



COURSE SYLLABUS

Knowledge Representation and the Semantic Web, 7.5 credits

Kunskapsrepresentation och den semantiska webben, 7,5 högskolepoäng

Course Code: TSWR21	Education Cycle: Second-cycle level
Confirmed by: Dean Mar 1, 2021	Disciplinary domain: Technology
Revised by: Director of Education Sep 29, 2022	Subject group: DT1
Valid From: Aug 1, 2022	Specialised in: A1N
Version: 4	Main field of study: Computer Science

Intended Learning Outcomes (ILO)

After a successful course, the student shall

Knowledge and understanding

demonstrate comprehension of linked data concepts and technologies, including the foundational data model (RDF), the serializations of that data model (RDF/XML, Turtle, JSON-LD, etc), query languages for it (SPARQL), validation techniques (SHACL), and embedding techniques (Microdata, RDFa)

- demonstrate comprehension of knowledge representation using ontologies, including the most common languages and vocabularies utilized on the Semantic Web (OWL, SKOS, etc.)
- display knowledge of established ontology engineering methods
- display knowledge of current research on the Semantic Web

Skills and abilities

- demonstrate the ability to use established tools for ontology development, for the processing, storage, and querying of linked data, and for the validation and visualization of linked data and ontologies
- demonstrate the ability to use established APIs and datasets in the development of software that consumes, processes, and presents linked data and ontologies

Judgement and approach

- demonstrate the ability to choose applicable methods and tools for knowledge-based AI systems based on ontologies and the semantic web technologies

Contents

The course teaches students to develop and utilize linked data graphs and semantic ontologies for purposes of knowledge modelling, enabling homogenous knowledge representations and data integration across distributed underlying systems. Such knowledge representations can be utilized in a multitude of domains, including document management and search, intelligent agents, smart buildings, biomedical research, web searching, e-retailing, etc.

The course includes the following elements:

- Data graphs with RDF
- The Semantic Web – established tools and datasets
- Ontologies and Description Logic
- Ontology Engineering
- Utilizing RDF and OWL in software development
- Knowledge-based systems

Type of instruction

Instruction will consist of lectures and practical exercises.

The teaching is conducted in English.

Prerequisites

The applicant must hold the minimum of a bachelor's degree (i.e the equivalent of 180 ECTS credits at an accredited university) with at least 90 credits in Computer Engineering, Electrical Engineering (with relevant courses in computer engineering), or equivalent, or passed courses at least 150 credits from the programme Computer Science and Engineering. The bachelor's degree should comprise a minimum of 15 credits in mathematics. Proof of English proficiency is required.

Examination and grades

The course is graded 5,4,3 or Fail.

The final grade for the course is based upon a balanced set of assessments. The final grade will only be issued after satisfactory completion of all assessments.

Registration of examination:

Name of the Test	Value	Grading
Laboratory work	2.5 credits	U/G
Assignment	2 credits	5/4/3/U
Project	3 credits	5/4/3/U

Course literature

The literature list for the course will be provided 8 weeks before the course starts.

Allemang, D., & Hendler, J. (2011). *Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL*. Elsevier Science & Technology.

Rudolph, S. (2011). Foundations of description logics. In *Reasoning Web International Summer School* (pp. 76-136). Springer, Berlin, Heidelberg.

There may be additional academic articles; these are normally accessible online through open access-sources, or through the university library.