**Fr. Conceicao Rodrigues College Of Engineering**

Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50

**Department of Information Technology**

**B.E. (IT) (semester VII)  (2019-2020)**

**Lesson Plan**

**Subject: Artificial Intelligence** **(ITC703)                   Credits-4**

**SYLLABUS**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr.**  **No.** | **Module** | **Detailed Content** | **CO**  **Mapping** |
| 0 | Prerequisites | Knowledge of any programming language, Data structures. | -- |
| 1 | Introduction to Intelligent Systems and Intelligent Agents | Introduction to AI, AI Problems and AI techniques, Solving problems by searching, Problem Formulation. State Space Representation  Structure of Intelligent agents, Types of Agents, Agent Environments PEAS representation for an Agent. | CO1,CO2 |
| 2 | Search Techniques | Uninformed Search: DFS, BFS, Uniform cost search, Depth Limited Search, Iterative Deepening. Informed Search: Heuristic functions, Hill Climbing, Simulated Annealing, Best First Search, A\*, Constraint Satisfaction Programming: Crypto Arithmetic, Map Coloring, N-Queens.  Adversarial Search: Game Playing, Min-Max Search, Alpha Beta Pruning | CO2,CO3 |
| 3 | Knowledge and Reasoning | A Knowledge Based Agent, Overview of Propositional Logic, First Order Predicate Logic, Inference in First Order Predicate Logic: Forward and Backward Chaining, Resolution. | CO4 |
| 4 | Planning | Introduction to Planning, Planning with State Space Search, Partial Ordered planning, Hierarchical Planning, Conditional Planning | CO4 |
| 5 | Uncertain Knowledge and Reasoning | Uncertainly, Representing Knowledge in an Uncertain Domain, Conditional Probability, Joint Probability, Bayes’ theorem, Belief Networks, Simple Inference in Belief Networks | CO5 |
| 6 | Natural Language Processing | Language Models, Natural Language for Communication: Syntactic Analysis, Augmented Grammars and Semantic Interpretation, Machine Translation.  Overview of Cognitive Computing: Foundation of Cognitive Computing, List of Design Principles for Cognitive Systems, Natural Language Processing in Support of a Cognitive System (First three chapters from Text book 3) | CO6 |

**Internal Assessment:**

Internal Assessment consists of two tests. Test 1, an Institution level central test, is for 20 marks and is to be based on a minimum of 40% of the syllabus. Test 2 is also for 20 marks and is to be based on the remaining syllabus.

**CO-Statements:**

|  |  |
| --- | --- |
| **Sr.No.** | **Course Outcome Statement** |
| ITC703.1 | Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents. |
| ITC703.2 | Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them |
| ITC703.3 | Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing |
| ITC703.4 | Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning. |
| ITC703.5 | Formulate and solve problems with uncertain information using Bayesian approaches. |
| ITC703.6 | Apply concept Natural Language processing to problems leading to understanding of cognitive computing. |

**CO-PO-PSO Mapping**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Name** | **PO**  **1** | **PO**  **2** | **PO**  **3** | **PO**  **4** | **PO**  **5** | **PO**  **6** | **PO**  **7** | **PO**  **8** | **PO**  **9** | **PO**  **10** | **PO**  **11** | **PO**  **12** | **PSO**  **1** | **PSO**  **2** |
| ITC703.1 | 3 |  |  |  |  |  |  |  | 1 | 3 |  |  |  |  |
| ITC703.2 | 3 | 3 |  |  |  |  |  |  | 1 | 3 |  |  |  |  |
| ITC703.3 | 3 | 2 | 3 | 1 | 2 |  |  |  | 1 | 3 |  |  | 2 | 3 |
| ITC703.4 | 3 | 2 | 3 | 1 | 2 |  |  |  | 1 | 3 |  |  | 2 | 3 |
| ITC703.5 | 3 | 2 | 3 | 1 | 2 |  |  |  | 1 | 3 |  |  | 2 | 3 |
| ITC703.6 | 3 | 2 | 3 | 2 | 3 |  |  |  | 1 | 3 |  |  | 2 | 3 |

**CO Assessment Tools**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Direct Methods** | | | | | | | | | **Indirect Methods** |
| **CO.No** | **Test1** | **Test2** | **Assignment1** | **Assignment2** | **Assignment 3** | **Assignment 4** | **Assignment5** | **Chatbot Project** | **University Theory Result** | **Course Exit Survey** |
| **ITC703.1** | **30%** | **-** | **40%** |  |  |  |  |  | **30%** | **100%** |
| **ITC703.2** | **30%** | **-** |  | **40%** |  |  |  |  | **30%** | **100%** |
| **ITC703.3** | **30%** | **-** |  |  | **40%** |  |  |  | **30%** | **100%** |
| **ITC703.4** | **-** | **30%** |  |  |  | **40%** |  |  | **30%** | **100%** |
| **ITC703.5** | **-** | **30%** |  |  |  |  | **40%** |  | **30%** | **100%** |
| **ITC703.6** | **-** | **30%** |  |  |  |  |  | **40%** | **30%** | **100%** |

**Curriculum Gap: NIL**

**Content beyond syllabus: NIL**

**Implementation of a project: Implementation of Chatbot using NLP and Machine Learning/Deep Learning.**

Students in group design and implement Chatbot for any suitable application/ BE project.

Objective:

* To learn Natural Language Processing and Machine Learning Concepts.
* To learn new tools and technology to implement the chatbot

**Lesson Plan:**

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| --- | --- | --- | --- | --- |
| **Sr. No.** | **Topic / Chapter** | **Planed Date** | **Actual date** | **Delivery Mechanisms** |
| 1 | Introduction to Intelligent Systems and Intelligent Agents (06) | 02-07-19 to 12-07-19 | 02-07-19 to 17-07-19 | Class room teaching/  Ppt/Online Links |
| 2 | Search Techniques: Uninformed Search Techniques, Informed Search Methods, Adversarial Search (12) | 16-07-19 to 02-08-19 | 18-07-19 to 31-07-19 | Class room teaching/  Ppt/Online Links /In class Exercise |
| 3 | Knowledge and Reasoning(8) | 06-08-19 to 23-08-19 | 01-08-19 to 20-08-19 | Class room teaching/  Ppt/Online Links /In class Exercise |
| 4 | Planning(8) | 27-08-19 to 17-09-19 | 21-08-19 to 18-09-19 | Class room teaching/  Ppt/Online Links /In class Exercise |
| 5 | Uncertain Knowledge and Reasoning(6) | 18-08-19 to 26-09-19 | 19-08-19 to 28-09-19 | Class room teaching/  Ppt/Online Links /In class Exercise |
| 6 | Natural Language Processing(06) | 01-10-19 to 11-10-19 | 29-09-19 to 10-09-19 | Class room teaching/  Ppt/Online Links /In class Exercise |

**Lab Plan**

**Lab Name: Intelligence System Lab (ITL703) Credits: 1**

**Lab Outcomes:**

ITL703.1.Design the building blocks of an Intelligent Agent using PEAS representation.

ITL703.2. Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.

ITL703.3. Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing

ITL703.4. Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.

ITL703.5. Formulate and solve problems with uncertain information using Bayesian approaches. ITL703.6. Apply concept Natural Language processing and cognitive computing for creation of domain specific ChatBots.

**Lab Plan:**

|  |  |  |
| --- | --- | --- |
| **Experiments** | **Week Planned** | **LO Mapped** |
| **1) Defining PEAS and state space representation for various problem statements.** | **Week1,2** | LO 1, LO 2 |
| **2) Implementing finite space problem statement and applying informed and uninformed search techniques.** | **Week3,4** | **LO2** |
| **3) Implementation of Constraint Satisfaction Problems** | **Week5,6** | **LO3** |
| 4) **Representation of AI problems using Predicate and Propositional Logic , and Reasoning** | **Week7,8** | **LO4** |
| **5) Design of Planning systems using STRIPS** | **Week9,10** | **LO4** |
| **6) Baye’s Belief Network- CaseStudy** | **Week11,12** | **LO5** |
| **7) Chatbot using AI** | **Week13,14** | **LO6** |

**Assignment Plan:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Assignment No** | **Date** | **Questions** | **CO/LO** |
| **1** | **17-07-19** | **Uploaded on Moodle** | **CO1,LO1** |
| **2** | **31-07-19** | **CO2,LO2** |
| **3** | **20-08-19** | **CO3,LO3** |
| **4** | **18-09-19** | **CO4,LO4** |
| **5** | **28-09-19** | **CO5,LO5** |

**Term Work:** Term Work shall consist of at least 10 to 12 practical’s based on the above list. Also Term work Journal must include at least 2 assignments.

**Term Work Marks:**

25 Marks (Total marks) = 20 Marks (Experiment + Mini-Project) + 5 Marks (Attendance) Oral Exam: An Oral exam will be held based on the above syllabus.