



Genomics and proteomics
Educational subject description sheet

Basic information

Field of study Bioinformatics	Education cycle 2021/22	
Speciality -	Subject code WBiHZBBIS.L10BO.0772.21	
Department The Faculty of Biology and Animal Science	Lecture languages english	
Study level First-cycle programme	Mandatory optional	
Study form Full-time	Block major subjects (conducted) in foreign languages	
Education profile General academic	Disciplines Biological sciences	
	Subject related to scientific research No	
	Subject shaping practical skills No	
Teacher responsible for the subject	Bożena Marszałek-Kruk, Tomasz Strzała	
Other teachers conducting classes	Bożena Marszałek-Kruk, Tomasz Strzała	
Period Semester 5	Examination exam	Number of ECTS points 4.0
	Activities and hours lecture: 15 laboratory classes: 30	

Goals

C1	Anatomy of the genomes, comparative analysis and phylogeny of the genomes, the functioning of genomes, the mechanisms of genome evolution, the construction of the human genome. Proteins and their functions in the cell; protein profiling, method for identification of proteins in proteome; Identification of proteins interacting with each other; relation and sequence of proteomics, metabolomics, biological systems.
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Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge - Student knows and understands:			
W1	can compare and determine the difference between nuclear and mitochondrial genomes of different species of animals and plants; knows the methods of mapping and sequencing genomes.	BI_P6S_WG03, BI_P6S_WG07, BI_P6S_WG10	written exam
W2	knows the structure and function of proteins in the cell, has a general knowledge of the techniques of protein identification.	BI_P6S_WG02, BI_P6S_WG03, BI_P6S_WG10	written exam
W3	knows the techniques of gel electrophoresis of proteins; knows the concept of denaturation, proteome.	BI_P6S_WG03, BI_P6S_WK11	written exam
Skills - Student can:			
U1	can use the selected databases of genomic sequences, can analyze the differences in the structure of simple genomes and determine the functions of the various elements that build them.	BI_P6S_UW02, BI_P6S_UW06	project, active participation, test
U2	acquires the ability to prepare denaturing gel, can perform protein electrophoresis in denaturing conditions and in native methods.	BI_P6S_UW02	project, active participation, test
U3	gains skills of the relevant computer programs used to analyze the spatial structures of proteins.	BI_P6S_UW02, BI_P6S_UW06	project, active participation, test
Social competences - Student is ready to:			
K1	The student knows the rules for safe working in a genetics laboratory.	BI_P6S_KK01, BI_P6S_KK03	project, active participation, test
K2	Student is aware of responsibility for the entrusted laboratory equipment, he or she takes part of common research team work.	BI_P6S_KK02	project, active participation, test

Balance of ECTS points

Activity form	Activity hours*
lecture	15
laboratory classes	30
exam participation	4
exam / credit preparation	20
lesson preparation	20
project preparation	15
consultations	2

Student workload	Hours 106	ECTS 4.0
Workload involving teacher	Hours 51	ECTS 2.0
Practical workload	Hours 30	ECTS 1.0

* hour means 45 minutes

Study content

No.	Course content	Activities
1.	1. Structure and function of pro- and eukaryotic genomes (1h) 2. Genome mapping methods (2h) 3. Genome sequencing (2h) 4. Methods of comparing genomes (1h) 5. Mechanisms of genome evolution (1h) 6. Introduction to proteomics (2h) 7. Protein profiling - a method of identifying proteins in a proteome (2h) 8. Identification of interacting proteins (2h) 9. From proteomics through metabolomics to biological systems (2h).	lecture
2.	1. Genomic databases - searching for information on genomes (3h) (IT work) 2. Finding and sourcing sequences for analysis (3h) (IT work) 3. Searching for similarities and differences in analysed genome fragments (3h) (IT work) 4. Presentation of the assumptions and results of Ensembl project - analysis of human genome (3h) (IT work) 5. Ensembl - searching of genomes for analysis (3h) (IT work) 6. Ensembl - reading of genome sequences and their characteristics (3h) (IT work) 7. Electrophoresis of proteins in denaturing gel SDS-PAGE (6h) (lab) 8. Spatial analysis of proteins using computer systems (6h) (IT work)	laboratory classes

Course advanced

Teaching methods:

lecture, classes

Activities	Examination methods	Percentage in subject assessment
lecture	written exam	50%
laboratory classes	project, active participation, test	50%

Entry requirements

biochemistry, genetics, molecular biology, basics of bioinformatics

Literature

Obligatory

1. Brown T.A. Genomy, PWN Warszawa, 2009
2. Bergman, Nicholas H. Comparative Genomics, Humana Press, 2007
3. Drewa G., Ferenc T. Genetyka medyczna. Elsevier Urban & Partner, Wrocław 2011
4. Węgleński P. Genetyka molekularna. Wyd. Naukowe PWN, Warszawa 2006

Optional

1. Strachan T., Read AP.; Human Molecular Genetics. Garland Science 2004
2. Allison L.A. Fundamental Molecular Biology. Blackwell Publishing 2007

Effects

Code	Content
BI_P6S_KK01	Absolwent jest gotów do krytycznej oceny posiadanej wiedzy i jej aktualizacji
BI_P6S_KK02	Absolwent jest gotów do odpowiedniego określania priorytetów służących realizacji określonego zadania
BI_P6S_KK03	Absolwent jest gotów do stosowania metod badawczych właściwych dla bioinformatyki, ma znajomość rozwoju dziedzin nauki i dyscyplin naukowych
BI_P6S_UW02	Absolwent potrafi stosować techniki i narzędzia badawcze w zakresie biologii eksperymentalnej, ze szczególnym uwzględnieniem biochemii, biofizyki i biologii molekularnej
BI_P6S_UW06	Absolwent potrafi stosować metody informatyczne do opisu i interpretacji wyników uzyskanych w analizie danych biologicznych i hodowlanych
BI_P6S_WG02	Absolwent zna i rozumie specyfikę interpretacji wyników analiz biologicznych
BI_P6S_WG03	Absolwent zna i rozumie zjawiska i procesy fizyczne, chemiczne oraz biochemiczne zachodzące w przyrodzie i w organizmach żywych
BI_P6S_WG07	Absolwent zna i rozumie w stopniu zaawansowanym zagadnienia z zakresu problemów właściwych dla bioinformatyki oraz zna ich powiązania z innymi dyscyplinami przyrodniczymi i możliwościami ich wykorzystania w praktyce
BI_P6S_WG10	Absolwent zna i rozumie w stopniu zaawansowanym elementarne techniki biologii molekularnej
BI_P6S_WK11	Absolwent zna i rozumie zasady bezpieczeństwa i higieny pracy oraz ergonomii