NoSQL Databases

1. **Course number and name:** 020NQLES3 NoSQL Databases

2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours

3. **Name of course coordinator:** Jacques Abdo

4. **Instructional materials:** Course handouts, Powerpoint slides, in-class problems

5. **Specific course information**
   a. **Catalog description:**
   This course explores the technology of NoSQL databases, used in contexts where relational databases have limitations, notably in the field of Big Data, advanced analytics, and storage of data with different structures. The course begins with a review of the principles of relational databases and their limitations, then examines in detail the various types of NoSQL databases and their specific applications. The covered technologies include column databases, document databases, key-value databases, graph databases, and distributed computing. Practical work is planned for most of the databases studied.

   b. **Prerequisites:** 020BDRES2/020RDBES2 Relational Databases

   c. **Required** for CCE Artificial Intelligence Option students; **Selected Elective** for students in the CCE Software Engineering and Telecommunication Networks Options.

6. **Educational objective for the course**
   a. **Specific outcomes of instruction:**
   - Understand NoSQL technology.
   - Identify limitations of relational database.
   - Explore various NoSQL database types.
   - Apply NoSQL databases practically.
   - Solve problems in Big Data environments.
   - Critically analyze NoSQL use cases.

   b. **PI addressed by the course:**

PI	1.1	1.2	1.3	6.3	6.4
Covered	x	x	x	x	x
Assessed		x	x	x	x

7. **Brief list of topics to be covered**
   - Reminder on data models (1 lecture)
   - Characteristics and limitations of relational databases (2 lectures)

- Reasons for the emergence of NoSQL databases (2 lectures)
- Introduction to databases: Document, Column, Graph, Key-Value, MapReduce (3 lectures)
- Column databases (3 lectures)
- Graph databases (2 lectures)
- Principles of choosing a database (2 lectures)
- Introduction to MongoDB (Document) (3 lectures)
- Introduction to distributed queries and Spark (3 lectures)
- Introduction to Neo4J (Graph) (3 lectures)