

Semester -VII
Branch: Computer Science & Engineering

S.N.	Code	Course Title	Lecture	Tutorial	Practical	Credits
1	CS701	Artificial Intelligence	3	0	0	3
2	PEC-V	Professional Elective -V	3	0	0	3
3	PEC-VI	Professional Elective -VI	3	0	0	3
4	OEC IV	Open Elective -IV	3	0	0	3
5	OEC V	Open Elective -V	3	0	0	3
6	CS751	Artificial Intelligence Lab.	0	0	3	1
7	CS752	Project-I	0	0	4	2
8	CS753	Internship Assessment II	0	0	2	2
Total credits						20

Code	Professional Elective-V (Any one)	Code	Professional Elective-VI (Any one)
CS711	Machine Learning	IT721	Data Mining and Data Warehousing.
CS712	Multimedia and Applications	IT722	Information Security.
CS713	Human Computer Interaction	CS721	Natural Language Processing

Code	Open Elective-IV (Any one)	Code	Open Elective-V (Any one)
IT701	Software Engineering	IT741	Information Security
CS732	Values and Ethics in Profession.	CS741	Cryptography
CS733	*Data Mining	IT742	Knowledge Domain Development

* Not for CSE Students

Computer Science & Engineering and Information Technology					
Code: CS701	Artificial Intelligence				
		L	T	P	C
		3	0	0	3

COURSE OUTCOME

CO.1: Discuss basic concepts of Artificial Intelligence, AI(Artificial Intelligence) principles, AI Task domains and application.

CO.2: Explain various searching techniques, constraint satisfaction problem, game playing techniques and **Apply** these techniques in applications which involve perception, reasoning and learning.

CO.3: Explain various searching techniques, constraint satisfaction problem, game playing techniques and **Apply** these techniques in applications which involve perception, reasoning and learning.

CO.4: Explain working of uncertainty management, decision making and learning methods.

CO.5: Apply different knowledge representation, reasoning, and learning techniques to real-world problems.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
CO.1	3	-	-	-	-	-	-	-	-	-	-	3
CO.2	3	2	2	2	-	-	-	-	-	-	-	-
CO.3	3	2	2	2	-	-	-	-	-	-	-	-
CO.4	3	-	-	-	-	-	-	-	-	-	-	2
CO.5	-	2	2	2	-	-	-	-	-	-	-	-

*3: high, 2: moderate, 1 low

MODULE 1:

Introduction

Overview of AI, Problems of AI, AI techniques, Problem Solving, Problem Space and Search, Defining the problem as state space search, Problem characteristics; Tic,Tac,Toe Problem

AI languages

Basic knowledge of AI programming languages like Prolog and Lisp .

MODULE 2:

Basic Search Techniques

Solving Problems by searching; Uniform search strategies; Breadth first search, depth first search, depth limited search, bidirectional search, Best First search, comparing search strategies in terms of complexity.

MODULE 3:

Special Search Techniques

Heuristic Search, greedy best, first search, A* search; Hill climbing search, Simulated Annealing search; Genetic Algorithm; Constraint Satisfaction Problems; Adversarial search, Games, Optimal decisions and strategies in games, Minimax search, Alpha, beta pruning.

Symbolic Logic

Syntax and semantics for propositional logic, Syntax and semantics of FOPL, Properties of WFF, Clausal form, Unification, Resolution.

MODULE 4:

Reasoning Under Inconsistencies and Uncertainties :

Non, monotonic reasoning, Truth Maintenance System, Default Reasoning & closed world assumption, Predicate completion and circumscription, Fuzzy Logic.

Probabilistic Reasoning

Bayesian probabilistic inference, Representation of knowledge in uncertain domain, Semantics of Bayesian networks, Dempster, Shafer theory.

MODULE 5:

Structured Knowledge

Associative networks, Conceptual graphs, Frames structures.

Expert Systems

Rule based systems, Non production systems : decision tree architectures, black board system architecture, neural network architecture.

Learning

Types of learning, general learning model, Learning by induction; generalization, specialization, example of inductive learner.

Text book:

1. Elaine Rich, Kevin Knight and Shivashankar B Nair, "Artificial Intelligence", Mc Graw Hill Publication, 2009.
2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert System", Pearson Publication, 2015.

References:

1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning, 2011.

Computer Science & Engineering and Information Technology					
Code: CS741	CRYPTOGRAPHY				
		L	T	P	C
		3	0	0	3

Course Outcome:

- .1 Explain the basics of network security and compare various encryption techniques.
- .2 Summarize the functionality of public key cryptography
- .3 Apply various message authentication functions and secure algorithms
- .4 Demonstrate different types of security systems and describe different levels of security and services.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
IT6103.1	-	-	-	-	2	-	-	-	-	1	-	1
IT6103.2	-	2	-	-	2	-	-	-	-	-	-	-
IT6103.3	3	2	-	-	2	1	-	-	-	-	1	-
IT6103.4	-	3	1	-	-	2	-	3	-	-	-	-
Average	0.75	1.75	0.25	0	1.5	0.75	0	0.75	0	0.25	0.25	0.25

Course Description:

MODULE 1:

Conventional Encryption and Message Confidentiality: Conventional Encryption Principles, Conventional Encryption Algorithms, Location of Encryption Devices, Key Distribution

MODULE 2:

Public key cryptography and Message Authentication: Approaches to Message Authentication, SHA-1, MD5, Public key cryptography Principles, RSA, Digital Signatures, Key Management

MODULE 3:

Network Security Applications: Kerberos Motivation, Kerberos version 4, PGP Notation, PGP Operational Description

MODULE 4:

IP Security: IP Security Overview, IP Security Architecture, Authentication Header

Web Security: Web Security Threats, Web Traffic Security Approaches, Overview of Secure Socket Layer and Transport Layer Security, Overview of Secure Electronic Transaction

Intruders and Viruses: Intruders, Intrusion Techniques, Password Protection, Password selection Strategies, Intrusion Detection, Malicious Programs, Nature of viruses, Types of viruses, Macro viruses, Antivirus Approaches

Firewalls: Firewall characteristics, Types of Firewalls, Firewall configuration

Suggested Text Books:

1. "Cryptography and Network Security Principles and Practices", Fourth Edition, William Stallings. Publisher: Prentice Hall
2. "Cryptography And Network Security", McGraw Hill, Behrouz A *Forouzan*

Computer Science & Engineering and Information Technology					
Code: IT701	Software Engineering	L	T	P	C
		3	0	0	3

Course Outcomes:

- Ability to identify the minimum requirements for the development of application.
- Ability to develop, maintain, efficient, reliable and cost effective software solutions
- Ability to critically thinking and evaluate assumptions and arguments.

MODULE- I: Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, legacy software, Software myths. A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI).

MODULE 2: Process patterns, process assessment, personal and team process models. Process models: The waterfall model, Incremental process models, Evolutionary process models, Specialized process models, The Unified process.

MODULE 3: Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document. Requirements engineering process: Feasibility studies, Requirements elicitation and analysis.

MODULE 4

Requirements validation, Requirements management. System models: Context Models, Behavioral models, Data models, Object models, structured methods.

MODULE 5: Design Engineering: Design process and Design quality, Design concepts, the design model, pattern based software design. Creating an architectural design: software architecture, Data design, Architectural styles and patterns, Architectural Design, assessing alternative architectural designs, mapping data flow into a software architecture. Modeling component-level design: Designing class-based components, conducting component-level design, object constraint language, designing conventional components. Performing User interface design: Golden rules, User interface analysis, and design, interface analysis, interface design steps, Design evaluation.

TEXT BOOKS:

Computer Science & Engineering and Information Technology								
Code: IT721	Data Mining and Data Warehousing				L	T	P	C
					3	0	0	3

Course Outcomes

1. Establish the relation between data warehousing and data mining.
2. Able to comprehend multi-dimensional structure of data model.
3. Able to identify the need for analysis of large, complex, information-rich data sets.
4. Identify the goals and primary tasks of the data mining process.
5. Recognize the iterative character of a data process and specify its basic steps.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
CO1	1	2	3	2	-	-	-	-	-	1	-	-
CO 2												
CO3	3	3	1	-	3	3	3	2	3	-	-	2
CO4	2	3	2	-	-	-	-	-	-	-	-	1
CO5	1	2	3	-	-	-	-	-	-	-	-	-

Syllabus

MODULE 1:

Introduction :

Data warehousing-definitions and characteristics, Multi-dimensional data model, Warehouse schema.

Data Marts : Data marts, types of data marts, loading a data mart, metadata, data model. Maintenance, nature of data, software components; external data, reference data, performance issues, monitoring requirements and security in a data mart.

MODULE 2:

Online Analytical Processing: OLTP and OLAP systems, Data Modeling, LAP tools, State of the market, Arbor Essbase web, Microstrategy DSS web, Brio Technology, star schema for multi dimensional view, snowflake schema, OLAP tools.

MODULE 3:

Developing a Data Warehousing : Building of a Data Warehousing, Architectural strategies & organizational issues, design considerations, data content, distribution of data, Tools for Data Warehousing.

MODULE 4:

Data Mining : Definitions; KDD (Knowledge Discovery database) versus Data Mining; DBMS versus Data Mining, Data Mining Techniques; Issues and challenges; Applications of Data Warehousing & Data mining in Government.

Association Rules: Apriori algorithms. Partition algorithm, Dynamic itemset counting algorithm, FP- tree growth algorithm, Generalized association rule.

MODULE 5:

Clustering Techniques :Clustering paradigm, Partition algorithms, CLARA, CLARANS, Hierarchical clustering, DBSCAN, BIRCH, CURE; Categorical Clustering, STIRR, ROCK, CACTUS.

Decision Trees : Tree construction principle, Best split, Splitting indices, Splitting criteria, Decision tree construction with presorting.

MODULE 6:

Web Mining: Web content Mining; Web structure Mining; Web usage Mining; Text mining.

Computer Science & Engineering and Information Technology							
Code: CS711	Machine Learning					L	T
						P	C
						3	0
						0	3

Course Outcome: At the completion of the course a student will be able to –

1. Discuss fundamental of machine learning, design and its application.
2. Differentiate various learning approaches, and to interpret the concepts of different learning.
3. Illustrate and apply clustering algorithms and identify its applicability in real life problems.
4. Discuss basics of neural network and its different model.
5. Describe different optimizations algorithm.

CO-PO Mapping-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2							
CO2	3	2	3	1					1			2
CO3	3	3	2	2	1							
CO4	3	2	2		2							
CO5	2	2	3	1	2							

MODULE 1: What is Machine learning, Basic principal, Utility of ML Well defined learning system, Designing learning system, Challenges in ML, Application of ML.

MODULE 2: Linear Regression (with one variable and multiple variables), Gradient Descent, Classification (Logistic Regression, Over fitting, Regularization, Support Vector Machines), Decision Trees and issue in decision tree, Bayesian Learning – Bayes Theorem, Concept Learning, Bayes Optimal Classifier, Naïve Bayes Classifier, Bayesian Belief Networks, EM Algorithm.

MODULE 3:

Clustering (K-means, Hierarchical, etc.), Dimensionality reduction, Principal Component Analysis, Anomaly detection, Feasibility of learning, Reinforcement learning.

MODULE 4:

Artificial Neural Networks, Artificial Perceptron's, Gradient Descent and The Delta Rule, Adaline, Multilayer Networks, Back-propagation Rule back-propagation Algorithm-Convergence.

MODULE 5:

Evolutionary algorithm, Genetic Algorithms – An Illustrative Example, Hypothesis Space Search, Genetic Programming, Swarm intelligence algorithm.

Text Book:

1. Understanding Machine Learning. Shai Shalev-Shwartz and Shai Ben-David. Cambridge University Press.
2. Tom Mitchell. Machine Learning (McGraw Hill)
3. Artificial Neural Network, B. Yegnanarayana, PHI, 2005

Reference Book:

1. Christopher M. Bishop. Pattern Recognition and Machine Learning (Springer)

Computer Science & Engineering and Information Technology					
Code: CS721	Natural Language Processing	L	T	P	C
		3	0	0	3

Course Outcomes:

Students will be able to

1. Understand approaches to syntax and semantics in NLP.
2. Understand approaches to discourse, generation, dialogue and summarization within NLP.
3. Understand current methods for statistical approaches to machine translation.
4. Understand machine learning techniques used in NLP, including hidden Markov models and probabilistic context-free grammars
5. Understand clustering and unsupervised methods, log-linear and discriminative models, and the EM algorithm as applied within NLP

Module-I

Introduction to Natural Language Processing (NLP). Sound: Biology of Speech Processing; Place and Manner of Articulation; Word Boundary Detection; Argmax based computations; HMM and Speech Recognition.

Module-II

Words and Word Forms: Morphology fundamentals; Morphological Diversity of Indian Languages; Morphology Paradigms; Finite State Machine Based Morphology; Automatic Morphology Learning; Shallow Parsing; Named Entities; Maximum Entropy Models; Random Fields.

Module-III

Structures: Theories of Parsing, Parsing Algorithms; Robust and Scalable Parsing on Noisy Text as in Web documents; Hybrid of Rule Based and Probabilistic Parsing; Scope Ambiguity and Attachment Ambiguity resolution.

Module-IV

Meaning: Lexical Knowledge Networks, Wordnet Theory; Indian Language Wordnets and Multilingual Dictionaries; Semantic Roles; Word Sense Disambiguation; WSD and Multilinguality; Metaphors; Co-references.

Module-V

Web 2.0 Applications: Sentiment Analysis; Named Entity Recognition; Text Entailment; Robust and Scalable Machine Translation; Question Answering in Multilingual Setting; Cross Lingual Information Retrieval (CLIR).

Text Books:

1. Dan Jurafsky and James Martin, "Speech and Language Processing", 2nd Edition, Prentice Hall, 2008.
2. Andrew Radford, Martin Atkinson, David Britain, Harald Clahsen and Andrew Spencer, "Linguistics: An Introduction", Cambridge University Press, 2009.

Semester -VIII
Branch: Computer Science & Engineering

S.N.	Code	Course Title	L	T	P	Credits
1.	CS851	Project-II			17	08
Total Credit						08

NOTE- A Student can be allowed to do project outside after the permission of departmental Academic Committee. Those students doing project outside has present their project progress every month. Those students doing project outside can be permitted to present progress every fortnight though video conferencing. Students doing project in house has present their project progress every week.