6th Semester Syllabus

Computer Science& Engineering and Information Technology			
CS632	**Artificial Intelligence &Machine Learning**	**L**	**T**
		3	**0**

Course objectives -

The aim of Artificial Intelligence & Machine Learning course is to prepare students for career in computer science & engineering where knowledge of AI & ML techniques leading to the advancement of research and technology. Artificial Intelligence and Machine Learning are the terms of computer science.Machine Learning is the learning in which machinecan learn by its own without being explicitly programmed. It is an application of AI that provide system the ability to automatically learn and improve from experience.

Course Outcomes: After completing this course the student will be able to:

CO1	Demonstrate fundamental understanding of artificial intelligence (AI) and expert systems.
CO2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
CO3	Demonstrate proficiency in applying scientific method to models of machine learning.
CO4	Discuss the basics of ANN and different optimizations techniques.

Mapping of course outcomes with program outcomes:

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

Course Detail -

MODULE 1. **Overview and Search Techniques:** Introduction to AI, Problem Solving, State space search, Blind search: Depth first search, Breadth first search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Constraint satisfaction problem; Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance.

MODULE 2. **Knowledge Representation (KR**): Introduction to KR, Knowledge agent, Predicate logic, Inference rule & theorem proving forward chaining, backward chaining, resolution; Propositional knowledge, Boolean circuit agents; Rule Based Systems, Forward reasoning: Conflict resolution, backward reasoning: Structured KR: Semantic Net - slots, inheritance, Conceptual Dependency.

MODULE 3. **Handling uncertainty and Learning**: Source of uncertainty, Probabilistic inference, Bayes' theorem, Limitation of naïve Bayesian system, Bayesian Belief Network (BBN); Machine learning, Basic principal, Utility of ML Well defined learning system, Challenges in ML, Application of ML.

MODULE 4. **Learning and Classifier:** Linear Regression (with one variable and multiple variables), Decision Trees and issue in decision tree,Clustering (K-means, Hierarchical, etc), Dimensionality reduction, Principal Component Analysis, Anomaly detection, Feasibility of learning, Reinforcement learning.

MODULE 5. **Artificial Neural Networks:** Introduction, Artificial Perceptron's, Gradient Descent and The Delta Rule, Adaline, Multilayer Networks, Back-propagation Rule back-propagation Algorithm- Convergence; Evolutionary algorithm,Genetic Algorithms – An Illustrative Example, Hypothesis Space Search, Swarm intelligence algorithm.

Text Book:

1. Artificial Intelligence by Elaine Rich and Kevin Knight, Tata MeGraw Hill
2. Understanding Machine Learning. Shai Shalev-Shwartz and Shai Ben-David. Cambridge University Press.
3. Artificial Neural Network, B. Yegnanarayana, PHI, 2005

Reference Book:

1. Christopher M. Bishop. Pattern Recognition and Machine Learning (Springer)
2. Introduction to Artificial Intelligence and Expert Systems by Dan W. Patterson, Prentice Hall of India

Computer Science& Engineering and Information Technology			
CS611	**Computer Graphics**	**L**	**T**
		3	**0**

Objectives of the course

This course covers basics of computer graphics. Computer graphics are pictures and films created using computers. Usually, the term refers to computer-generated image data created with the help of specialized graphical hardware and software. It is a vast and recently developed area of computer science. Computer graphics is responsible for displaying art and image data effectively and meaningfully to the consumer. It is also used for processing image data received from the physical world. Computer graphics development has had a significant impact on many types of media and has revolutionized animation, movies, advertising, video games, and graphic design in general.

Course Outcomes

After completing this course, the student will be able to:

CO1	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO2	Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
CO3	Use of geometric transformations on graphics objects and their application in composite form.
CO4	Extract scene with different clipping methods and its transformation to graphics display device.
CO5	Render projected objects to naturalize the scene in 2D view and use of illumination models for this

Detailed Syllabus:

MODULE 1. Introduction to computer graphics and graphics systems. Raster and vector graphics systems, video display devices, physical and logical input devices, simple color models.

MODULE 2. Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

MODULE 3. 2D Transformation : Basic transformations : translation, rotation, scaling ; Matrix representations & homogeneous coordinates, transformations between coordinate systems ; reflection shear ; Transformation of points, lines, parallel lines, intersecting lines.

MODULE 4. Viewing pipeline, Window to Viewport co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse.

MODULE 5. Hidden Surfaces: Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods, fractal - geometry. Rendering of a polygonal surface; Flat, Gouraud, and Phong shading; Texture mapping, bump texture, environment map; Introduction to ray tracing; Image synthesis, sampling techniques, and anti-aliasing.

Text / Reference Books

1. Donald Hearn and Pauline Baker Computer Graphics, Prentice Hall, New Delhi, 2012

2.Steven Harrington, "Computer Graphics- A programming approach", McGraw 3. Hill, 2nd Edition, 1987.

3. Foley J.D., Van Dam A, "Fundamentals of Interactive Computer Graphics", Addison Wesley, 1990

Computer Science& Engineering and Information Technology			
CS612	**Distributed System**	**L**	**T**
		3	**0**

Course objective:

This course covers the basic understanding of distributed computing system. The course aims to provide an understanding of the principles on which the Internet and other distributed systems are based; their architecture, algorithms and how they meet the demands of contemporary distributed applications. The course covers the building blocks for a study of distributed systems, and addressing the characteristics and the challenges that must be addressed in their design: scalability, heterogeneity, security and failure handling being the most significant.Distributed computing is a field of computer science that studies distributed systems. A distributed system is a system whose components are located on different networked computers, which communicate and coordinate their actions by passing messages to one another.The components interact with one another in order to achieve a common goal. Three significant characteristics of distributed systems are: concurrency of components, lack of a global clock, and independent failure of components.

Course Outcomes:

At the end of this course the students will be able to:

CO1	Demonstrate knowledge of the basic elements and concepts related to distributed system technologies.
CO2	Demonstrate knowledge of the core architectural aspects of distributed systems
CO3	Demonstrate knowledge of details the main underlying components of distributed systems (such as RPC, file systems);
CO4	Use and apply important methods in distributed systems to support scalability and fault tolerance;
CO5	Demonstrate experience in building large-scale distributed applications.

Detailed Syllabus:

MODULE 1. Introduction to distributed computing system, evolution different models, gaining popularity, definition, issues in design, DCE, message passing –introduction, desirable features of a good message passing system, issues in IPC, synchronization, buffering, multigram messages, encoding and decoding of message data, process addressing, failure handling, group communication.

MODULE 2. Introduction, model, transparency, implementation mechanism, stub

generation, RPC messages, marshallingarguments and results, server management, parameter - passing semantics, call semantics, communicationprotocols for RPCs, client – server binding, exception handling, security, mini project using Java RMI.

MODULE 3. General architecture of DSM systems, design and implementation issues of DSM systems, granularity, structure ofshared memory space, consistency model, replacement strategy, thrashing, advantages of DSM, clocksynchronization DFS and security- Desirable features of good DFS, file models, file accessing Models, file sharingsemantics, file catching schemes, file replication, fault Tolerance, atomic transaction, potential attacks to computersystem, cryptography, authentication, access control. Digital signatures, DCE security service.

MODULE 4. Operating Systems, Client-Server Model, Distributed Database Systems, Parallel Programming Languages andAlgorithms. Distributed Network Architectures-Managing Distributed Systems. Design Considerations.

MODULE 5. For development, implementation & evaluation of distributed information systems, workflow, softwareprocesses, transaction management, and data modeling, infrastructure e.g. middle-ware to glueheterogeneous, autonomous, and partly mobile/distributed data systems, such as e.g. client/server-,CORBA-, and Internet-technologies. Methods for building distributed applications.

Text / Reference

1. Pradeep K. Sinha, "Distributed Operating Systems: Concepts Design", 2007

2.Crichlow Joel M, "An Introduction to Distributed and ParallelComputing", PHI, 1997

3.Black Uyless, "Data Communications and Distributed Networks", PHI, 5th Edition,1997

Computer Science& Engineering and Information Technology			
CS633	**Image Processing**	**L**	**T**
		3	**0**

Objectives of the course

Course Outcomes:

After completing this course, students will be able to:

CO1	To study the image fundamentals and mathematical transforms necessary for image processing
CO2	To study the image enhancement techniques and image restoration procedures.
CO3	To study the image compression procedures.
CO4	To study the image segmentation and representation techniques.

Mapping of course outcomes with program outcomes:

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

Course Details-

Module 1 : DIGITAL IMAGE FUNDAMENTALS

Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels – color models.

Module 2: DIGITAL IMAGE FORMATION

A Simple Image Model, Geometric Model-Basic Transformation (Translation, Scaling, Rotation), Perspective Projection, Sampling & Quantization-Uniform & Non uniform.

Module 3: MATHEMATICAL PRELIMINARIES

Neighbour of pixels,Connectivity,Relations,Equivalence & Transitive Closure; DistanceMeasures, Arithmetic/Logic Operations, FourierTransformation, Properties of the two Dimensional Fourier Transform, Discrete Fourier Transform, Discrete Cosine & Sine Transform

Module 4 : IMAGE ENHANCEMENT

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering–Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

Module 5 : IMAGE RESTORATION AND SEGMENTATION

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation- Morphological processing- erosion and dilation.

TEXT BOOK:

- Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2010.

REFERENCES:

- Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.

Computer Science& Engineering and Information Technology			
IT641	**Information retrieval**	**L**	**T**
		3	**0**

Course objective:
To provide an overview of Information Retrieval systems. Expose them to various retrieval models with emphasis on pros and cons of these models. Discuss mechanisms of web search along with the details of ranking algorithms. Introduce basic concepts of text categorization and recommender systems.

Course Outcomes:

At the end of the course the student will be able to:

CO1	To understand the different information retrieval models
CO2	To know about evaluation methods of the information retrieval model
CO3	To know about text categorization and its implementation
CO4	To demonstrate the challenges associated with each topic on new domain of retrieval and classification

Detailed Syllabus:

MODULE 1. Introduction to Information Retrieval: The nature of unstructured and semi-structured text. Inverted index and Boolean queries. Text Indexing, Storage and Compression Text encoding: tokenization; stemming; stop words; phrases; index optimization. Index compression: lexicon compression and postings list compression. Gap encoding, gamma codes, Zipf's Law. Index construction. Postings size estimation, dynamic indexing, positional indexes, n-gram indexes, real-world issues.

MODULE 2. Information Retrieval Models: Boolean; vector space; TFIDF; Okapi; probabilistic; language modeling; latent semantic indexing. Vector space scoring. The cosine measures. Efficiency considerations. Document length normalization. Relevance feedback and query expansion. Rocchio algorithm.

MODULE 3. **Web Information Retrieval:** Hypertext, web crawling, search engines, ranking, link analysis, PageRank, HITS. Retrieving Structured Documents: XML retrieval, semantic web.Performance Evaluation of IR systems: Evaluating search engines. User happiness, precision, recall, F-measure. Creating test collections: kappa measure, interjudge agreement.

MODULE 4. **Text Categorization and Filtering:** Introduction to text classification. Naive Bayes models. Spam filtering. Vector space classification using hyperplanes; centroids; k Nearest Neighbors. Support vector machine classifiers. Kernel functions. Boosting.

MODULE 5. **Advanced Topics:** Summarization, Topic detection and tracking, Personalization, Question answering, Cross language information retrieval (CLIR). Recommender System.

Text Book:

1. Manning, Raghavan and Schutze, "Introduction to Information Retrieval", Cambridge University Press, 2009.
2. Baeza-Yates and Ribeiro-Neto, "Modern Information Retrieval", Addison Wesley.

Reference Books

1. Charles L. A. Clarke, Gordon Cormack, and Stefan Büttcher, "Information Retrieval: Implementing and Evaluating Search Engines", MIT Press Cambridge, 2010.
2. Baeza-Yates / Ribeiro-Neto, "Modern Information Retrieval: The Concepts and Technology behind Search", Pearson Education India, 2010.

Computer Science& Engineering and Information Technology			
CS642	**Cloud Computing**	**L**	**T**
		3	**0**

Objectives of the course:

The aim this course to understand the basics and importance of cloud computing. Cloud computing is a general term for anything that involves delivering hosted services over the Internet. These services are broadly divided into different categories: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS). The name cloud computing was inspired by the cloud symbol that's often used to represent the Internet in flowcharts and diagrams. Cloud computing is the on-demand availability of computer system resources, especially data storage and computing power, without direct active management by the user. The term is generally used to describe data centers available to many users over the Internet. Large clouds, predominant today, often have functions distributed over multiple locations from central servers.

Course Outcomes:

At the end of the course, the student should be able to:

CO1	To identify the appropriate cloud services for a given application and perform cloud-oriented analysis.
CO2	To design the composition of a cloud services.
CO3	To analyze authentication, confidentiality and privacy issues in Cloud computing environment.
CO4	To Determine financial and technological implications for selecting cloud computing platforms.

Mapping of course outcomes with program outcomes:

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

Detailed syllabus:

MODULE 1. **Introduction to cloud computing:** Emergence of cloud computing in distributed computing; Cloud computing Definition, Architecture, Cloud-Based Services, Benefits of using a Cloud Model, Key Characteristics of Cloud Computing, Understanding- Public & Private cloud environments, The Evolution of Cloud Computing – Hardware & Internet Software Evolution, SPI framework.

MODULE 2. **Cloud services:**Communication-as-a-Service (CAAS), Infrastructure-as-a-Service (IAAS), Monitoring-as-aService (MAAS), Platform-as-a-Service (PAAS), Software-as-a-Service (SAAS).

MODULE 3. **Cloud security challenges:**Security Management People, Security Governance, Security Portfolio Management, Security Architecture Design, Identity Access Management (IAM), Data Security. Cloud computing threats, Case studies-Amazon EC2, Google App engine, IBM clouds.

MODULE 4. **The MSP Model:** Evolution from the MSP Model to Cloud Computing and Software-as-a-Service, TheCloud Data Center, Basic Approach to a Data Center-Based SOA, Open Source Software, Service- Oriented Architectures as a Step Toward Cloud Computing.

MODULE 5. **Virtualization concepts & Smartphone:** virtualization benefits, Hardware &Software Virtualization, Memory Virtualization, Storage Virtualization, Data Virtualization, Network Virtualization, Virtualization Security Recommendations, Introduction to Various Virtualization OS VMware, KVM, Virtual Machine Security, Smartphone, Mobile Operating Systems for Smartphone's (iPhone, Windows Mobile), Google (Android).

Course outcomes:

At the end of this course

1. Student will be able to identify the appropriate cloud services for a given application and perform cloud-oriented analysis.
2. Students will be able to design the composition of a cloud services.
3. Student will be able to analyze authentication, confidentiality and privacy issues in Cloud computing environment.
4. Determine financial and technological implications for selecting cloud computing platforms.

Text Book:

1. Toby Velte, Anthony Vote and Robert Elsenpeter, “Cloud Computing: A Practical Approach”, McGraw Hill, 2002
2. Gautam Shroff, Enterprise Cloud Computing, Cambridge, 2010.

Reference Book:

1. Tim Matherm, Subra Kumara swamy and Shahed Latif, “Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance”, O’Reilly Media, 2005.
2. Ronald Krutz and Russell Dean Vines, Cloud Security, 1st Edition, Wiley, 2010

Computer Science& Engineering and Information Technology			
IT611	**System Software**	**L**	**T**
		3	**0**

Objectives of the course

To introduce the student to key concepts in Phase transformations and enable an understanding of the steps involved in several important phase transformations.

Course Outcomes

After completing this course, the student should be able to:

CO1	Explain the organization of basic computer, its design and the design of control unit.
CO2	Understand the organization of memory and memory management hardware.
CO3	Distinguish between Operating Systems software and Application Systems software.
CO4	Identify the primary functions of an Operating System.
CO5	Master attributes and assessment of quality, reliability and security of software.

Detailed Syllabus:

MODULE 1. INTRODUCTION: System Software, Application Software, components of a programming system: Assembler, Loader, Linker, Macros, Compiler, Program Development Cycle, Evolution of Operating Systems, Functions of Operating System, Machine Structure: General Machine Structure, Approach to a new machine, Memory Registers, Data, Instructions, Evolution of Machine Language: Long Way, No looping, Address Modification, Looping, Introduction to Assembly Language Program.

MODULE 2. ASSEMBLERS: Review of Computer Architecture – Machine Instructions and Programs – Assemblers –Basic Assembler Functions – Assembler Features – Assembler Design Options. LOADERS AND LINKERS: Loaders and Linkers – Basic Loader Functions – Machine-Dependent Loader Features – Machine-Independent Loader Features– Loader Design Options-Dynamic Linking and Loading- Object files-Contents of an object file – designing an object format – Null object formats- Code sections- Relocation – Symbols and Relocation – Relocatable a.out- ELF.

MODULE 3. MACROPROCESSORS AND EMULATORS: Microprocessors – Basic Macro Processor Functions – Machine-Independent Macro Processor Features – Macro Processor Design Options - Introduction to Virtual Machines (VM) - Emulation - basic Interpretation – Threaded Interpretation – Interpreting a complex instruction set – binary translation.

MODULE 4. VIRTUAL MACHINES: Pascal P-Code VM – Object-Oriented VMs – Java VM Architecture – Common Language Infrastructure – Dynamic Class Loading. ADVANCED FEATURES: Instruction Set Issues – Profiling – Migration – Grids – Code optimizations- Garbage Collection - Examples of real-world implementations of system software.

TEXT BOOKS:

1. Leland L. Beck, "System Software", 3rd ed., Pearson Education.
2. John R. Levine, "Linkers & Loaders", Morgan Kauffman.
3. James E Smith and Ravi Nair, "Virtual Machines", Elsevier.

REFERENCES:

1. Srimanta Pal, " Systems Programming " , Oxford University Press.
2. John J.Donovan, " "Systems Programming", Tata McGraw-Hill.
3. Systems Programming by John J Donovan (McGraw-Hill Education)
4. Operating System and System Programming – Dhamdhere (McGraw-Hill Education)

Computer Science& Engineering and Information Technology			
CS622	**Natural Language Processing**	**L**	**T**
		3	**0**

Objectives of the course:

This course provides an introduction to the field of natural language processing (NLP). Purpose is to make students learn how systems can understand and produce language, for applications such as information extraction, machine translation, automatic summarization, question-answering, and interactive dialogue systems. The course will cover linguistic (knowledge-based) and statistical approaches to language processing in the three major subfields of NLP: syntax (language structures), semantics (language meaning), and pragmatics/discourse (the interpretation of language in context).

Course Outcomes

After completing this course, the student should be able to:

CO1	Understand approaches to syntax and semantics in NLP.
CO2	Understand approaches to discourse, generation, dialogue and summarization within NLP
CO3	Understand current methods for statistical approaches to machine translation
CO4	Understand machine learning techniques used in NLP, including hidden Markov models and probabilistic context-free grammars
CO5	Understand clustering and unsupervised methods, log-linear and discriminative models, and the EM algorithm as applied within NLP

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Mapping of course outcomes with program outcomes:

Detailed Syllabus:

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.

Reference Books:

1. Chris Manning and HinrichSchütze, “Foundations of Statistical Natural Language Processing”, MIT Press. Cambridge, 1999.
2. Allen James, “Natural Language Understanding”, 2nd edition, Benjamin Cumming, 1995.
3. Eugene Charniack, “Statistical Language Learning”, MIT Press, 1993.
4. Steven Bird, “Natural Language Processing with Python”, 1st Edition, O'Reilly, 2009.
5. Jacob Perkins, “Python Text Processing with NLTK 2.0 Cookbook”, Packt Publishing, 2010.

Computer Science& Engineering and Information Technology			
CS621	**Soft Computing**	**L**	**T**
		3	**0**

Course objective:

ThiscoursewillcoverfundamentalconceptsusedinSoftcomputing.SoftComputingrefersto a partnership of computational techniques in computer science, artificial intelligence,machine learning and some engineering disciplines, which attempt to study, model, and analyze complexphenomena.TheconceptsofArtificialNeuralNetworks(ANNs)willbecoveredfirst, followed by Fuzzy logic (FL) and optimization techniques using Genetic Algorithm (GA). Applications of Soft Computing techniques to solve a number of real-life problems will be coveredtohavehandsonpractices.Insummary,thiscoursewillprovideexposuretotheoryas well as practical systems and software used in softcomputing.

Course outcomes:

At the end of the course students will be able to:

CO1	**Present** the feasibility of applying a soft computing methodology for specific problem.
CO2	**Identify** and describe soft computing techniques and their roles in building intelligent machines.
CO3	**Apply** neural networks to pattern classification and regression problems.
CO4	**Apply** fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
CO5	**Apply** genetic algorithms to combinatorial optimization problems.

Mapping of course outcomes with program outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
CO 1	3	3	3	2	3	-	-	-	-	1	-	2
CO 2	3	3	2	2	-	-	-	-	2	-	-	-
CO 3	3	2	2	2	2	-	-	-	-	-	-	2
CO 4	3	3	2	2	2	-	-	-	-	-	-	-
CO 5	3	2	2	2	2	-	-	-	-	-	-	2
Avg	3	2.6	2.2	2	2.25				2	1		2

Detailed Syllabus:

MODULE 1. INTRODUCTION TO SOFT COMPUTING: Soft computing: Soft computing concepts, soft computing versus hard computing, various types of soft computing techniques, applications of soft computing.

MODULE 2. ARTIFICIAL NEURAL NETWORKS: NeuralNetworks:History,overviewofbiologicalNeuro-system,MathematicalModelsofNeurons, ANN architecture, learning rules, Learning Paradigms- Supervised, Unsupervised and reinforcement Learning, ANN training, Algorithms-perceptions; Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model.

MODULE 3. SPECIAL LEARNING NETWORK: Competitive learning networks, Kohonen Self-organizing networks, Hebbian learning, Hopfield Networks, Associative memories, The Boltzman machine**,** Applications of Artificial Neural Networks.

MODULE 4. FUZZY LOGIC: Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, MembershipFunction,Fuzzyrulegeneration.OperationsonFuzzySets:Compliment,Intersections, Unions, Combinations of Operations, Aggregation Operations. Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Qualifiers, Linguistic Hedges, Introduction & features of membershipfunctions.

MODULE 5. FUZZY RULE BASED SYSTEM: Fuzzy rule base system: Fuzzy Propositions, implications and inferences, Fuzzy reasoning, Defuzzification techniques, Fuzzy logic controller design, Fuzzy decision making & Applications of fuzzy logic.

MODULE 6. GENETIC ALGORITHMS: Genetic Algorithms: An Overview of Genetic algorithm (GA), Evolution strategies (ES), Evolutionary programming (EP), Genetic programming (GP); GA operators: Encoding, Selection, Crossover, Mutation, schema analysis, analysis of selection algorithms; convergence; optimization, of travelling salesman problem using genetic algorithm approach; Markov & other stochastic models. Other Soft Computing Techniques: Simulated annealing, Tabu search, Ant colony-based optimization (ACO), etc.

Text Book:

1. P. R. Beeley, Foundry Technology, Newnes-Buttterworths, 2001.
2. P. D. Webster, Fundamentals of Foundry Technology, Portwillis press, Red hill, 1980.

Supplementary Reading:

1. P. C. Mukherjee, Fundamentals of Metal casting Technology, Oxford IBH, 1980.
2. R. W. Hein, C. R. Loper and P. C. Rosenthal, Principles of Metal casting, Mc Graw Hill, 1976.

Computer Science& Engineering and Information Technology			
CS601	**Computer Network**	**L**	**T**
		3	**1**

Course objective:

Thiscoursewillcoverfundamentalconceptsof computer network. A computer network is a digital telecommunications network which allows nodes to share resources. In computer networks, computing devices exchange data with each other using connections (data links) between nodes. These data links are established over cable media such as wires or optic cables, or wireless media such as Wi-Fi. Network computer devices that originate, route and terminate the data are called network nodes.[1] Nodes are generally identified by network addresses, and can include hosts such as personal computers, phones, and servers, as well as networking hardware such as routers and switches. Two such devices can be said to be networked together when one device is able to exchange information with the other device, whether or not they have a direct connection to each other.

Course outcomes:

At the end of the course students will be able to:

CO1	Students will be able to explain the types of transmission media with real time applications
CO2	Students will be able to describe the functions of each layer in the OSI and TCP/IP model.
CO3	Students will be able to classify the routing protocols and analyze how to assign the IP addresses for the given network

Detailed syllabus:

MODULE 1. Data communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media.

MODULE 2. LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spreadspectrum.

MODULE 3. Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC.

MODULE 4. Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA

MODULE 5. Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routingprotocols.

MODULE 6. Transport Layer:Process toProcess Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality ofService, QOS improving techniques: Leaky Bucket and Token Bucketalgorithm.

Text Book:

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.

Reference Books

1. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice HallIndia.

2. Computer Network, 8th Edition, Andrew S. Tanenbaum, Pearson International Edition.

Computer Science& Engineering and Information Technology			
Code: CS651	**Computer Networks Lab**	**L**	**P**
		0	**3**

Course Outcomes:

CO 1: Students will be able to design the different type of topologies in the network.
CO 2: Students will be able to configure the Switch, Router, Gateway and different network devices.

List of Experiments: -

1. Introduction to Local Area Network with its cables, connectors and topologies.

2. Installation of Switch, hub their cascading and network mapping.

3. Installation of UTP, Co-axial cable, Cross cable, parallel cable NIC and LAN card.

4. Case Study of Ethernet (10 base 5, 10 base 2,10 base T)

5. Installation and working of Net meeting and Remote Desktop.

6. Installation and working with Telnet (Terminal Network).

7. Installation and working with FTP (File Transfer Protocol).

8. Installation and Computers via serial or Parallel ports and enable the computers to share disk and printer port.

9. To connect two Personal Computer with Telephone line.

10. Installation of Modem and Proxy Server.

11. Installation of Windows 2003 server/ Windows 200 server.

12. Configuration of DHCP.

13. Introduction to Server administration.

Reference Books

1. Computer Network and internet by Dougles E. Comer (Pearson Education)

2. List of Software required: - Windows 2003 server/Windows 2000 server.

3. List of Hardware required: - LAN Trainer Kit LAN Card Cable, Connectors, HUB, Switch, and Crimping Tools.

IT621	**INTERNET OF THINGS**	**L**	**T**
		3	**0**

COURSE OUTCOMES:

1. Understand the building blocks of Internet of Things and characteristics.
2. Describe the various application areas of IoT.
3. Design a basicIoT product using Raspberry Pi and sensors.
4. Deploy an IoT application and connect to the cloud.

Module1. FUNDAMENTALS OF IOT

Introduction to IOT, Characteristics, Sensing, Actuation,Basics of Networking and Protocols – Physical design, Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.

Module2. IOT DESIGN METHODOLOGY

IoT systems management – IoT Design Methodology – Specifications Integration and Application Development, Interoperability in IoT.

Module 3. BUILDING IOT WITH RASPBERRY PI USING PYTHON

Introduction to Python Programming,Introduction to Raspberry Pi, Raspberry Pi Interfaces, Physical devices, Integration of Sensors and Actuators with Raspberry Pi.

Module 4. ADVANCED TOPICS

Software Defined Networks for IoT, Cloud Computing, Cloud Storage forIoT, Sensor Data Handling and Analytics; Software & Management Tools for IoT, Recent trends in IoT.

Module5. CASE STUDIES

Various Real time applications of IoT- Smart cities, Smart Homes, Agriculture, HealthCare,

Industrial IOT, Activity monitoring.

REFERENCES:

1. ArshdeepBahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press,

2015.

2. Marco Schwartz, “Internet of Things with the Arduino Yun”, Packt Publishing, 2014.

3. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press).

4.WaltenegusDargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice.

5. Manoel Carlos Ramon, “Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers”, Apress, 2014.

6. Research papers.

IT613	**E-commerce**	**L**	**T**
		3	**0**

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

- Discuss fundamental of e-business and e-commerce, types and application.
- Comprehend the underlying economic mechanisms and driving forces of E-Commerce
- Discuss information distribution and messaging in E-commerce.
- Describe and Utilize different Payment systems.
- Asses Security & legal issues and User Experience.

CO-PO Mapping-

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

Module 1. INTRODUCTION: What is E-Commerce, Forces behind E-Commerce, E-Commerce Industry Framework, and Brief History of Ecommerce. Inter Organizational E-Commerce, Intra Organizational E-Commerce, and Consumer to Business Electronic Commerce, Architectural framework, Logical layers of E-commerce.

Module 2. ELECTRONIC PAYMENT SYSTEM: Requirement and types of electronic payment systems, digital token-based electronic payment systems, smart cards & electronic payment systems, credit card based electronic payment systems, electronic cheque, e-cash, risk and solution in electronic payment systems, designing electronic payment systems.

Module 3. INFORMATION DISTRIBUTION AND MESSAGING: FTP, E-Mail, www server, HTTP, Web service implementation, Information publishing, Web Browsers, HTML, Common Gateway Interface, Electronic data interchange (EDI), technology & standards, Communication, implementation & securing EDI.

Module 4. E-BUSINESS: Supply chain management, Internet bookshop, Software supplies & support, E-payment system, Internet banking Gambling on net, E-diversity & case studies through Internet.

Module 5. LEGAL AND SECURITY ISSUES: Paper Vs Electronic document, Authentication of E-document, Legal issues of E-commerce, Copyright & jurisdiction issues, Security solutions, Symmetric & asymmetric cryptography DES, RSA, Digital signature, Protocols for securing message, SET, Internet security.

Text Book:

1. Frontiers of E-commerce by Kalakota & Whinston, Addison Wesley.
2. E-business road map for success by Dr. Ravi Kalakota& Marcia Robinson, Addison Wesley

Reference Book:

1. Electronic Commerce by Bharat Bhasker, TMH

IT614	**Enterprise Resource Planning**	**L**	**T**
		3	**0**

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

- Explain the different applications of ERP systems
- Identify and describe typical functional modules in ERP system;
- Describe the process of developing and implementing ERP systems;
- Describe the basic concepts and technologies used in ERP;

CO-PO Mapping-

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

Module 1. INTRODUCTION: ERP: An Overview, Enterprise – An Overview, Origin, Evolution and Structure: Conceptual Model of ERP, The Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, Product Life Cycle Management (PLM), Supply chain Management (SCM).

Module 2.ERP IMPLEMENTATION: ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Role of SDLC/SSAD, Object Oriented

Architecture Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees,

Project Management and Monitoring, Success or Failure of ERP Implementation.

Module 3.THE BUSINESS MODULES: Business modules in an ERP Package, Finance,

Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management,

Sales and Distribution.

Module 4.THE ERP MARKET: ERP Marketplace and Marketplace Dynamics: Market Overview, Marketplace Dynamics, The Changing ERP Market. ERP- Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP, Supply chain and Customer Relationship Applications, Sales and service.

Module 5.ERP – PRESENT AND FUTURE: ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into organizational culture Using ERP tool: ERP Market Place, SAP AG, PeopleSoft, Turbo Charge the ERP System, EIA, ERP and e-Commerce, ERP and Internet, Future Directions. Case studies: my SAP Business Suite Implementation at ITC, Oracle ERP Implementation at Maruti Suzuki, Siebel CRM Implementation at Bharti Airtel.

Text Book:

1. Alexis Leon, "ERP Demystified", Tata McGraw Hill, New Delhi, 2000
2. Enterprise Resource Planning by Rajesh Ray, Tata McGraw Hill Education, 2011.

Reference Book:

1. ERP, Concepts & Practices by V.K. Garg & N.K. Venkatkrishnan, PHI, 2004.
2. Enterprise Resource Planning by Ashim Raj Singla, Cengage Learning, 2008.

Computer Science & Engineering			
IT612	**Management Information System**	**L**	**T**
		3	**0**

CO.1	Define the Information System the importance of Information System in Business and management.
CO.2	Understand the common management problems in the organization.
CO.3	Describe the structure of a typical organization and people and their roles in the organization.
CO.4	Analyze various real world management information systems and review.
CO.5	Apply the knowledge of Information System to solve common business problems.
CO.6	Design and develop management information system.

Module1. Management within organizations:

Management activities, roles and levels, Management Planning and Control, Strategic Planning within an organization: activities, techniques and results. The nature of decision-making: decision making models and classification of decision-making situations, the nature of information: classifications and characteristics. MIS sub types, Measurement of MIS performance and capabilities.

Module2. MIS applications and relationships:

Kinds of Information Systems: Transaction Processing System(TPS) – Office Automation System (OAS) – Management Information System (MIS) – Decision Support System (DSS) and Group Decision Support System (GDSS) – Expert System (ES) – Executive Support System (ESS) Data warehouses and data mining facilities: the relationship between data warehousing and other MIS facilities

Module3. Development of MIS:

Development of Long range plans, Determining information requirement, Development and Implementation, Organization for Development of MIS, Choice of Information Technology, Strategic decision, Configuration design, IT implementation plan, Phases of MISD implementation Assessing information

needs, Identification and development of information sources, design and development of information flow network and cost considerations, need and design of an integrated information system for MIS, role of computers in MIS: Processing information flow, Maintaining records and generating outputs for decision making. Implementation and evaluation of MIS

Module4. Information System Application:

Transaction Processing Applications, Applications for Budgeting and Planning, Automation, Manufacturing Management System,

Module5. Database Management System:

Architecture of RDBMS. Brief history of DBMS development. ER Model. Relational Data Model, Relational algebra, Database design, Conceptual and physical model, MIS and RDBMS.

Module6. Enterprise System:

Enterprise Resources Planning (ERP)-Features, selection criteria, merits, issues and challenges in Implementation.

Suggested Text Books:

1. Kenneth C. Laudon, Jane Price Laudon, "Management Information Systems: Managing the digital firm", Pearson Education, PHI, Asia, 2012.

2. O'Brien, James A, Marakas, George M, "Management Information Systems", 2006, Ninth Edition, Tata McGraw Hill.

Suggested Reference Books:

Jawadekar W S, “Management Information Systems”, Second Edition, 2002, Tata McGraw Hill.

“Introduction to Information Technology” Turban E.F, Potter R.E, Wiley.

“Modern Systems Analysis and Design” Jeffrey A.Hoffer, Joey F.George, Joseph S. Valachich, Prentice Hall

“Database System Concepts” Avi Silberschatz · Henry F.Korth · S. Sudarshan.

Robert Schultheis, Mary Summer, “Management Information Systems – The ManagersView”, Tata McGraw Hill, 2008.

Davis, Gorden B. Olson, M.H, “Management Information Systems”, 2000, Tata McGraw Hill.

Haag, Cummings and Mc Cubbrey, “Management Information Systems for the Information Age”, McGraw Hill, 2005. 9th edition, 2013.

Turban, McLean and Wetherbe, “Information Technology for Management –

Transforming Organizations in the Digital Economy”, 6th Edition, 2008.