SYLLABUS

Name: ***Programming in R and Python (MakAu-DS>SM1PIRP19)***
Name in Polish:
Name in English: ***Programming in R and Python***

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science
Course for department: Silesian University of Technology

Default type of course examination report:

EGZ

Language:

English

Course homepage:

https://platforma2.polsl.pl/rau2/course/view.php?id=894

Short description:

The aim of the course is making students familiar with programming in the R and Python languages. An important part of the course is to show applications of R and Python in the field of soft computing. On the basis of numerous examples, it will be demonstrated that R and Python are effective and efficient tools for data analysis.

Description:

Number of ECTS credits: 4
Number of ECTS credits covered by the part of the courses taught with the direct participation of academic teachers or other persons teaching courses and students: 2

Number of hours: 120 (60 contact / 60 student's own work)
- lecture: 30,
- laboratory: 30,

Student's own work:
Preparation to laboratory, preparation to examination.

Lecture content:

Basic information on R and Python programming languages. Data types. Flow control. Modules. File management. Reading and saving data in various formats: CSV, XLS, XML, binary, database formats. Data visualization. Regular expressions. External libraries – using existing and creating customized libraries.
Examples of using R and Python in various areas: statistical analysis, classification, clustering, image processing, computer vision, bioinformatics, computational biology. Elements of concurrent programming in R and Python. Integration with other programs, C++.

During the laboratory students practice the elements shown at the lecture.

Bibliography:

J. Zelle, G. van Rossum, Python programming: An introduction to Coomputer Science, Franklin, Beedle & Associates, 2016

S. Raschka, V. Mirjalili, Python Machine Learning, Pack Publishing, 2017.

Wickham, H., Grolemund, G. (2017) R for Data Science: Import, Tidy, Transform, Visualize, and Model Data, O'Reilly Media.

James, G., Witten, D., Hastie, T., Tibshirani, R. (2013) An Introduction to Statistical Learning with Applications in R, Springer-Verlag New York. Teetor, P. (2011) R Cookbook: Proven Recipes for Data Analysis, Statistics, and Graphics, O'Reilly Media.

Learning outcomes:

Knows the syntax of R and Python programming languages (examination): K2A_W02.
Knows the data structures and algorithms in R and Python (examination): K2A_W02.
Knows the popular libraries and packages for R and Python (examination): K2A_W02.

Can implement programs in R and Python (laboratory): K2A_U14.
Can choose proper R/Python algorithms and data structures to particular tasks (laboratory): K2A_U14, K2A_U16.
Can use R and Python to analyze and visualize data from different domains (laboratory): K2A_U07, K2A_U15.

Assessment methods and assessment criteria:

Laboratory:
I. There are six laboratory topics evaluated in 0-10 scale.
II. Laboratory topics are evaluated during classes.
III. In order to complete the laboratory, a student has to get 30 points from all topics.

Exam:
I. In order to complete the lectures, a student has to pass an examination.
II. To pass the examination, one has to get 30 points out of 60.
III. There are three examination terms, each graded in 0-60 scale.
IV. A final examination result is the average of points from all taken terms. If the average is below 60 and the last examination take was graded on 30 or more, the final result is 30.
V. The completion of the laboratory is required to be admitted to the examination.

Final grade:
I. The points in the course are assigned in the laboratory (0-60) and the examination (0-60).

II. Both components must be completed to complete the course.
III. The points from both components are added to obtain the final grade.

The syllabus is valid from academic year 2024/25 and its content cannot be changed during the semester.

Element of course groups in various terms:

Course group description	First term	Last term
missing group description in English (MakAu>SM1-DS-19)	2020/2021-L	
Automation, electronics and informatics sem. 1 (AEIAu>SM_1)	2024/2025-Z	

Course credits in various terms:

<without a specific program>

Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	4	2020/2021-L	