Course code	Course Name	L-T-P - Credits	Year of Introduction
IT407	**Knowledge Engineering**	**3-0-0-3**	**2016**

Prerequisites: CS205 Data structures.

Course Objectives

To enable the students:

- To get introduced to the basic knowledge representation, problem solving, and learning methods of Artificial Intelligence.
- To solve problems in Artificial Intelligence using Python.
- To familiarize with Fuzzy Logic and knowledge processing in expert systems.

Syllabus

Introduction to the Concepts of Artificial Intelligence, Search Space, Knowledge Representation, Learning Techniques, Fuzzy systems and expert systems.

Expected outcome .

The students will

  i.   know the fundamental concepts of Artificial Intelligence such as knowledge representation, problem solving, fuzzy set and expert systems
  ii. will be able to implement search methods using Python.

Text Books:

1. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill Publishing Company Ltd., New Delhi, Third Edition, ISBN: 13:978-0-07-008770-5, 2010.
2. Stuart Russell, Peter Norvig, "Artificial Intelligence- A modern approach", Pearson Education Asia, Second Edition, ISBN:81-297-0041-7

References:

1. Akshar Bharati, Vineet Chaitanya, Rajeev Sangal, "Natural Language Processing: A Paninian Perspective", Prentice Hall India Ltd., New Delhi, 1996, ISBN 10: 8120309219
2. Amit Konar, Artificial Intelligence and Soft Computing, CRC Press.
3. Dan W.Patterson, "Introduction to Artificial Intelligence and Expert Systems", Prentice Hall India Ltd., New Delhi, 2009, ISBN: 81-203-0777-1.
4. Rajendra Akerkar, Introduction to Artificial Intelligence, PHI Learning Pvt. Ltd., 2005, ISBN: 81-203- 2864-7.

Course Plan			
Module	**Contents**	**Hours**	**Sem. Exam Marks**
I	**Problems and Search:** What is Artificial Intelligence, The AI Problems, Defining the Problem as a State Space Search, Problem Characteristics Searching strategies – Generate and Test, Heuristic Search Techniques- Hill climbing– issues in hill climbing. **Python**-Introduction to Python- Lists Dictionaries & Tuples in Python- Python implementation of Hill Climbing.	7	15%
II	**Search Methods -** Best First Search - Implementation in Python - OR Graphs, The A * Algorithm, Problem Reduction- AND-OR Graphs, The AO* algorithm, Constraint Satisfaction. MINIMAX search procedure, Alpha–Beta pruning.	7	15%
FIRST INTERNAL EXAMINATION			

III	**Knowledge representation** - Using Predicate logic - representing facts in logic, functions and predicates, Conversion to clause form, Resolution in propositional logic, Resolution in predicate logic, Unification. Representing Knowledge Using Rules: Procedural Versus Declarative knowledge, Logic Programming, Forward versus Backward Reasoning.	7	15%
IV	**Learning:** What is learning, Rote learning, Learning by Taking Advice, Learning in Problem-solving, Learning from example: induction, Explanation-based learning.	7	15%
SECOND INTERNAL EXAMINATION			
V	**Connectionist Models:** Hopfield Networks, Learning in Neural Networks, Applications of Neural Networks, Recurrent Networks. Connectionist AI and Symbolic AI	7	20%
VI	**Expert System** –Representing and using Domain Knowledge – Reasoning with knowledge– Expert System Shells –Support for explanation- examples –Knowledge acquisition-examples.	7	20%
END SEMESTER EXAM			

QUESTION PAPER PATTERN

Maximum Marks: 100   Exam Duration: 3 hours

The question paper shall consist of Part A, Part B and Part C.

Part A shall consist of three questions of 15 marks each uniformly covering Modules I and II. The student has to answer any two questions (15×2=30 marks).

Part B shall consist of three questions of 15 marks each uniformly covering Modules III and IV. The student has to answer any two questions (15×2=30 marks).

Part C shall consist of three questions of 20 marks each uniformly covering Modules V and VI. The student has to answer any two questions (20×2=40 marks).

Note : Each question can have a maximum of 4 subparts, if needed