| **LO1** | in-depth selected topics from the sciences useful for the formulation of systems specific to biocybernetics | IB2_W01 |
| **LO2** | in depth biomedical engineering issues necessary for the construction of biocybernetics models, and tools for modelling and simulation of systems | IB2_W02 |
| | **Skills: the graduate is able to** | |
| **LO3** | use the mathematical methods and models learnt and modify them accordingly | IB2_U08 |
| **LO4** | make inferences from designed biocybernetics models | IB2_U09 |
| **LO5** | integrate knowledge from the field of biomedical engineering using a systems approach, taking into account non-technical aspects, including ethical aspects, when formulating and solving complex tasks related to the modelling of biocybernetics models | IB2_U12 |
| | **Social competence: the graduate is ready to** | |
| **LO6** | do substantive analysis of the content received and evaluate it critically | IB2_K01 |
| **Symbol of learning outcome** | **Methods of assessing the learning outcomes** | **Type of tuition during which the outcome is assessed** |
| **LO1** | Written test | **L** |
| **LO2** | Written test | **L** |
| **LO3** | Written test, project report | **L,P** |
| **LO4** | Written test, project report | **L,P** |
| **LO5** | Written test, project report | **L,P** |
| **LO6** | Written test, project report | **L,P** |
| **Student workload (in hours)** | | **No. of hours** |
| **Calculation** | Lecture attendance | **30** |
| | Participation in project classes | **30** |
| | Preparation for the written test of lectures | **10** |
| | Preparation for project tasks | **10** |

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|---|---|---|---|
| | Preparation of project tasks reports | **15** | |
| | Participation in consultations | **5** | |
| | **TOTAL:** | **100** | |
| **Quantitative indicators** | | **HOURS** | **No. of ECTS credits** |
| **Student workload – activities that require direct teacher participation** | | **65** | **2,6** |
| **Student workload – practical activities** | | **60** | **2,4** |
| **Basic references** | 1. Tadeusiewicz R.: Biocybernetyka. Metodologiczne podstawy dla inżynierii biomedycznej, Wydawnictwa Naukowe PWN 2013.<br>2. Tadeusiewicz R., Jaworek J., Kańtoch E., Miller J., Pięciak T., Przybyło J.: Wprowadzenie do modelowania systemów biologicznych oraz ich symulacji w środowisku MATLAB, UMCS, Lublin 2012.<br>3. Meurs W.: Modeling and simulation in biomedical engineering: applications in cardiorespiratory physiology. New York: McGraw-Hill, c2011. ISBN 978-0071714457. | | |
| **Supplementary references** | 1. Rutkowska D., Piliński M., Rutkowsk LI.: Sieci neuronowe, algorytmy genetyczne i systemy rozmyte, Wydawnictwo Naukowe PWN, Warszawa-Łódź, 1999.<br>2. Arabas J.: Wykłady z algorytmów ewolucyjnych, Wydawnictwa Naukowo-Techniczne, Warszawa 2001. | | |
| **Organisational unit conducting the course** | Institute of Biomedical Engineering | **Date of issuing the programme** | |
| **Author of the programme** | Prof. Jolanta Pauk, DSc, PhD, Eng. | 04.07.2022 | |

**L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work, S – seminar**