

Course Title: **Semantic Web Technologies and Applications**

Course Code: Elective

Duration: One Semester

Class Load: 3 – 0 – 1

Pre-requisite: Knowledge of Database and AI is preferable

Evaluation:

	Theory	Practical	Total
Sessional	25	15	40
Final	60	-	60
Total	85	15	100

Course Objectives:

- To introduce the field of Semantic Web technologies
- To provide knowledge about structured information representation
- To provide knowledge of Ontologies and knowledge representation standards
- To provide knowledge of social semantic web and Linked Open Data
- To introduce application areas of Semantic Web technologies

Course Contents:

1. Introduction (5 hrs)

Background and vision, Foundations of the Semantic Web, Semantic Web Layer Cake, Knowledge sharing, AI and the Semantic Web

2. Information representation, structured data and semantics (9 hrs)

XML, DTD, XML schema, XSLT, Metadata standards, Dublin core, Information representation in the Semantic Web (RDF, RDFS, RDF/XML, n-triples, turtle, RDFa, Microformats, eRDF, HTML5, GRDDL), Querying the Semantic Web: SPARQL

3. Ontologies (8 hrs)

Introduction, Ontology classification - Top level ontologies and domain ontologies, Lightweight and heavyweight ontologies, Knowledge representation and reasoning -

Description Logic, OWL, Rules – SWRL, Ontology engineering methodologies, Ontology learning, Ontology alignment

4. The Social Semantic Web (8 hrs)

Social web and web 2.0, Creation of Semantic Web data, Semantic annotation, Social semantic web tools and applications, Tags and ontologies, Social web and emergent semantics, Semantic interoperability and integration

5. Linked Open Data (8 hrs)

Linked data principles, Linked data publishing, Linked Open Data (LOD), LOD cloud, Linked Data applications.

6. Semantic Web in the industry and Web 3.0 (7 hrs)

Case studies, Application areas: knowledge management, data integration, enterprise applications, e-government, multimedia etc., Recent developments and open research problems

Lab sessions: Lab sessions may be conducted for learning to use XML tools (XML spy, etc), Semantic Web frameworks (Jena, ARC, etc), Ontology creation (Protégé, etc). A project work would also be included.

Reference Books:

1. *A Semantic Web Primer*. MIT Press, 2004. Grigoris Antoniou and Frank van Harmelen
2. Handouts, W3C specifications and online materials
3. *Spinning the Semantic Web - Bringing the World Wide Web to Its Full Potential*. MIT Press, 2002, Dieter Fensel, James A. Hendler, Henry Lieberman, and Wolfgang Wahlster (Eds.)
4. *Semantic Web for the Working Ontologist*. 2008. Dean Allemang and Jim Hendler.
5. *The Social Semantic Web*. Springer, 2009. John G. Breslin, Alexandre Passant and Stefan Decker.
6. *Linked Data: Evolving the Web into a Global Data Space*. Morgan & Claypool, 2011. Tom Heath and Christian Bizer.
7. *Semantic Web for Business: Cases and Applications*. IGI, 2008. Roberto Garcia.
8. *XML Bible*. Hungry Minds. New York, 2001. Elliotte Rusty Harold.