Course Unit Descriptor

Study Programme: Applied Mathematics – Data Science
Course Unit Title: Programming for Data Science
Course Unit Code: MDS01
Name of Lecturer(s): dr Vladimir Crnojević
Type and Level of Studies: Master studies
Course Status (compulsory/elective): Compulsory
Semester (winter/summer): Winter
Language of instruction: English
Mode of course unit delivery (face-to-face/distance learning): Face-to-face
Number of ECTS Allocated: 6
Prerequisites: Linear Algebra, Basic Programming Skills
Course Aims: - Introducing the fundamental principles of data science and data-analytic thinking - Learning Python coding skills for modelling and analyzing of a broad range of datasets - numerical, string, and more complex data formats - Translate a simple algorithm into a Python code - Learning how to effectively visualise results
Learning Outcomes: -Introduction into analysis and processing of data - Ability to write scripts in Python with basic programming concepts like loops, arrays, dictionaries, strings, if statements, functions and classes. - Develop practical skills in problem solving by working on diverse data

Syllabus:

Theory

Develop skills necessary to use Python for data analysis: □ □ □

Learn data structures: lists, tuples, dictionaries

Learn to write, test, and debug Python code

Learn scientific libraries in Python: NumPy (multidimensional array objects, linear algebra operations), SciPy (matrix decompositions, sparse matrices, statistical tests), Networkx (structure and analysis measures for graphs), Pandas (structured data, slicing, aggregating, and selecting subsets of data), Seaborn and Matplotlib (drawing attractive statistical graphics and visualizations)

Practice

Develop skills necessary for data-driven applications and decision making.

Required Reading:

Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "Introduction to data mining", Pearson Addison Wesley, 2006.

Wes McKinney, "Python for Data Analysis, O'Reilly Media", 2012. Ron Zacharski, "A Programmer's Guide to Data Mining", 2012.

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Weekly Contact Hours:	**Lectures: 2**	**Practical work: 3**

Teaching Methods: Lectures; revisions of the material; active students' participation in problem solving; homework assignments; application of the taught material on real-world examples.

Knowledge Assessment (maximum of 100 points): 100

Pre-exam obligations	points	**Final exam**	points
Active class participation		written exam	
Practical work	40	oral exam	
Preliminary exam(s)	20	Course project	40
Seminar(s)			

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.