# GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

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| Subject name and code | Business Data Semantics and Representation, PG_00053100 |
| Field of study | Data Engineering |

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| Date of commencement of studies | October 2023 | Academic year of realisation of subject | 2025/2026 |
| Education level | first-cycle studies | Subject group | Optional subject group<br>Subject group related to scientific research in the field of study |
| Mode of study | Full-time studies | Mode of delivery | at the university |
| Year of study | 3 | Language of instruction | English |
| Semester of study | 6 | ECTS credits | 5.0 |
| Learning profile | general academic profile | Assessment form | exam |

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| Conducting unit | Department of Informatics In Management -> Faculty of Management and Economics -> Faculties of Gdańsk University of Technology |
| Name and surname of lecturer (lecturers) | Subject supervisor — dr inż. Sławomir Ostrowski |
| | Teachers — mgr Jaromir Durkiewicz<br><br>dr inż. Sławomir Ostrowski |

| Lesson types | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|---|
| | Number of study hours | 30.0 | 0.0 | 30.0 | 0.0 | 0.0 | 60 |
| | E-learning hours included: 0.0 | | | | | | |
| | eNauczanie source addresses:<br>Moodle ID: 47810 Business data semantics and representation 2026<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=47810 | | | | | | |

| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | Self-study | SUM |
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| | Number of study hours | 60 | 8.0 | 57.0 | 125 |

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| Subject objectives | The aim of the course is to present the possibilities of applying web intelligence methods in business. |

| Learning outcomes | Course outcome | Subject outcome | Method of verification |
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| | [K6_U11] is able to use mathematical and IT tools in economics. | The student is able to model and represent business knowledge using Semantic Web technologies (RDF, OWL) and ontology engineering tools to integrate and analyze data from various business sources. | [SU1] Assessment of task fulfilment |
| | [K6_W03] Knows the applications of geoinformation systems, spatial data formats, methods of creating and analysing digital maps, architecture and services of satellite navigation systems. | The student knows and understands methods of semantic data representation and the architecture of Semantic Web technologies (RDF, OWL, SWRL) and their application in the integration and analysis of business data. | [SW3] Assessment of knowledge contained in written work and projects |
| | [K6_K03] Knows how to cooperate or work in a project team and take managerial or executive functions. | Student, as an engineer with economic and financial skills is aware of the need for consultation based on the principles of their work on the background of the organization of the business enterprise and its technical infrastructure. | [SK1] Assessment of group work skills |

| Subject contents | Course content – lecture |
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| | Idea of the Semantic Web |
| | Monitoring of the Internet, brand protection |
| | NLP as a knowledge discovery method of the Semantic Web, sentiment analysis |
| | Social networks analysis |
| | Introduction to ontologies |
| | Resource Description Framework (RDF) |
| | Web Ontology Language (OWL) |
| | Semantic Web Rule Language (SWRL) as an extension of OWL |
| | Description Logic (DL) and inference algorithms |
| | Knowledge bases vs. databases |
| | Elements of ontology engineering |
| | Application of semantic technologies in business |

Course content – laboratory
1. Introduction to laboratories and project work organization.
2. Identification and analysis of a selected business sector as a domain for knowledge modeling.
3. Acquisition and analysis of business knowledge sources (industry reports, market data, literature).
4. Introduction to knowledge modeling and ontology in a business context.
5. Designing ontologies for a selected area of economic activity.
6. Building ontologies using the Protégé tool.
7. Defining classes, relationships, and properties of ontologies for business knowledge representation.
8. Creating ontology instances and building a knowledge base for the analyzed industry.
9. Integrating data and documenting knowledge sources used in the project.
10. Developing a knowledge base and using it to support managerial decisions.
11. Designing simple applications or scenarios using the developed knowledge base.
12. Presentation and discussion of project results ontology and knowledge base (R1 report).
13. Developing an application to support the activities of a company in the analyzed industry.
14. Presentation and evaluation of final team projects (R2 report).

| Prerequisites and co-requisites | No requirements |
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| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
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| | Reports | 60.0% | 50.0% |
| | Exam | 60.0% | 50.0% |

| Recommended reading | Basic literature | Hitzler, P., Krötzsch, M., Rudolph, S. (2020). *Foundations of Semantic Web Technologies (2nd ed.).* CRC Press. |
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| | | Allemang, D., Hendler, J. (2020). *Semantic Web for the Working Ontologist (3rd ed.).* Morgan Kaufmann. |
| | | Hogan, A. et al. (2021). *Knowledge Graphs.* Morgan & Claypool. |

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| | Supplementary literature | Antoniou, G., van Harmelen, F. (2008). *A Semantic Web Primer*. MIT Press. |
| | | Hitzler, P., Krötzsch, M., Rudolph, S. (2010). *Foundations of Semantic Web Technologies*. CRC Press. |
| | | Allemang, D., Hendler, J. (2011). *Semantic Web for the Working Ontologist*. Morgan Kaufmann. |
| | | Baader, F. (2003) The description logic handbook: theory, implementation, and applications, Cambridge University Press |
| | | Goczyła, K. (2011) Ontologie W Systemach Informatycznych, Exit |
| | | Mykowiecka, A (2007) Inżynieria Lingwistyczna, PJWSTK |
| | eResources addresses | |
| Example issues/ example questions/ tasks being completed | Application of sentiment monitoring tools fondness in brand protection Detection of trends in social networks Semantic data integration | |
| Practical activites within the subject | Not applicable | |

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