SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

R programming language

Educational subject description sheet

Basic information

Field of study Biotechnology **Speciality** - **Organizational unit** Faculty of Biology and Biotechnology **Study level** first cycle (engineering degree) **Study form** full-time studies **Education profile** General academic	**Didactic cycle** 2024/25 **Subject code** BBTBTjS_D.320.01621.24 **Lecture languages** english **Mandatory** Elective subjects **Block** Major subjects **Disciplines** Biological sciences

Coordinator	Marek Koter
Teacher	Marek Koter, Piotr Gawroński

Period Semester 6	**Examination** Pass with grade **Activities and hours** Laboratory exercises: 30	**Number of ECTS points** 2

Goals

Code	Goal
C1	Learning the basics of operating the Linux operating system from the command line and the basics of programming in the R language

Entry requirements

The student should have basic knowledge of using a PC and about information technologies.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	the commands of the Linux operating system and software in this system	BTj_K3_W04	Project
W2	the concepts used in programming languages	BTj_K3_W04	Project
W3	the useful functions and types of charts for representing different types of data	BTj_K3_W04, BTj_K3_W06	Project
Skills – Student can:			
U1	efficient navigate in the Linux command line environment and can create scripts and professional charts	BTj_K3_U01_inz, BTj_K3_U03	Project
Social competences – Student is ready to:			
K1	data analysis from experiments and their professional presentation	BTj_K3_K01, BTj_K3_K02	Project

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	The topics of the exercises include basic information about the graphical interface and the command line of the operating system Linux. Students are familiarized with the basic commands of the operating system, including those that allow you to navigate around directory tree, change file and directory access permissions, and install software. As part of learning the R language, students install the development environment (R and RStudio), learn the basic concepts about programming (constants, variables, functions and their arguments, types of data), and basic functions and create their own. Also they install additional packages, and learn to automate code (loops and conditional statements).	W1, W2, W3, U1, K1	Laboratory exercises

Course advanced

Activities	Methods of conducting classes
Laboratory exercises	Individual work

Activities	Examination method	Percentage
Laboratory exercises	Project	100%

Activities	Credit conditions
Laboratory exercises	Prepearing a project

Literature

Obligatory

1. R Graphics Cookbook: Practical Recipes for Visualizing Data, Winston Chang, O'Reilly, 2013
2. Efficient Linux at the Command Line: Boost Your Command-Line Skills, Daniel Barrett, O'Reilly Media
3. Learning R: A Step-by-Step Function Guide to Data Analysis, Richard Cotton, O'Reilly Media

Optional

1. The Linux Command Line, 2nd Edition: A Complete Introduction, William Shotts, No Starch Press
2. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data, Garrett Grolemund, O'Reilly Media
3. Linux Bible, Christopher Negus, Wiley
4. R Crash Course for Biologists: An introduction to R for bioinformatics and biostatistics (Coding and Quantitative Biology), Robert I Colautti,
5. Bioinformatics Data Skills: Reproducible and Robust Research with Open Source Tools, Vince Buffalo, O'Reilly Media

Calculation of ECTS points

Activity form	Activity hours*
Laboratory exercises	30
Preparing the project	10
Preparation for exercises	10
Student workload	**Hours** 50
Number of ECTS points	**ECTS** 2

* hour means 45 minutes

Effects

Code	Content
BTj_K3_K01	The graduate is ready to proper storage of data, updating and extending knowledge on topics related to biotechnology and the related sciences;
BTj_K3_K02	The graduate is ready to development and application of one’s skills in practice (including communication, teamwork), which enable effective lifelong learning with respect to biological sciences;
BTj_K3_U01_inz	The graduate can utilise proper techniques and knowledge related to biotechnology in practice, under the care of a supervisor;
BTj_K3_U03	The graduate can provide and explain specific examples and apply proper experimental methods associated with the explanation of principles related to gene expression;
BTj_K3_W04	The graduate knows and understands the necessity to use proper simple computational techniques (including statistical analysis, computational tools and computer software suites) for biological data
BTj_K3_W06	The graduate knows and understands the functions of various cells (prokaryotic and eukaryotic), being able to critically explain, how their properties are related to varying biological functions, knowing how they can be tested experimentally