COURSE DESCRIPTION CARD – SPECIMEN

<table>
<tr><td colspan="10">Faculty of Mechanical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6"></td><td colspan="2">Degree level and programme type</td><td>Bachelor's degree/Master's degree/Doctoral degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6"></td><td colspan="2">Study profile</td><td></td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Bioinformatics</td><td colspan="2">Course code</td><td>IS-FME-00231S</td></tr>
<tr><td colspan="2">Course type</td><td></td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td colspan="2">Semester</td><td>summer</td></tr>
<tr><td>30</td><td></td><td></td><td>15</td><td></td><td></td><td></td><td colspan="2">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 basic objective is to give students an introduction to the basic practical techniques of bioinformatics. Emphasis will be given to the application of bioinformatics and biological databases to problem solving in real research problems. The students will become familiar with the use of a wide variety of internet applications, biological database and will be able to apply these methods to research problems.</td></tr>
<tr><td>Course content</td><td colspan="9">Mathematical basis of bioinformatics. Introduction to algorithms and numerical methods. Selected languages of bioinformatics (Python, Biopython, language R). Sequence analysis. Bioinformatics and the Internet. Downloading information from biological databases, medical databases, sequence matching and database searches. Analysis of microarray experiments. Phylogenetics. Structural bioinformatics. Prediction of spatial structures. The use of machine learning methods in the problems of classification and prediction. Familiarization with selected tools to facilitate the analysis of biological data. Selected programs for visualization and manipulation of sequence sets. Project: Practical solving of problems related to the analysis of biological data.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">L – Lecture, P - Project</td></tr>
<tr><td>Assessment method</td><td colspan="9">lecture – oral exam, credit project</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="8">Learning outcomes</td><td>Reference to the learning outcomes for the field of study</td></tr>
<tr><td>LO1</td><td colspan="8">knows the tools and understands the methods of basic sciences used in the analysis of biomedical data</td><td>IB2_W01, IB2_W04, IB2_W09</td></tr>
<tr><td>LO2</td><td colspan="8">knows and understands the identification of a biological problem in algorithmic terms</td><td>IB2_W01, IB2_W04</td></tr>
<tr><td>LO3</td><td colspan="8">is able to analyze simple problems of bioinformatics and find their solution, using the appropriate programming language as well as using the software and databases available on the</td><td>IB2_U04, IB2_U06</td></tr>
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	Internet	
LO4	can prepare and present a presentation (documentation) concerning either the theoretical basis of bioinformatics, or a description of a chosen method or methods of data processing	**IB2_U04, IB2_U05**
LO5	is ready to interpret and critically evaluate the results of biological data processing	**IB2_K01, IB2_K06**
Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	Exam, qualifying lecture	**L**
LO2	Exam, qualifying lecture	**L**
LO3	Project: assessment of completed projects, current progress at work, discussion and activity in the classroom	**P**
LO4	Project: assessment of completed projects, current progress at work, discussion and activity in the classroom	**P**
LO5	Exam, qualifying lecture, Project: assessment of completed projects, current progress at work, discussion and activity in the classroom	**L, P**
Student workload (in hours)		**No. of hours**
Calculation	**lecture attendance**	**30**
	project attendance	**15**
	preparation for and participation in exams/tests	**20 + 2**
	preparation for project tasks	**26**
	performing design tasks (including preparation of presentations)	**6**
	preparation for passing project tasks	**8**
	participation in consultations	**3**
	TOTAL:	**110**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	**50**	**2**
Student workload – practical activities	**56**	**2**

Basic references	1. Pevsner, J. (2015). *Bioinformatics and functional genomics*. Hoboken : Wiley-Blackwell, 2009, 1-951. 2. Dua, S., & Chowriappa, P. (2012). *Data mining for bioinformatics*. CRC Press. Boca Raton : CRC/Taylor & Francis, 2010, 1-328. 3. Gentleman R., R programming for bioinformatics, Boca Raton : CRC/Taylor & Francis, 2009 4. Hill, C. (2016). *Learning scientific programming with Python*. Cambridge University Press, 1-451.
Supplementary references	1. Matthew H., Mathematics of bioinformatics : theory, practice, and applications / Matthew He, Sergey Petoukhov. Hoboken: John Wiley a. Sons, 2011.
Organisational unit conducting the course	**Department Biocybernetics and Biomedical Engineering** — **Date of issuing the programme**
Author of the programme	**Edward Oczeretko** — **20.03.2021**

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

S – seminar

Please notice!
Depending on number of students enrolled for the subject hours of tuition are as follows (for each 30 hours given in course description card):
1 – 2 students - 5 hours of tuition hours;
3 – 4 students - 8 hours of tuition;
5 – 6 students - 11 hours of tuition;
7 – 8 students - 15 hours of tuition;
9 and more students - hours of tuition given by a teacher as regular classes.