#### card of course

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| Subject name | Introduction to BIG DATA |

1. The placement of the subject in the study system

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| 1.1. Field of study | Computer science |
| 1.2. Form and path of study | Full-time/Part-time |
| 1.3. Level of education | First-cycle studies |
| 1.4. Study profile | Practical |

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| 1. 5. Specialty | Web Technologies and the Internet of Things |
| 1.6. Subject Coordinator | Dr Michał Kalisz |

2. General characteristics of the subject

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| 2.1. Belonging to a subject group | Optional/practical |
| 2.2. Number of ECTS | 5 |
| 2.3. Language of lectures | English |
| 2.4. Semesters in which the subject is taught | V |
| 2.5.Criteria for selecting course participants | For the specialization: Web Technologies and Internet of Things |

1. Learning outcomes and course delivery
   1. Subject Objectives

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| No. | Subject Objectives |
|
| C1 | Providing both theoretical and practical understanding of the principles and tools of big data analysis. |
| C2 | Preparation for the use of Big Data technologies in business practice. |
| C3 | Developing analytical skills and critical thinking in the context of data processing and interpretation. |

* 1. Subject-specific learning outcomes, divided into knowledge , skills and competences , with reference to the directional learning outcomes

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| --- | --- | --- | --- | --- | --- | --- |
| No. | Description of subject  learning outcomes | Reference to  directional effects  learning (symbols) | Method of implementation (mark "X") | | | |
| ST | | NST | |
| Classes at the University | Activities on  the platform | Classes at the University | Activities on  the platform |
| After passing the course, the student knows and understands **the knowledge** | | | | | | |
| W1 | Theoretical foundations of data analysis, including algorithms and statistical models used to interpret large data sets. | INF\_W04  INF\_W10  INF\_W12 |  | X |  | X |
| W2 | Various tools and technologies used in Big Data processing, including data visualization tools and analytical platforms. |  | X |  | X |
| W3 | Current trends and innovations in Big Data, including the development of artificial intelligence, machine learning and predictive analytics. |  | X |  | X |
| After passing the course, the student is **able** to: | | | | | | |
| U1 | Apply various tools and techniques in data analysis, including programming in languages such as Python, R. | INF\_U01 INF\_U02 INF\_U08 INF\_U12 INF\_U14 INF\_U27 | X |  | X |  |
| U2 | Efficiently process large data sets, including cleaning data, integrating data sources, and detecting and correcting errors. | X |  | X |  |
| U3 | Interpret the results of data analysis and formulate conclusions that can be used to make business decisions or develop research strategies. | X |  | X |  |
| After completing the course, the student is ready to take part in **social competences.** | | | | | | |
| K1 | Effective communication and collaboration, which is important in the context of Big Data analysis projects that often require interdisciplinary collaboration. | INF\_K04 | X |  | X |  |
| K2 | Working in a dynamic environment, adapting to changing project requirements and collaborating with various stakeholders, including business, scientific and technical teams. | X |  | X |  |

3.3. Forms of teaching and their number of hours - Full-time studies (ST), Part-time studies (NST)

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Path | Lecture | Exercises | Design | Workshop | Laboratory | Seminar | Lecturer | Classes conducted using distance learning methods and techniques in the form of a lecture | Other | **ECTS points** |
| **ST** |  |  |  |  | 30 |  |  | 20 |  | 5 |
| **NST** |  |  |  |  | 15 |  |  | 10 |  | 5 |

3.4. Content of education (separately for each form of classes: (W, ĆW, PROJ, WAR, LAB, LEK, OTHER). It should be marked (X) how the given content will be implemented (classes at the university or classes on the e-learning platform conducted using distance learning methods and techniques)

TYPE OF CLASS: LECTURE

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| --- | --- | --- | --- | --- | --- | --- |
| No. | Content of the course | Reference to subject-specific learning outcomes | Method of implementation (mark "X") | | | |
| ST | | NST | |
| **Classes at the University** | **Activities on  the platform** | **Classes at the University** | **Activities on  the platform** |
| 1. | Discuss basic concepts related to big data analytics, such as data volume, variety, and velocity. | W1, |  | X |  | X |
| 2. | Presentation of the main challenges related to processing and analyzing big data, including scalability, data integration, and security. | W1, W2 |  | X |  | X |
| 3. | An overview of various technologies and tools used in big data processing and analysis, and data visualization tools. | W2, W3 |  | X |  | X |
| 4. | Big data and artificial intelligence. | W1, W2, W3 |  | X |  | X |
| 5. | Discussing the role of Python in creating proprietary data analysis solutions. | W3 |  | X |  | X |
| 6. | Summary of classes and discussion of grades |  |  | X |  | X |

TYPE OF CLASS: LABORATORY

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| --- | --- | --- | --- | --- | --- | --- |
| No. | Content of the course | Reference to subject-specific learning outcomes | Method of implementation (mark "X") | | | |
| ST | | NST | |
| **Classes at the University** | **Activities on  the platform** | **Classes at the University** | **Activities on  the platform** |
| 1. | Familiarization with tools for analyzing data sets. Possibilities of creating own solutions based on Python language, available libraries. | U1, K1, K2 | X |  | X |  |
| 2. | Using practical knowledge to perform operations on vectors, matrices and numerical calculations in the context of analyzing large data sets. | U1, U3, K1, K2 | X |  | X |  |
| 3. | Practical examples of working with big data. | U2, U3, K1, K2 | X |  | X |  |
| 4. | Artificial intelligence and big data. | U2, U3, K1, K2 |  |  |  |  |
| 5. | Big data processing and analysis. | U1, U2, U3, | X |  | X |  |
| 6. | Summary of classes and discussion of grades |  | X |  | X |  |

3.5. Methods of verifying learning outcomes (indication and description of methods of conducting classes and verification of achievement of learning outcomes and method of documentation)

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| --- | --- | --- | --- |
| Subject Effects | Teaching methods | Methods of verifying learning outcomes | Documentation methods |
| KNOWLEDGE | | | |
| W1-W3 | Informative lecture using multimedia, conversational lecture | Lecture credit – test containing a set of 20 questions. Scoring:  Score 3: 11 – 12 points  Rating 3.5: 13 – 14 points  Score 4: 15 – 16 points  Rating 4.5: 17 – 18 points  Score 5: 19 – 20 points | Rated test |
| SKILLS | | | |
| U1-U3 | Doing exercises | Final colloquium | Assessed colloquium |
| SOCIAL COMPETENCES | | | |
| K1-K2 | Performing exercises, working in a group | Final colloquium | Assessed colloquium |

3.6. Assessment criteria for the achieved learning outcomes

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| --- | --- | --- | --- | --- | --- |
| **Learning effect** | **For a grade of 3 or "pass."**  **the student knows and understands/is able to/is ready to** | **For a grade of 3.5, the student knows and understands/is able to/is ready to** | **For a grade of 4, the student knows and understands/is able to/is ready to** | **For a grade of 4.5, the student knows and understands/is able to/is ready to** | **For a grade of 5, the student knows and understands/is able to/is ready to** |
| W | 51-60% of knowledge indicated in learning outcomes | 61-70% of knowledge indicated in learning outcomes | 71-80% of knowledge indicated in learning outcomes | 81-90% of knowledge indicated in learning outcomes | 91-100% of knowledge indicated in learning outcomes |
| U | 51-60% of skills indicated in learning outcomes | 61-70% of skills indicated in learning outcomes | 71-80% of skills indicated in learning outcomes | 81-90% of skills indicated in learning outcomes | 91-100% of skills indicated in learning outcomes |
| K | 51-60% of skills indicated in learning outcomes | 61-70% of skills indicated in learning outcomes | 71-80% of skills indicated in learning outcomes | 81-90% of skills indicated in learning outcomes | 91-100% of skills indicated in learning outcomes |

3.7. Literature

**Basic**

* Craig Stedman, The ultimate guide to big data for businesses, https://www.techtarget.com/searchdatamanagement/The-ultimate-guide-to-big-data-for-businesses
* Viktor Mayer-Schönberger, Kenneth Cukier, *BIG DATA Rewolucja, która zmieni nasze myślenie, pracę i życie*, MT Biznes, 2014

**Supplementary**

* Big Data. Najlepsze praktyki budowy skalowalnych systemów obsługi

4. Student workload - ECTS points balance

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| **Types of student activity** | **Student Load** | |
| **ST** | **NST** |
| **Classes requiring direct contact between the student and the academic teacher at the university premises** | **50** | **25** |
| Classes included in the study plan | 50 | 25 |
| **Student's own work** | **75** | **100** |
| Ongoing preparation for classes, preparation of project work/presentations/etc. | 40 | 50 |
| Preparation for passing classes | 35 | 50 |
| **TOTAL STUDENT HOURLY LOAD** | **125** | **125** |
| **Number of ECTS points** | **5** | **5** |

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| Last change date | 30/09/2024 |
| The changes were introduced | INF Education Quality Team |
| The changes were approved | Arkadiusz Gwarda, M.A. |