# COURSE DESCRIPTION CARD - SYLLABUS

Course name

Bioinformatics

## Course

Field of study

Education in Technology and Informatics

Year/Semester

1/2

Area of study (specialization)

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

## Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

## Number of credit points

3

## Lecturers

Responsible for the course/lecturer:

mgr Kaja Gutowska

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Faculty of Computing and Telecommunications

ul. Piotrowo 2, 60-965 Poznań

Responsible for the course/lecturer:

## Prerequisites

Basics of biology (high school level), basic IT skills, basics of programming, basic knowledge of databases, willingness to go beyond the boundaries of one's own field of study, the ability to think creatively and the ability to obtain information from the indicated sources. The active attitude in solving problems, creativity, cognitive curiosity and ability to work in a team.

## Course objective

1. Providing knowledge in bioinformatics and computational biology.

2. Developing the ability to solve contemporary problems in the field of biological sciences, mainly molecular biology, using computational techniques.

3. Presentation of generally available bioinformatics resources and tools.

4. Developing teamwork skills in solving bioinformatics problems.

## Course-related learning outcomes

### Knowledge

1. Student has knowledge about development trends and the most important new achievements in bioinformatics [K2_W11], [K2_W14].

2. Student knows the basic methods, techniques and tools used to solve simple computer science tasks in the field of bioinformatics [K2_W07].

### Skills

1. Student is able to obtain information from the literature, databases and other sources in order to consolidate and expand knowledge in the field of bioinformatics [K2_U04].

2. Student is able to prepare a well-documented description of problems and algorithms in the field of bioinformatics [K2_U02].

3. Student is able to plan and conduct computational experiments with the use of bioinformatics tools, interpret the obtained results and draw conclusions [K2_U01], [K2_U10].

4. Student has the ability to design algorithms and programming them with the use of tools used in bioinformatics [K2_U23].

### Social competences

1. Student is able to work on a particular task independently and cooperate in a team [K_K03].

2. Student is able to properly define the priorities for the implementation of the particular tasks. [K_K04].

3. Student understands the need to expand their competences in design and application of data analysis tools in bioinformatics and understands that in this field of knowledge and skills quickly become obsolete [K2_K01].

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:
Partial assessment:

- in lectures: based on answers to questions about the material discussed in previous lectures;

- in laboratory classes: based on the assessment of the current progress in the implementation of tasks.

Summative assessment:

- continuous assessment in classes,
- final exam,
- assessment of student's preparation for individual sessions of laboratory classes,
- assessment of skills related to the implementation of tasks in laboratory classes,
- obtaining additional points for attendance and activity during laboratory classes.

## Programme content

During the lecture, students gain knowledge of the basic issues of bioinformatics as well as the basic concepts and issues in the field of molecular biology (necessary to understand the discussed bioinformatics issues). The following issues will be discussed:

1. Introduction to molecular biology and bioinformatics

2. Biological databases

3. Sequences analysis and comparison

4. Genomics and sequencing

5. Resequencing and assembling

6. Structural bioinformatics

7. Systems biology

During the laboratory classes, students solve in a theoretical and practical way bioinformatical problems and learn about the available resources and bioinformatics tools related to the subject of the lectures.

## Teaching methods

1. Lecture: multimedia presentation illustrated with examples given on the blackboard.

2. Laboratory class: practical exercises, conducting experiments, discussion, teamwork.

## Bibliography

Basic

1. P.G. Higgs, T.K. Atwood: Bioinformatics and Molecular Evolution

2. J. Xiong: Essential Bioinformatics

3. A.D. Baxevanis, B.F. F. Ouellette: Bioinformatics: A Practical Guide to the Analysis of Genes and Protein

Additional

1. RC Deonier, S.Tavare, MS Waterman. Computational Genome analysis. an Introduction. Springer 2005

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 45 | 3,0 |
| Classes requiring direct contact with the teacher | 30 | 2,0 |
| Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1] | 15 | 1,0 |

[1] delete or add other activities as appropriate