

# Elements of bioinformatics - course description

General information	
Course name	Elements of bioinformatics
Course ID	13.1-WF-FizD-EB-S17
Faculty	<a href="#">Faculty of Physics and Astronomy</a>
Field of study	Physics
Education profile	academic
Level of studies	Second-cycle studies leading to MS degree
Beginning semester	winter term 2018/2019

Course information	
Semester	3
ECTS credits to win	4
Course type	obligatory
Teaching language	english
Author of syllabus	

Classes forms					
The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	15	1	-	-	Exam
Laboratory	30	2	-	-	Credit with grade

## Aim of the course

To familiarize the student with the theoretical, computational and practical elements of bioinformatics. Preparation for work at a bioinformatics laboratory either in a medical healthcare center or a research facility.

## Prerequisites

Knowledge of the elements of probability theory, programming and mathematical methods of bioinformatics. The ability to program in either Python or R

## Scope

1. Fundamentals of genes and genomes.
2. Fundamentals of molecular evolution
3. Genomic technologies
4. Data, databases, formats, search and retrieval / genome browsers
5. Large volume data analysis in bioinformatics / big data in bioinformatics
6. Sequence alignment and similarity search
7. Sequencing
8. Microarrays analysis
9. Protein structure

In the laboratory the students will carry out programming exercises covering the above topics in the Python or R programming languages.

## Teaching methods

lectures on problems and discussions. Laboratory, programming assignments and projects.

## Learning outcomes and methods of their verification

Outcome description	Outcome symbols	Methods of verification	The class form
The student can name the aims and methods of bioinformatics and their relation to physics and biophysics		<ul style="list-style-type: none"><li>• a project</li><li>• an exam - oral, descriptive, test and other</li></ul>	<ul style="list-style-type: none"><li>• Lecture</li><li>• Laboratory</li></ul>
The student can search suitable databases on the internet, he or she can also use the available tools		<ul style="list-style-type: none"><li>• a project</li><li>• an exam - oral, descriptive, test and other</li></ul>	<ul style="list-style-type: none"><li>• Lecture</li><li>• Laboratory</li></ul>

Outcome description	Outcome symbols	Methods of verification	The class form
The student knows the basic terminology and methodology of bioinformatics		<ul style="list-style-type: none"> <li>• a project</li> <li>• an exam - oral, descriptive, test and other</li> </ul>	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Laboratory</li> </ul>
The student can perform basic analyses and search for similarities		<ul style="list-style-type: none"> <li>• a project</li> <li>• an exam - oral, descriptive, test and other</li> </ul>	<ul style="list-style-type: none"> <li>• Laboratory</li> </ul>
The student is able to independently acquire bioinformatics knowledge and is able to read documentation on the implementation of new bioinformatics algorithms		<ul style="list-style-type: none"> <li>• a project</li> <li>• an exam - oral, descriptive, test and other</li> </ul>	<ul style="list-style-type: none"> <li>• Laboratory</li> </ul>

## Assignment conditions

**LECTURE:** A course credit for the lectures is obtained by taking a final exam composed of tasks of varying degrees of difficulty.

**Laboratory:** During the laboratory the students will be given a series of open-ended projects covering the lectures.

Credit will consist of 40% the result of the exam and 60% of the grades achieved for the laboratory projects.

## Recommended reading

[1] Supratim Choudhuri, Bioinformatics for Beginners: Genes, Genomes, Molecular Evolution, Databases and Analytical Tools,

[2] Phillip Compeau and Pavel Pevzner, Bioinformatics Algorithms: An Active Learning Approach, 2nd Ed

## Further reading

## Notes

Modified by dr hab. Piotr Lubiński, prof. UZ (last modification: 28-06-2018 18:01)

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