Uniwersytet Gdański

KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez
Unię Europejską w ramach
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Course title	ECTS code
Introduction to R programming	13.3.1294

Name of unit administrating study

null

Studies

faculty	field of study	type	second tier studies (MA)
Faculty of Chemistry	Chemistry	form	full-time
		specialty	all
		specialization	all

Teaching staff

prof. dr hab. Tomasz Puzyn; dr inż. Karolina Jagiełło; dr Agnieszka Gajewicz-Skrętna; mgr Alicja Mikołajczyk

Forms of classes, the realization and number of hours	ECTS credits
Forms of classes	5
Laboratory classes, Lecture	Lecture – 15 h
The realization of activities	Laboratory classes - 45 h
classroom instruction	Student's own work – 30 h
Number of hours	Tutorial classes – 35 h
Lecture: 15 hours, Laboratory classes: 45 hours	TOTAL: 125 h – 5 ECTS

The academic cycle

2022/2023 summer semester

Type of course	Language of instruction
obligatory	english

Teaching methods	Form and method of assessment and basic criteria for eveluation or examination requirements
- critical incident (case) analysis	**Final evaluation**
- discussion	- Graded credit
- group work	- Examination
- multimedia-based lecture	**Assessment methods**
	Lecture – exam with multiple-choice questions
	Laboratory classes – written reports
	The basic criteria for evaluation
	according to "Rules and regulations for studies at the University of Gdansk"
	Lectures: passing the final exam in the form of a multiple-choice question test (a score of 50% or more required to pass the exam).
	Lab classes: the arithmetic mean of partial grades received during the semester for written reports on laboratory exercises.

Method of verifying required learning outcomes

Written exam tests student's knowledge of R programming language and abilities to design of a project using the R programming language and chemistry-related algorithms. During the laboratory exercises, the student solves problems in writing (reports including codes in R) or oral (oral answer) in the field programming in R. (K_W06, K_W08, K_W09) Assessment of the student's independent programming exercises, the correctness of the analysis of the algorithm and preparation of reports. (K_U02, K_U03) Method of verifying the acquisition of social competences: The student identifies the level of their knowledge and skills as well as the need for updating knowledge, continuous professional training, and personal development. (K_K06).

Required courses and introductory requirements

A. Formal requirements

B. Prerequisites

none

Aims of education

familiarize students with the R programming language and software environment

presenting the benefits of using R for exploratory data analysis and data visualizations

familiarize students with basic R programming concepts to automate data analysis and data visualizations

Course contents

The course covers practical issues in statistical computing, exploratory data analysis and data visualizations which includes introduction to R programming (basic data structures; data inspection and manipulation; data formatting and analysis; accessing add-on R packages (how to find, install, and work with them), visualization in R (methods for graphing data), introduction to basic programming structures (writing R functions; loops, if-else statements; organizing and commenting R code; writing documents with R Markdown).

Bibliography of literature

Literature required to pass the course

Teetor S. 25 Recipes for Getting Started with R: Excerpts from the R Cookbook. O'Reilly Media, 2011

Murray S. Learn R in a Day. SJ Murray, 2013

Extracurricular readings

Mahoney M. Introduction to Data Exploration and Analysis with R, 2019

Peng R.D. (2020). R Programming for Data Science, 2020

The learning outcomes (for the field of study and specialization)

K_W06:

applies mathematics to the extent necessary to understand, describe and model chemical processes of extended complexity

K_W08:

demonstrates in-depth knowledge of theoretical computational and IT methods used to solve problems in chemistry

K_W09:

classifies specialist IT tools used in statistical evaluation of experiment results

K_U02

critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors

K_U03

finds necessary information in specialist literature, databases and other sources, lists basic scientific journals in chemistry

K_K02

works in a team taking on various roles in it

K_K06

raises her/his professional and personal competences by using information provided in various sources

Knowledge

At the completion of this course, the student is expected to be able to:

know and understand the fundamental programming concepts in R,

describe and summarize the differences between R, RStudio and RStudioCloud,

know the most important and useful R functions and R packages for data manipulations, exploratory data analysis and data visualizations,

know the benefits of using R for data analysis.

Skills

At the completion of this course, the student is expected to be able to:

use the fundamental R functions and R packages for data manipulation, exploratory data analysis and data visualizations,

use web resources such as CRAN, Github or Bioconductor to find, install and load the suitable packages,

analyze, interpret and modify (whenever needed) the existing R scripts,

write scripts and loop functions to automate data formatting, analysis and visualizations,

design and establish custom approaches for analyzing, visualizing and interpreting obtained results,

use help pages such as StackOverflow to find relevant information, understand commands and solve problems.

Social competence

At the completion of this course, the student is expected to be able to:

feel empowered and inspired to learn more R on their own and/or within a community of R users,

appreciate the benefits of working with the R programming language and software environment and strive to increase the attractiveness and transparency of their research,

develop interpersonal skills such as communication, cooperation in group (taking different roles), and problem-solving abilities,

understand the principles of working safely, responsibly, and efficiently using the workstations connected to the Internet,

understand the social aspects of practical use of knowledge and abilities as well as connected with them responsibility.

Contact

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