

Course Code				
Department	CSE			
Course Name	Semantic Web			
Credits	4			
Course Offered to	UG/PG			
Whether the course is to be counted towards M.Tech specialization. If yes, please select the specialization towards which it is to be counted	CSE- Data Engineering			
If the course is to be counted towards other B.Tech programs(For Ex if a course with CSE no. satisfies the requirement of 32 credits of B.Tech ECE program that students have to do in last 4 semesters, then the drop down answer should be ECE)	CSE			
Course Description	Knowledge Representation and Reasoning (KRR) is a field of AI that deals with capturing knowledge of the world in a form suitable for machines to act on. This helps machines in taking decisions based on the domain knowledge and rules. In this course, we will be looking at KRR from a Semantic Web perspective. Semantic Web technologies are now widely used by several commercial enterprises (Google, Amazon, LinkedIn, IBM, GE) in the form of Knowledge Graphs (semantic descriptions of entities and their relationships) and ontologies. They play a key role in knowledge driven applications across several domains such as life science, geoscience, healthcare, IoT, smart cities etc.			
Pre-requisites				
Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requisite(other)		
CSE101 Introduction to Programming, CSE202 Fundamentals of Database Systems	CSE201 Advanced Programming			
*Please insert more rows if required				
Post Conditions				
CO1	CO2	CO3	CO4	CO5
Students can write RDF statements (15-20) to describe a given use case	Students are able to design and build ontologies with concepts (20-30), roles (5-10),and relationships between them	Students can write SPARQL queries on RDF graphs	Students can express simple constraints on RDF graphs using SHACL	Students are able to demonstrate the use of Semantic Web technologies in an application
Weekly Lecture Plan				
Week Number	Lecture Topic	COs Met	Assignment/Labs/Tutorial	
1	Course logistics Introduction to KRR - role of KRR in AI systems - forms of KRR. Introduction to Semantic Web - vision, - KRR and the web aspects - Semantic Web, Knowledge Graphs and the hype			
2	Resource Description Framework (RDF) - different syntaxes - triples, blank nodes - RDFS, RDFa, JSON-LD - entailment rules - semantics	CO1	In-class activity	
3	Introduction to Logic (guest lecture from Dr. Sankha Basu, Maths department) - propositional logic - first order logic - tableau algorithm		Assignment	
4	Description Logics - ALC - SHIQ - SROIQ - Tableau algorithm			
5	- classes, properties, individuals			
6	- Ontology Design Patterns	CO2	In-class activity	
7	- syntax	CO3		
8	- 5 stars of linked data		Assignment	
9	- guest lecture from Dr. Sumit Bhatia of IBM Research Lab, Delhi			
10	Shapes Constraint Language (SHACL) - Introduction - Shapes and Constrai	CO4		
11	- distributed query processing			
12	- to simplify ontology creation	CO5		
13	worlds meet?			
*Please insert more rows if required				
Assessment Plan				
Type of Evaluation	% Contribution in Grade			
Quiz (2 * 10)	20			
Mid-sem	20			
In-class activity (2 * 5)	10			
Project/Paper presentation	25			
End-sem	25			
*Please insert more row for other type of Evaluation				
Resource Material				
Type	Title			
Textbook	Foundations of Semantic Web Technologies. Pascal Hitzler, Markus Krotzsch, Sebastian Rudolph. CRC Press			
Reference book	Knowledge Representation and Reasoning. Ronald Brachman, Hector Levesque. Morgan Kaufmann			
Reference book	Artificial Intelligence. Stuart Russell, Peter Norvig. Pearson			
Reference book	Linked Data: Storing, Querying, and Reasoning. Sherif Sakr, Marcin Wylot, Raghava Mutharaju, Danh Le Phuoc, Irini Fundulaki. Springer			
Research Papers	As needed			