Name of the course	**ECTS code**
Applications of bioinformatic methods – all-academic profile	

Name of the leading institution
Department of Biosystematics

Study description

faculty	level	type of study	specialty	specialisation
Biology	*II*	*stationary*	*palaeobiology*	-

*the name follows the accepted catalogue of faculties and specializations

Name/-s of a teacher/-s
Prof. dr hab. Jerzy Lis

Type of course, way of realization and amount of hours

A. type of course
- *lecture (L)*
- *laboratory (Lab)*
- *conversatory (C)*

B. way of realization
- *laboratory and lecture room*

C. amount of hours

15L+15Lab+15C

ECTS credit points: 3

Contact hours
- lecture participation: 15 x 1h = 15h
- laboratory participation: 15 x 1h = 15h
- conversatory participation: 15 x 1h = 15h
- consultations: 5 x 1h = 5h

All: 50h = 2 cp ECTS

Individual student work
- preparation to the laboratory: 15 x 1h = 15h
- preparation to the final credit: 15 x 1h = 15h
- preparation to the conversatory: 15 x 1h = 15h

All: 45h = 1cp ECTS

L (1cp ECTS) + Lab (1 cp ECTS) + Conv (1 cp ECTS)

Module
- *Faculty module - obligatory*

Language
English

Didactic methods

- *multimedial lecture*
- *laboratory: exercises involving computer programs and internet data, computer simulations, discussion, work in focus groups*
- *conversatory: oral presentations accompanied by the electronic presentation*

Conditions to get credits for:

A. Way of final evaluation:
- *lectures: a grade*
- *laboratory: a grade*
- *conversatory: a grade*

B. Form of testing:
- *lecture: final written test (including open and closed questions)*
- *laboratory: oral presentation of results of computer analyses and simulations (accompanied by the electronic presentation)*
- *conversatory: oral presentations based on literature studies accompanied by the electronic presentation*

C. Basic criteria
- *L: positive rating over 50% of points scored (in the examination test)*
- *Lab: evaluation of results obtained during computer analyses*

Conv: evaluation of the oral presentations accompanied by the electronic presentation

Necessary knowledge from listed below subjects and the preliminary conditions

A. *Formal conditions: none*

B. *Preliminary conditions: Computer skills and elementary knowledge of computer science and IT, a basic knowledge on the principles of organisms systematics and classification, genetics and evolution, an ability to find and process biological information into knowledge, an ability to use the relevant published biological scientific literature and to know its practical application.*

Goal:

Knowing and understanding the basic concepts and definition relevant to bioinformatics. Knowing and understanding the bioinformatics methods of DNA analyses, and acquiring the skill of their application in various fields of life sciences. Acquiring the skill of the use of computer techniques in bioinformatics. Knowing the bioinformatic databases and their functioning.

Content:

A. *Lecture: Essential bioinformatics. Molecular databases as sources of DNA sequences used in various fields of life sciences. Analyses of mitochondrial and nuclear DNA. DNA polimorphism. Molecular markers in phylogenomics, phylogeography, ecology, conservation biology, forensic biology, medicine and biodiversity studies. Computer programms enabling the use of bioinformatic data in various fields of life sciences.*

B. *Laboratory: Computer programms and bioinformatic databases in phylogenomic and phylogeographic analyses. Haplotype analyses. Procedures of downloading the DNA sequences from GenBank. Sequence alignments and analyses. Substitution model selection. Tree construction using different algorithms. Oral presentation of results of computer analyses and simulations (accompanied by the electronic presentation).*

C. *Conversatory: Mitochondrial, chloroplast and nuclear genomes, their structure, function and evolution. DNA sequences alignment. Molecular clock and its calibration. Usefulness of the molecular clock in phylogenomics and phylogeography. Molecular markers in phylogenomics, phylogeography, conservation biology and biodiversity studies – examples. Computer programms used in phylogenomics and phylogeography. Application of bioinformatic methods in studies on fossils. Basics of the structural bioinformatics.*

Literature

A. obligatory literature:

A.1. used during lectures and laboratory sessions

- Xiong J. Essential bioinformatics. Cambridge University Press, 2006.

- Freeland J.R. Molecular ecology. John Wiley & Sons Ltd., 2005

- Hall B.G. Phylogenetic trees made easy: A how-to manual. Third edition. Sinauer Associates Inc., 2008.

- specialised literature.

A.2. lectures for self-study – as above

B. additional literature

- Avise J.C. Phylogeography: the history and formation of species. Harvard University Press, 2001.

- Higgs P.G., Attwood T.K. Bioinformatics and Molcular Evolution. Blackwell Science Ltd., 2005.

- specialised literature.

Effects of education	
	Knowledge K_W01_/ P7S_WG K_W02_ /_ P7S_WG K_W12_/_ P7S_WG K_W15_/_ P7S_WG
	Skills K_U02_/ _ P7S_UK K_U03_ /_ P7S_UW K_U05_ /_ P7S_UW K_U07_/_ P7S_UW K_U08_ /_ P7S_UK
	Social competencies K_K01_/_ P7S_KK K_K04_ / _ P7S_KK K_K06_ /_ P7S_KK

Contact

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