Syllabus on the course "Big Data Analytics for Industrial Internet"
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Credits	6
Academic Hours	228
Year of study	2
Mode of study	Full-time

1. Applicability and Normative References

The present course syllabus sets minimal requirements for the theoretical background and practical skills obtained by students; provides the contents of the course and describes assessment of students' performance.

The program is designed for instructors teaching this course, teaching assistants and students of educational track 38.04.05 "Business Informatics", Masters's level.

The program is designed in compliance with the working curriculum of the University, educational track 38.04.05 "Business Informatics", 2^{d} year, Master's program.

2. Course Objectives

The present course is to introduce students to the core concepts of Big Data Analytics in Industrial Internet.

3. Course Description

"Big Data Analytics in Industrial Internet" is an elective course taught in the 2^{d} year of the master's program. The course is designed to give students an overview of an industrial environment as a source of data and related techniques of big data analytics.

The duration of the course covers two modules. The course is taught in English and worth 6 credits.

4. Learning Outcomes and Competences

By the end of the module, students should

- **Know** the fundamental concepts, principles and approaches to description of the Big Data Landscape in Industry.
- **Be able to** understand the main problems of the Big Data Analytics in Industry, get acquainted to the architectural components and programming models used for scalable data analysis.
- **Learn how to** use one of the most common frameworks, Hadoop.

5. Role of the Course in the Curriculum

The course is a part of major (professional) block of disciplines. It is an elective course.
The course is based on a number of preceding disciplines:

- Data Analysis
- Advanced Data Analysis & Big Data for Business Intelligence
- Big Data Systems Development and Implementation

To successfully study the current course, students should know major definitions and theorems of the above disciplines and be able to solve the typical problems.

6. Course Plan

1. LECTURE TOPICS
   1.1. Industrial revolutions
   1.2. 4th Industrial revolution. Features, drivers and challenges
   1.3. Industry 4.0. Definition, components, design principles
   1.4. Big Data Definition. Data Mining
   1.5. ata Analytics. Manufacturing Analytics
   1.6. ces of data in industrial environment
   1.7. IoT Gateway: collecting low-level shopfloor data
   1.8. rt Factory
   1.9. ata analytics concepts
   1.10. ata analytics methodologies and architectures
   1.11. ata analytics tools and platforms: Hadoop framework, MapReduce, HDFS, Tableau
   1.12. Industrial use cases
   1.13. QL and noSQL databases.
   1.14. rem, eventual consistency
   1.15. BASE: architecture, core work principles
   1.16. ference architectures in Industry 4.0.
   1.17. MI 4.0 – The Reference Architectural Model for I4.0
   1.18. ational and alternative reference architectures
   1.19. eria for I4.0 products
2. SEMINARS
   2.1.Individual presentations on selected topics related to Big Data Analytics in Industrial Internet:
   2.2.Practical workshops
   2.3. Architecture definitions

7. Assessment of Student's Performance

7.1. Criteria of assessment

To qualify the current assessment, the students should be able to solve the tests and problems on the topics discussed in class.

7.2. Topics tested at current assessment

1) Topics related to those covered during the lectures in a form of individual presentations
2) Practical tasks related to basic concepts, principles and algorithms studied in the course

7.3. Questions for assessing student's performance

Theoretical part of the course

7.4. Sample exam questions

The final exam is paper based. The duration of the exam is 90 minutes. The final exam covers the material of lectures.

8. Grading

The final grade O_{fin} is comprised of the O_{act} -grade (for activity during the lectures), the O_{ht} –grade (for home tasks) accumulated over the module and the grade O_{exam} obtained at the final in-class exam:

$$O_{fin} = 0.2 \cdot O_{act} + 0.3 \cdot O_{ht} + 0.5 \cdot O_{exam}$$