



COURSE UNIT DESCRIPTION

Course unit title	Code
CERN methods of data analysis for everyone	

Lecturer(s)	Department where the course unit is delivered
Coordinator: Dr. Mindaugas Šarpis Other(s): -	Faculty of Physics

Study cycle	Type of the course unit (module)
Undergraduate	Elective

Mode of delivery	Period when the course unit (module) is delivered	Language(s) of instruction
Lectures, seminars, homework	3 semester	English

Requirements for students	
Prerequisites: None	Additional requirements (if any): Computer literacy

Course (module) volume in credits	Total student's workload	Contact hours	Self-study hours
5	140	64	76

Purpose of the course unit (module): programme competences to be developed		
Learning outcomes of the course unit (module)	Teaching and learning methods	Assessment methods
Be able to apply computing skills for data analysis	Lectures / demos	Multiple choice / Project
Understand how different computing tools can be used	Lectures / demos	Multiple choice / Project
Know and follow best computing practices	Lectures / demos	Multiple choice / Project
Know and follow best data analysis practices	Lectures / demos	Multiple choice / Project
Become independent in data analysis and statistics	Lectures / demos	Multiple choice / Project
Be able to perform simple statistical analysis with Python	Lectures / demos	Multiple choice / Project
Be able to construct a reproducible analysis workflow	Lectures / demos	Multiple choice / Project

Content: breakdown of the topics	Contact hours							Self-study work: time and assignments	
	Lectures	Tutorials	Seminars	Exercises	Laboratory work	Internship/work placement	Contact hours	Self-study hours	Assignments
Overview of Computing Principles <i>Computer Infrastructure and Components/ Main working principles</i>	2		2				4	6	Repetition for exam; presentation preparation.
Overview of Computing Architectures and Tools <i>Different OS / Different programming languages / IDEs</i>	2		2				4	6	Repetition for exam; presentation preparation.
Overview of Tools and Environments <i>Software / Packages / Environments</i>	2		2				4	6	Repetition for exam; presentation preparation.
Introduction to Programming and Computing Skills <i>Intro to Python programming</i>	2		2				4	6	Repetition for exam; presentation preparation.
Best practices in coding <i>Readability / Version Control / Modularity</i>	4		4				8	6	Repetition for exam; presentation preparation.
Best practices in data analysis <i>Universality / Modularity / Reproducibility</i>	4		4				8	8	Repetition for exam; presentation preparation.
Effective problem solving techniques <i>Workflow oriented logic / Extensibility</i>	4		4				8	6	Repetition for exam; presentation preparation.
Basics of statistical analysis in Python <i>Overview of basics of statistics / examples in Python</i>	2		2				4	6	Repetition for exam; presentation preparation.
Analysis preservation and reproducibility <i>Scalability of analysis workflows and reproducibility with snakemake</i>	2		2				4	6	Repetition for exam; presentation preparation.
Project preparation <i>Examples / Demos</i>	2		2				4	6	Repetition for exam; presentation preparation.
Project preparation <i>Examples / Demos</i>	2		2		8		12	6	Repetition for exam; presentation preparation.
Total	28		28		8		64	76	

Assessment strategy	Weight, %	Deadline	Assessment criteria
Interim Tests	40	All course	2 multiple choice tests each including both problem solving and theory, and providing up to 40% to the final grade.
Final Project	60	End of course	A final project. Student needs to provide a project report written in English. As an appendix to the project report, the code written by student has to be provided. Project has to include the results of data analysis: plots, obtained numerical values. It is also possible to provide a link to repository if formats are not compatible with .pdf report format.

Author	Year of publication	Title	Issue of a periodical or volume of a publication	Publishing place and house or web link
Compulsory reading				
https://software-carpentry.org				
https://www.python.org/doc/				
Optional reading				
https://snakemake.readthedocs.io/en/stable/				
https://code.visualstudio.com/docs				