

Course title: INTRODUCTION TO BIOINFORMATICS

ECTS credit allocation (and other scores):

Semester: autumn

Level of study: ISCED-6 - first-cycle programmes (EQF-6)

Branch of science: Natural sciences

Language: English

Number of hours per semester: 45 h.

Course coordinator/ Department and e-mail: Jan Paweł Jastrzębski; Department of Plant Genetics, Physiology and Biotechnology; jan.jastrzebski@uwm.edu.pl

Type of classes: classes and lectures

Substantive content

CLASSES: Understanding the work environment of bioinformatics, biological databases: types of databases, methods of searching databases, retrieving information, data processing.

LECTURES: Presentation of the bioinformatics work environment. Introduction to databases and methods of comparative analysis of sequences and structures of biological macromolecules - DNA, RNA and proteins (Introduction to NCBI, EBI and RCSB PDB, database structure, methods of searching and data analysis using tools implemented in databases, data analysis using external bioinformatics tools). Bioinformatics of nucleic acids and proteins.

LEARNING PURPOSE: The purpose of education is to learn about the work environment of a bioinformatician, especially in the topic of biological databases and basic bioinformatics tools: types of databases, ways of searching databases, information retrieval, data processing, comparison of sequences.

On completion of the study programme the graduate will gain:

KNOWLEDGE: The student defines the term bioinformatics and names and explains the basic assumptions and fields of bioinformatics; distinguishes between types of alignment, homology; explains the difference between homology and similarity; selects appropriate techniques for: search biological databases, compare sequences, analyze properties of biophysical and biochemical properties of biopolymer sequences. Knows and understands the structure of basic bioinformatics data formats and theoretical assumptions and mechanisms of operation of basic bioinformatics algorithms and tools: database structures, sequence comparison techniques and algorithms, search engines bioinformatics, editors, and data visualizers. He knows how and what technical parameters of selected algorithms should be modified in order to obtain the appropriate biological effect

SKILLS: The student uses publicly available bioinformatic databases; uses methods of searching and analyzing sequences and structures. The student is able to modify the technical parameters of selected bioinformatics algorithms in order to obtain the appropriate biological effect, do not apply the appropriate data format and convert bioinformatics data between different formats; can read data in biological databases, find related data in various databases and create a document with an analytical report and make the material available on-line.

SOCIAL COMPETENCIES: The student is aware of the use of in silico techniques. He works in a group on a joint project. He is creative in the search for new applications of known tools in solving a biological problem

Basic literature:

1.) The NCBI Handbook [Internet]. 2nd edition. Bethesda (MD): National Center for Biotechnology Information (US);

2013-. Editors and Reviewers. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK169443/>
2.) Andrew Lloyd, Bioinformatics for Dummies, *Briefings in Bioinformatics*, Volume 4, Issue 2, June 2003, Pages 197–198, <https://doi.org/10.1093/bib/4.2.197>

The allocated number of ECTS points consists of:

Contact hours with an academic teacher: 47 h.

Student's independent work: 28 h.