

Certified Artificial Intelligence Professional:

Module 1:

Foundation of AI:

- What is AI
- It's Foundation
- History of AI
- Ethics and Risks of Developing AI

Module 2:

Intelligent Agents:

- Agents and Environments
- Concept of Rationality
- Nature of Environments
- Structure of Agents

Module 3:

Logic and Reasoning:

- Knowledge-based agents
- Propositional logic based agents
- Knowledge engineering in First-Order Logic
- Propositional vs First-Order Inference
- Forward Chaining
- Backward Chaining
- Classical Planning Approaches
- Hierarchical Planning
- Planning and Acting in Nondeterministic Domains
- Multi-agent Planning
- Ontological Engineering
- Categories, Objects and Events
- Mental Events and Mental Objects
- Reasoning Systems for Categories
- Reasoning with Default Information

Module 4:

Dealing with Uncertainty:

- Acting under Uncertainty
- Basic Probability Notation
- Inference using Full Joint Distributions
- Independence
- Bayes Rule and its use
- Representing Knowledge in an Uncertainty Domain
- Keeping Track of Many Objects

Module 5:

Complexity Classes:

- P
- NP
- NP-Complete
- NP-Hard
- Knowledge About Other Classes

Module 6:

Expert Systems:

- Basis of Utility Theory
- Utility Functions
- Multi-attribute Utility Functions
- Decision Networks
- Value of Information
- Decision-Theoretic Expert Systems

Module 7:

Belief Networks:

- Semantics of Bayesian Networks
- Efficient Representations of Conditional Distributions
- Exact Inference in Bayesian Networks
- Approximate Inference in Bayesian Networks
- Relational and First-Order Probability Models
- Other Approaches to Uncertain Reasoning
- Time and Uncertainty
- Inference in Temporal Models
- Hidden Markov Models
- Kalman Filters
- Dynamic Bayesian Networks

Module 8:

Natural Language Processing:

- Language Models
- Text Classification
- Information Retrieval
- Information Extraction
- Syntactic Analysis
- Augmented Grammars and Semantic Interpretation
- Machine Translation
- Speech Recognition

Module 9:

Machine Learning:

- Forms of Learning
- Supervised Learning
- Learning Decision Trees
- Evaluating and Choosing the Best Hypothesis
- Theory of Learning
- Regression and Classification with Linear Models
- Artificial Neural Networks
- Non-parametric models
- Support Vector Machines
- Ensemble Learning
- Knowledge in Learning
- Statistical Learning
- Learning with Complete Data
- Learning with Hidden Variables – The EM Algorithm
- Passive Reinforcement Learning
- Active Reinforcement Learning
- Generalization in Reinforcement Learning
- Early Image – Processing Operations
- Object Recognition by Appearance
- Object Recognition from Structural Appearance

Module 10:

Robotics:

- Robot Hardware
- Robotic Perception
- Robotic Movement

- Robotic Software Architectures