CS6852: **Theory and Applications of Ontologies (Jan-April 2018, C Slot)**

Faculty: Dr P Sreenivasa Kumar, Professor, CSE Dept, IIT Madras.

General: It is understood that – 1) all students undertake that no work submitted for evaluation as part of this course will be re-used for any other purpose by the student, 2) no work submitted as part of this course is copied/taken from any internet source or work of other students.

Course Grading:

Quiz I - 15%, Quiz II - 15%, Programming Assignments - 30%, End-semester - 40%.

Course Contents:

Semi-structured Data and the XML framework: Need for semi-structured data, Relevance as a data model and in data integration, the XML framework, Document Type Definitions (DTDs), XML Schema, Storing and querying XML data, XPATH, XSLT, XQUERY languages. Limitations of the XML framework.

Theory behind Ontologies: Description Logics (DLs), the attributive language with complement (ALC), ALCN, Specific DLs – SROIQ, and SHIQ; Semantics of Description Logics; Inference in DLs, the tableaux algorithms.

Semantic Models and Knowledge Bases: Elements of Semantic Web Technology – Resource Description Framework (RDF); Ontology Frameworks – RDF Schema, Ontology Web Language (OWL); Ontology tools – Protégé; Query languages for semantic data – SPARQL language; Principles of Linked Data, Linked Data Cloud; Triple stores and indexing RDF data.

Applications of Ontologies: Semantic search, Ontologies for information integration, ontologies for question answering systems.

Programming assignments: Developing DTDs, Using XPATH 2.0, XQUERY and XSLT; Developing ontologies using OWL and Protégé, Querying using SPARQL, OWLAPI etc

A detailed document on the programming assignments and method of evaluation is made available on the course page on the IITM Moodle course management system.

Primary Reference Books:

1. Semantic Web for the Working Ontologist – Effective modeling in RDFS and OWL (Second Edition), Dean Allemang and Jim Hendler, Morgan Kaufman, 2011.
2. Foundations of Semantic Web Technologies, Pascal Hitzler, Sebastian Rudolph and Markus Kroetzsch, Chapman & Hall / CRC Textbooks in CS, 2010.
3. The Semantic Web Primer (2nd Edition), Grigoris Antoniou and Frank van Harmelen, MIT Press, 2008.
4. Description Logic Handbook: Theory, Implementation and Applications, (2nd Edition), Franz Baader et al, Cambridge Univ Press, 2010.