Course Unit Descriptor

Study Programme: Applied Mathematics – Data Science	
Course Unit Title: Databases	
Course Unit Code: MDS27	
Name of Lecturer(s): Danijela Boberić Krstićev	
Type and Level of Studies: Master Academic Degree	
Course Status (compulsory/elective): elective	
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: None	

Course Aims:

Educating student for modelling, creating and using relational data model as well document-oriented databases.

Learning Outcomes:

Expected: The student should know and understand the differences between a relational database and a NoSQL database. The student should be able to create database model for an illustrated example of a real system as well as to store and retrieve data from a particular database system.

Desired: At the end of the course, it is expected that successful student is able to apply theory and techniques to unseen problems, to work independently and under a time constraint. Also, a successful student should be able to analyse semi-structured data and choose an appropriate storage structure.

Syllabus:

Theory

Concept of databases. Relational data model. SQL - query language for manipulating data. ACID transactions. The principles behind the NoSQL databases. The CAP theorem. ACID vs. BASE transaction. Architectures and common features of the main types of NoSQL databases (key-value stores, document databases, column-family stores, graph databases).

Practice

Creating relational data model by using appropriate CASE tool. Managing data using illustrative SQL queries. Analysis of case studies through the use of different types of NoSQL database systems.

Required Reading:

- Pramod J. Sadalage, Martin Fowler. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence. Addison-Wesley. 2012.
- Eric Redmond, Jim R Wilson. Seven Databases in Seven Weeks A Guide to Modern Databases and the NoSQL Movement. Pragmatic Bookshelf. 2012.
- Christopher J. Date. An Introduction to Database Systems. Pearson. 2003

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

Teaching Methods:

Classical teaching methods using video beam are applied during lectures. Basic principles of databases are explained and illustrated on appropriate examples. Practical exercises involve creating relational data model and execution of SQL

queries. Also, the most popular open source NoSQL database systems will be examined on practical exercises. Student has two sequential assessments: the first relating to RDBMS and the second relating to NoSQL. At the end of course, each student gets practical assignment which includes creation of data model using appropriate technology. At the oral exam, student must demonstrate his/her knowledge of basic principles of NoSQL and RDBMS.

Knowledge Assessment (maximum of 100 points):

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