

Semester -VII
Branch: Computer Science & Engineering

S.N.	Code	Course Title	Lecture	Tutorial	Practical	Credits
1	CSC701	Artificial Intelligence	3	0	0	3
2	PEC-III	Professional Elective -III	3	0	0	3
3	PEC-IV	Professional Elective -IV	3	0	0	3
4	OEC III	Open Elective -III	3	0	0	3
5	OEC IV	Open Elective -IV	3	0	0	3
6	CS701P	Artificial Intelligence Lab.	0	0	2	1
7	CS702D	Project-I	0	0	4	2
8	CS703I	Internship Assessment II	0	0	2	2
Total credits						20

Code	Professional Elective-III Any one)	Code	Professional Elective- IV(Any one)
CSP702	Machine Learning	ITP705	Data Mining and Data Warehousing.
CSP703	Multimedia and Applications	ITP706	Information Security.
CSP704	Human Computer Interaction	CSP707	Computer Vision

Code	Open Elective-III (Any one)	Code	Open Elective-IV(Any one)
ITO708	Software Engineering	ITO711	Information Security
CSO709	Values and Ethics in Profession.	CSO712	Cryptography
CSO710	*Data Mining	ITO713	Knowledge Domain Development

* Not for CSE Students

Computer Science & Engineering and Information Technology				
Code: CSC701	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 Maintainace 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													
CSP702	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														
ITP705		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	PO10	PO11	PO12
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.

MODULE 7:

Temporal and Spatial Data Mining: Basic concepts of temporal data mining, The GSP algorithm, SPADE, SPIRIT, WUM.

Books

1. Data Warehousing, Reema Thareja
2. Data mining - Concepts & Techniques, Jiawei Han, Micheline Kamber, Morgan Kaufmann ,2nd Ed.2006.
3. Oracle 8i Data Warehousing, Michale Corey, Michale Abbey, Tata McGraw Hill
4. Fundamentals of Database Systems, Navathe and Elmasry, Addison Wesley, 2000
5. Data Mining, Arun Pujari Orient Longman, 2003

Computer Science & Engineering and Information Technology													
CSO709		Values and Ethics in Profession								L	T	P	C
										3	0	0	3

Course Outcomes:

- CO1** Identify the effects of technological growth on the society and the limited natural resources.
- CO2** Identify the essence of sustainable development, and will be able to apply approaches to handle energy crisis and environment protection.
- CO3** Analyze the impact of technology transfer and the problems of man machine interaction for the human operators in engineering projects and industries.
- CO4** Apply industrial standards, code of ethics and role of professional ethics in engineering field.
- CO5** Assess the possible values crisis at different levels and the way out with the help of the constitution and moral, and ethical values.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
IT6105.1	-	-	2	-	-	2	3	-	-	-	-	-
IT6105.2	-	-	3	-	-	-	3	-	-	-	-	-
IT6105.3	-	-	1	-	2	-	2	2	-	-	-	-
IT6105.4	-	-	3	-	2	3	-	3	-	-	-	-
IT6105.5	-	-	1	-	2	3	-	3	-	-	-	-
Average			2		1.2	1.6	1.6	1.6				

#3 highly, #2 moderate and #1 low

Module-1

Science, Technology and Engineering as Knowledge and as Social and Professional Activities, Effects of Technological Growth: Rapid Technological growth and depletion of resources. Reports of the Club of Rome. Limits of growth; sustainable development, Energy Crisis; Renewable Energy Resources.

Module-2

Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations. Environmental Ethics, Appropriate Technology Movement of Schumacher: later developments

Module-3

Technology and developing nations. Problems of Technology transfer. Technology assessment, impact analysis. Human Operator in Engineering projects and industries. Problems of man machine interaction. Impact of assembly line and automation. Human centered Technology.

Module-4

Ethics of Profession

Engineering profession: Ethical issues in engineering practice. Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond. Case studies.

Module-5

Profession and Human Values

Value Crisis in contemporary society, Nature of values: Value Spectrum of a 'good' life, Psychological values: Integrated personality; mental health, Societal values: The modern search for a 'good' society, justice, democracy, secularism, rule of law; values in Indian Constitution, Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity - Moral and ethical values: Nature of moral judgments; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.

Suggested Text Books:

1. Stephen H Unger, Controlling Technology: Ethics and the Responsible Engineers, John Wiley & Sons, New York 1994 (2nd Edition)
2. Deborah Johnson, Ethical Issues in Engineering, Prentice Hall, Englewood Cliffs, New Jersey 1991.
3. A N Tripathi, Human values in the Engineering Profession, Monograph published by IIM, Calcutta 1996.

Suggested Reference Books:

1. Mike Martin and Ronald Schinzinger, "Ethics in Engineering", McGraw-Hill, New York, 2005.
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics Concepts and Cases", Thompson Learning, 2000.
3. Govindarajan M, Natarajan S., Senthil Kumar V. S., "Engineering Ethics", Prentice Hall of India, New Delhi 2004.
4. Charles D Fledderman, Engineering Ethics", Prentice Hall, New Mexico, 1999.
5. Edmund G Seebauer and Robert L Barry, Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.
6. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, 2003.

Computer Science & Engineering and Information Technology					
ITO708	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:

- Software engineering A practitioner's Approach, Roger S Pressman, sixth edition McGraw Hill International Edition.
- Software Engineering, Ian Sommerville, seventh edition, Pearson education.

REFERENCE BOOKS:

- Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
- Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
- Fundamentals of Software Engineering, Rajib Mall, PHI, 2005
- Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
- Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.
- Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition 2006.
- Software Engineering Foundations, Yingxu Wang, Auerbach Publications, 2008.
- Software Engineering Principles and Practice, Hans Van Vliet, 3rd edition, John Wiley & Sons Ltd.
- Software Engineering 3: Domains, Requirements, and Software Design, D. Bjorner, Springer International Edition.
- Introduction to Software Engineering, R. J. Leach, CRC Press.

Computer Science & Engineering and Information Technology												
CSO712	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	PO10	PO11	PO12
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

MODULE 5:

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**