

Subject card

Subject name and code	Introduction to R programming, PG_00117806						
Field of study	Chemistry						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
Education level	Master's studies		Subject group		Obligatory subject group in the field of study		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		English		
Semester of study	2		ECTS credits		3.0		
Learning profile	academic		Assessment form		credit		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Tomasz Puzyn				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	45.0	0.0	0.0	45
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	45		8.0		22.0	75
Subject objectives	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						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEMMU2_K02] Is able to undertake a variety of roles in the team, including supervisory ones.	At the completion of this course, the student is expected to understand the principles of working safely, responsibly, and efficiently using the workstations connected to the Internet, as well as understand the social aspects of practical use of knowledge and abilities as well as connected with them responsibility.	[SK2] presentation/project/paper/report [SK5] implementation of a problem task
	[CHEMMU2_W06] Applies mathematics to the extent necessary to understand, describe and model chemical processes of medium complexity.	At the completion of this course, the student is expected to know and understand the fundamental R functions for data manipulation, exploratory data analysis and data visualizations.	[SW2] presentation/project/paper/report [SW5] implementation of a problem task
	[CHEMMU2_U03] Finds necessary information in specialist literature, databases and other sources, lists basic scientific journals in chemistry.	At the completion of this course, the student is expected to use web resources such as CRAN, Github or Bioconductor to find, install and load the suitable packages.	[SU2] presentation/project/paper/report [SU5] implementation of a problem task
	[CHEMMU2_U02] Critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors.	At the completion of this course, the student is expected to design and establish custom approaches for analyzing, visualizing and critical interpreting obtained results, as well as use help pages such as StackOverflow to find relevant information and/or solve problems.	[SU2] presentation/project/paper/report
	[CHEMMU2_K06] Undertakes research tasks consciously and responsibly, understanding the social aspects of the practical application of the acquired knowledge and skills and the responsibility related to it.	At the completion of this course, the student is expected to understand the principles of working safely, responsibly, and efficiently using the workstations connected to the Internet, as well as understand the social aspects of practical use of knowledge and abilities as well as connected with them responsibility.	[SK2] presentation/project/paper/report [SK5] implementation of a problem task
	[CHEMMU2_W08] Demonstrates knowledge of theoretical computational and IT methods used to solve problems in chemistry.	At the completion of this course, the student is expected to know the most important and useful R functions and R packages for data manipulations, exploratory data analysis and data visualizations.	[SW2] presentation/project/paper/report [SW5] implementation of a problem task
	[CHEMMU2_W09] Classifies specialist IT tools used in statistical evaluation of experiment results.	At the completion of this course, the student is expected to describe and summarize the differences between R, RStudio and RStudioCloud.	[SW2] presentation/project/paper/report [SW5] implementation of a problem task
Subject 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).		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	51.0%	100.0%
Recommended reading	Basic literature	- 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	
	Supplementary literature	- Mahoney M. Introduction to Data Exploration and Analysis with R, 2019 - Peng R.D. (2020). R Programming for Data Science, 2020	
	eResources addresses		

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable

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