

**Course Title: Knowledge Engineering (3 Cr.)**

**Course Code: CACS458**

**Year/Semester: IV/VIII**

**Class Load: 5 Hrs. / Week (Theory: 3Hrs. Practical: 2 Hrs.)**

**Course Description**

This course offers detailed concept about knowledge representation, logic, reasoning and principles. It includes introduction, knowledge acquisition, knowledge representation and reasoning. It does not entirely focus on theoretical concept but also strongly focuses on practical skill based learning.

**Course objectives**

The general objectives of this course are to provide theoretical as well as practical knowledge of knowledge engineering to make students capable of analysis, design, implementing and managing of knowledge engineering in their personal as well professional life.

**Course Contents**

**Unit 1: Introduction [6 Hrs.]**

- 1.1 Overview of data. Information and knowledge
- 1.2 Knowledge engineering and Knowledge management
- 1.3 Artificial intelligence use in knowledge Engineering
- 1.4 Knowledge based system and its applications

**Unit 2: Knowledge Acquisition [8 Hrs]**

- 2.1 Information gathering
- 2.2 Information retrieval
- 2.3 Applications of Natural Language processing
  - 2.3.1 Morphology, lexicon, syntax and semantics
  - 2.3.2 Parsing, POS tagging, named entity tagging

**Unit3: Machine Learning [12 Hrs]**

- 3.1 Machine Learning and its applications
- 3.2 Supervised and unsupervised learning
- 3.3 Classification and clustering
- 3.4 Classification algorithms
  - 3.4.1 Linear classifiers
  - 3.4.2 nearest neighbor
  - 3.4.3 Support Vector Machines
  - 3.4.4 Decision tree
  - 3.4.5 Random forest
  - 3.4.6 Neural networks
  - 3.4.7 Case based reasoning

**Unit 4: Knowledge representation and reasoning [7Hrs]**

- 4.1 Proposition logic, predicate logic and reasoning
- 4.2 Knowledge representation languages
- 4.3 Non-monotonic reasoning
- 4.4 Probabilistic reasoning

**Unit 5: Ontology Engineering [6 Hrs]**

- 5.1 Overview to Ontology
- 5.2 Classifications of ontology
- 5.3 Methodology use in Ontology



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## 5.4 Ontology VS Language

### Unit 6: Knowledge Sharing [9 Hrs]

#### 6.1 Information Distribution and Integration

#### 6.2 Semantic web and its applications

##### 6.2.1 RDF and linked data

##### 6.2.2 Description logic

##### 6.2.3 Web Ontology language

#### 6.3 Social web and semantics

### Laboratory Works

The practical work consists of all features of knowledge engineering and case studies.

### Teaching Methods

The teaching faculties are expected to create environment where students can update and upgrade themselves with the current scenario of computing and information technology with the help of topics listed in the syllabus. The general teaching pedagogy that can be followed by teaching faculties for this course includes class lectures, laboratory activity, group discussions, case studies, guest lectures, research work, project work, assignments (Theoretical and Practical), and written and verbal examinations.

### Evaluation

Examination Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	

### Text Books

3. Kendal, Simon, Creen, Malcolm, An Introduction to Knowledge engineering, Springer first edition, 2007
4. R.J. Brachman and H.J. Levesque. Knowledge representation and resoning (Elsevier 2004)

### Reference Books

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A modern approach ( Prentice Hall edition , second edition, 2002)
2. P. Jackson, Introduction to expert systems, Addison Wesley, 1999.
3. John Debenham, Knowledge Engineering: Unifying Knowledge Base and Database Design , Springer , 1998

