Courses in English
Course Description

Department	07 Computer Science and Mathematics
Course title	**Semantic Technologies and Knowledge Graphs**
Course number	
Hours per week (SWS)	4
Number of ECTS credits	5
Course objective	Students understand the terms "taxonomy" and "ontology". Students understand the expressive power and semantics of the ontology languages OWL and RDF(S). Students can model an OWL ontology in the ontology editor and apply a reasoner to derive new knowledge. Students recognize use cases where knowledge graphs add value. Students can generate an RDF knowledge graph. Students can query and update a knowledge graph.
Prerequisites	Basic knowledge in the fields of: relational databases, mathematical logic, complexity theory, programming (Python or Java)
Recommended reading	Learning SPARQL: Querying and Updating with SPARQL 1.1 (2nd Edition), Bob DuCharme, O'Reilly Media, 2013. Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL (3rd Edition), James Hendler, Fabien Gandon, Dean Allemang, ACM Books, 2020.
Teaching methods	whiteboard, slides, practical exercises
Assessment methods	module work (40%), oral exam (60%)
Language of instruction	English
Name of lecturer	Dr. Maja Milicic-Brandt
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Link	
Course content	Knowledge Graphs have been increasingly used since 2012, after Google successfully used them as a key technology to improve search results and provide structured answers. They collect "domain knowledge" in a network of "entities" and "relations", making large heterogeneous information available for automated processing. Application areas include: Data Access and Dashboarding, Recommender Systems, Digital Companions, Automated Planning. The lecture will cover the following topics: History of Knowledge Representation; Description Logics; W3C Semantic Technologies stack (RDF, RDF(S), OWL); Ontology Engineering: roles and requirements; RDF Knowledge Graphs and their industrial application; SPARQL (RDF Query Language); ETL (Extract, Transform, Load) for Knowledge Graphs; RDF Data Quality and Validation; Machine Learning outlook on Knowledge Graphs.
Remarks	