DESCRIPTION OF THE COURSE OF STUDY

Course code	**0719-2ID-F56-SBGPR**	
Name of the course in	Polish	*Systemy Big Data i przetwarzanie rozproszone*
	English	*Big Data Systems and Distributed Processing*

1. LOCATION OF THE COURSE OF STUDY within the system of studies

1.1. Field of study	**Data Engineering**
1.2. Mode of study	**Full-time**
1.3. Level of study	**First-cycle engineering studies**
1.4. Profile of study*	**General academic profile**
1.5. Person/s preparing the course description	Łukasz Misztal
1.6. Contact	**lukasz.misztal@ujk.edu.pl**

2. GENERAL CHARACTERISTICS OF THE course of study

2.1. Language of instruction	**Polish**
2.2. Prerequisites*	**None**

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

3.1. **Form of classes**		**Lecture, tutorial**
3.2. **Place of classes**		**Classes in UJK teaching rooms**
3.3. **Form of assessment**		credit with grade (lectures, laboratories), credit without grade (project)
3.4. **Teaching methods**		**Lecture using multimedia techniques**
3.5. **Bibliography**	**Required reading**	1. Tom White, „Hadoop: The Definitive Guide", O'Reilly Media. 2. Matei Zaharia, Learning Spark, O'Reilly Media. 3. Tyler Akidau, Slava Chernyak, Streaming Systems, O'Reilly Media.
	Further reading	

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

4.1 Course objectives ***(including form of classes)***

C1. To introduce students to the architecture and operating principles of Big Data systems.
C2. To develop practical skills in designing and implementing distributed data processing systems.
C3. To understand methods of scalability, parallelism, and reliability in data systems.

4.2 **Detailed syllabus** ***(including form of classes)***

Lectures:

1. Introduction to Big Data and distributed system architectures.
2. The MapReduce model, HDFS, Apache Hadoop, Apache Spark.
3. NoSQL databases, Data Lake, and cloud-based data processing.
4. Stream data processing – Apache Kafka, Apache Flink.
5. Scalability, reliability, and data security.

Laboratory classes / Project:

1. Configuration of the Hadoop/Spark environment and operations on large data sets.
2. Data analysis using Spark SQL and PySpark.
3. Integration with NoSQL databases (MongoDB, Cassandra).
4. Stream data processing – Kafka Streams.
5. Containerization and deployment of distributed systems using Docker/Kubernetes.

4.3 Intended learning outcomes

Code	**A student, who passed the course**	**Relation to learning outcomes**
within the scope of **KNOWLEDGE:**		
W01	knows the architecture and operating principles of distributed data processing systems (Hadoop, Spark, Flink).	ID1A_W06, ID1A_W07
W02	knows the models and technologies for storing and analyzing large data sets (HDFS, NoSQL, Data Lake).	ID1A_W09, ID1A_W10
W03	understands the concepts of scalability, parallelism, and fault tolerance in Big Data systems.	ID1A_W07, ID1A_W16

within the scope of **ABILITIES:**		
U01	is able to configure and run a distributed processing environment (e.g., Apache Hadoop/Spark).	ID1A_U06, ID1A_U07
U02	is able to develop and execute a large data set processing task using a selected Big Data technology.	ID1A_U07, ID1A_U08
U03	is able to analyze and optimize the performance of a distributed processing system and present the results of project work.	ID1A_U09, ID1A_U13
within the scope of **SOCIAL COMPETENCE:**		
K01	understands the need for continuous knowledge updating and skill improvement in the field of Big Data technologies, and is able to work in a project team, taking responsibility for task execution in a distributed environment.	ID1A_K01, ID1A_K03, ID1A_K04

4.4. **Methods of assessment of the intended learning outcomes**

Teaching outcomes *(code)*	**Method of assessment (+/-)**																				
	Exam oral/written*			**Test***			**Project***			**Effort in class***			**Self-study***			**Group work***			**Others* e.g. standardized test used in e-learning**		
	Form of classes			***Form of classes***			***Form of classes***			***Form of classes***			***Form of classes***			***Form of classes***			Lecture, tutorial		
	L	*C*	*P*	*L*	*C*	*P*	*L*	*C*	*P*	*L*	*C*	*P*	*L*	*C*	*P*	*L*	*C*	*P*	*L*	*C*	*P*
W01				+							+										
W02				+							+										
W03				+							+										
U01					+				+		+										
U02					+				+		+										
U03					+				+		+										
K01									+												

****delete as appropriate***

4.5. **Criteria of assessment of the intended learning outcomes**

Form of classes	**Grade**	**Criterion of assessment**
lecture (L) (including e-learning)	**3**	**Achievement of <50–60)% of the requirements specified in the assessment methods**
	3,5	**Achievement of <60–70)% of the requirements specified in the assessment methods**
	4	**Achievement of <70–80)% of the requirements specified in the assessment methods**
	4,5	**Achievement of <80–90)% of the requirements specified in the assessment methods**
	5	**Achievement of <90–100)% of the requirements specified in the assessment methods**
classes (C)* (including e-learning)	**3**	**Achievement of <50–60)% of the requirements specified in the assessment methods**
	3,5	**Achievement of <60–70)% of the requirements specified in the assessment methods**
	4	**Achievement of <70–80)% of the requirements specified in the assessment methods**
	4,5	**Achievement of <80–90)% of the requirements specified in the assessment methods**
	5	**Achievement of <90–100)% of the requirements specified in the assessment methods**
project (P)* (including e-learning)	**3**	**Achievement of <50–60)% of the requirements specified in the assessment methods**
	3,5	**Achievement of <60–70)% of the requirements specified in the assessment methods**
	4	**Achievement of <70–80)% of the requirements specified in the assessment methods**
	4,5	**Achievement of <80–90)% of the requirements specified in the assessment methods**
	5	**Achievement of <90–100)% of the requirements specified in the assessment methods**

5. BALANCE OF ECTS CREDITS – STUDENT'S WORK INPUT

Category	**Student's workload**	
	Full-time studies	**Extramural studies**
NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/	***60***	
*Participation in lectures**	*15*	

*Participation in classes, seminars, laboratories**	*30*	
Project	15	
INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/	***40***	
*Preparation for the classes, seminars, laboratories**	*10*	
*Preparation for the exam/test**	*15*	
Project	15	
TOTAL NUMBER OF HOURS	***100***	
ECTS credits for the course of study	**4**	

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Accepted for execution *(date and legible signatures of the teachers running the course in the given academic year)*

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