DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Scheme (Third Year)

Sixth Semester

S. No.	Subject Code	Course Title	Subject Name	L	T	P	Credits
1	CS106101CS	Program Core	Data Warehousing and Data Mining	3	1	0	**4**
2	CS106102CS	Program Core	Cryptography and Network Security	3	1	0	**4**
3	CS106103CS	Program Core	Artificial Intelligence & Expert System	3	1	0	**4**
4	CS1062XXCS	Program Elective	Elective – II	3	0	0	**3**
5	CS1063XXCS	Open Elective	Open Elective -II	3	0	0	**3**
6	CS106401CS	Laboratory	Data Warehousing and Data Mining Lab & AI Lab	0	0	2	**1**
7	CS106402CS	Laboratory	Cryptography and Network Security Lab	0	0	2	**1**
		Total Credits					**20**

Program Elective -II		**Open Elective-II**	
Subject Code	**Subject Name**	**Subject Code**	**Subject Name**
CS106201CS	Network Programming	CS106301CS	Cloud Computing
CS106202CS	Advanced Algorithms	CS106302CS	Applied Machine Learning
CS106203CS	Computer Vision	CS106303CS	E-Commerce
CS106204CS	Soft Computing	CS106304CS	Information Retrieval

Data Warehousing and Data Mining

[6th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Data Warehousing and Data Mining	3-1-0, (4)	EPR	CS106101CS

[Pre-requisites: Nil]

Course Objectives

1. To understand the principles of Data warehousing and Data Mining.
2. To understand the Architecture of a Data Mining system.
3. To perform classification, association, and prediction of data.

Course Content

Unit-1 Data Warehousing – Introduction and Design:

Overview and Concepts: Data Warehousing Components, Building a Data Warehouse, Data Warehouse Architecture, Infrastructure and Metadata. Data Design and Data Representation: Principles of Dimensional Modeling, Data Extraction, Transformation and Loading, Data Quality, Online Analytical Processing (OLAP)–OLAP and Multidimensional Data Analysis.

Unit-2 Data Mining – Pre-processing:

Steps in Data mining process, Data Mining Functionalities, Architecture of a Typical Data Mining Systems, Classification of Data Mining Systems, Knowledge Discovery in Databases (KDD), KDD Process, Data Preprocessing, Data Cleaning, Data Transformation, Data Compression and Dimension Reduction, Principal Component Analysis, Binning Methods.

Unit-3 Data Mining Techniques

Association Rule Mining, Classification and Prediction: Efficient and Scalable Frequent Itemset Mining Methods, Mining, Various Kinds of Association Rules, Association Rules, Market Basket Analysis, Apriori Algorithm, Tree Based Algorithms. Classification by Decision Tree Introduction, Bayesian Classification, Rule Based Classification, Classification by Back propagation, Support Vector Machines, Lazy Learners, Prediction Techniques, Regression Models.

Unit-4 Clustering & Introduction to Web Mining

Data Mining Algorithms: Clustering. Partitioned Algorithms, Hierarchical Algorithms, Density Based, Algorithms, Grid Based Algorithms, Web Content Mining, Web Structure Mining, Web Usage Mining, Spatial Mining, Multimedia Data Mining, Text Mining.

Course Materials

Required Text: Text books

1. J. Han and M. Kamber, "Data Mining Tools and Techniques", Morgan Kaufmann Publishers.
2. M.H. Dunham, "Data Mining Introductory and Advanced Topics", Pearson Education.
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Pearson Education.

Optional Materials: Reference Books

1. Prabhu, "Data warehousing - concepts, Techniques, Products and Applications", Prentice Hall of India.
2. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw Hill Edition, Tenth Reprint.
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Pearson Education.

Cryptography and Network Security

[6th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Cryptography and Network Security	3-1-0, (4)	EPR	CS106102CS

[Pre-requisites: Computer Network]

Course Objectives

1. To understand securing computer network protocols, based on the application of cryptography techniques.
2. To understand various protocols for network security to protect against the threats in the networks.
3. To get an insight into the working of different existing cryptographic algorithms
4. To learn how to use cryptographic algorithms in security

Course Content

Unit-1 Elementary Number Theory:

Introduction to security attacks, services and mechanism, introduction to cryptography, Conventional encryption model, Classical encryption techniques- substitution ciphers and transposition ciphers, Cryptanalysis, Stream and block ciphers, Euclidean Algorithm, Congruences, Computing the inverse, Random number generation.

Unit-2 Symmetric Key Cipher:

DES and its variants, strength of DES, AES, Block cipher modes of operations, IDEA encryption and decryption, Modular arithmetic, Fermat's and Euler's theorem, Primality testing, Quadratic Residues, Legendre Symbol, Jacobi Symbol, Gauss's lemma, Quadratic Reciprocity Law, Chinese Remainder theorem, Discrete logarithms problems, Diffle-Hellman key exchange algorithm.

Unit-3 Asymmetric Key Cipher:

Hash functions, Birthday attacks, MD5 message digest algorithm, Secure hash algorithm (SHA). Principles of public key cryptosystems, RSA algorithm, Security of RSA, ElGamal Public Key Cryptosystem, Elliptic curve cryptography: Cubic Curves, Singular points, Discriminant; Introduction to Elliptic Curves, Geometry of elliptic curves over reals; Point at infinity; Addition of two points; Elliptic Curves over finite fields, ElGamal Public Key Cryptosystem for elliptic curves, Digital Signatures, Digital signature standards (DSS).

Unit-4 Email and Web Security:

Authentication Applications: Kerberos and X.509, directory authentication service, electronic mail security - pretty good privacy (PGP), S/MIME, IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET).

Course Materials

Required Text: Text books

1. Cryptography and Network Security: Principles and Practice, 6th Edition, William Stallings, Pearson, ISBN 13:9780133354690.
2. Forouzan, Behrouz A., and Debdeep Mukhopadhyay. Cryptography and network security. McGraw Hill Education (India) Private Limited.

Optional Materials: Reference Books

1. Paar, Christof, and Jan Pelzl. Understanding cryptography: a textbook for students and practitioners. Springer Science & Business Media.
2. Kahate, Atul. Cryptography and Network Security, 3e. Tata McGraw-Hill Education.
3. Elliptic curves: Number theory and cryptography, Lawrence C. Washington, (Chapman & Hall/CRC)
4. A Course in Number Theory and Cryptography, Neal Koblitz, (Springer)

Artificial Intelligence & Expert System

[6th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Artificial Intelligence & Expert System	3-1-0, (4)	EPR	CS106103CS

[Pre-requisites: Nil]

Course Objectives

1. To understand basic concepts of NLP and Machine Learning.
2. To obtain a thorough knowledge of various knowledge representation schemes.
3. To understand an overview of various AI applications.
4. To study about various heuristic and game search algorithms.

Course Content

Unit-1 Overview & 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. Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance.

Unit-2 Introduction to KR:

Knowledge agent, Predicate logic, WFF, Inferencerule & theorem proving: forward chaining, backward chaining, resolution; Propositional knowledge, Boolean circuit agents. Rule Based Systems, Forward reasoning: Conflict resolution, backward reasoning: Use of backtracking, Structured KR: Semantic Net - slots, Inheritance, Frames exceptions and defaults attached predicates, Conceptual Dependency formalism, knowledge representations.

Unit-3 Source of uncertainty:

Probabilistic inference, Bayes' theorem, Limitation of naïve Bayesian system, Bayesian Belief Network (BBN), Inference with BBN, Dempster-Shafer Theory, Overview of Fuzzy Logic. Non monotonic reasoning: Dependency directed backtracking, Truth maintenance systems. Learning: Concept of learning, Learning model, learning decision tree, Paradigms of machine learning, Supervised & Unsupervised learning, Example of learning, Learning by induction, Learning using Neural Networks.

Unit-4 NLP, Planning and Expert System:

Overview of NLP tasks, Parsing, Machine translation, Components of Planning System, Planning agent, State-Goal & Action Representation, Forward planning, Backward chaining, Planning example : partial-order planner, Block world, Expert System Architectures, Rule based systems, Non production system, knowledge acquisition, AI languages.

Course Materials

Required Text: Text books

1. Dan W. Patterson " Introduction to Artificial Intelligence and Expert Systems", Pearson Education
2. G. Luger, W. A. Stubblefield, Artificial Intelligence "Structures and Strategies for Complex Problem Solving", Sixth Edition, Addison-Wesley Longman.
3. Elaine Rich, Kevin Knight and Shivashankar B Nair," Artificial Intelligence", Tata McGraw Hill, 3rd Edition.

Optional Materials: Reference Books

1. N. J. Nilsson, Principles of Artificial Intelligence, 1st edition, Narosa Publishing House.
2. S. Russell and P. Norvig "Artificial Intelligence: A Modern Approach" Prentice Hall 3rd Edition.
3. Clocksin & C.S. Melish; Programming in PROLOG - Narosa Publishing house.

Network Programming

[6th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Network Programming	3-0-0, (3)	EPR	CS106201CS

[Pre-requisites:

1. Java,
2. Unix & Shell Programming]

Course Objectives

1. To learn how to write network programs using an application program interface (API).
2. To help to understand in-depth of advanced sockets API, sometimes called Berkeley Sockets, acknowledging their heritage from Berkeley Unix.
3. To understand simple network management protocols and basics of TCP, raw sockets and socket programming, high performance scalable network applications & UDP sockets.

Course Content

Unit-1 Networking & Tcp/Ip:

Communication protocols, Network architecture, UUCP, XNS, IPX/SPX for LANs, TCP & IP headers, IPv4 & v6 address structures, Programming Applications: Time date routines, Internet protocols: Application layer, Transport layer, Network layer, Data Link layer protocols, Chat, Email, Web server working method & programming.

Unit-2 Unix Socket Programming In C

Creating sockets, Posix data type, Socket addresses, Assigning address to a socket, Java socket programming, Thread programming, Berkeley Sockets: Overview, socket address structures, byte manipulation & address conversion functions, elementary socket system calls – socket, connect, bind, listen, accept, fork, exec, close, TCP ports (ephemeral, reserved), Berkeley Sockets: I/O asynchronous, multiplexing models, select poll functions, signal & fcntl functions, socket implementation (client & server programs), UNIX domain protocols.

Unit-3 Java Socket Programming

Java network programming, packages, RMI, Client-side programming: Creating sockets, Implementing generic network client, Server side programming: Steps for creating server, Accepting connection from browsers, Adding multithreading to a server.

Unit-4 Advance Java Web Programming & Relevant Technologies

Parsing data using string Tokenizer, Retrieving file from an HTTP server, Retrieving web documents by using the URL class, Overview of Javascript, Introduction to Java Beans, Introduction to CGI programming.

Course Materials

Required Text: Text books

1. UNIX Network Programming, Steven. W.R, PHI (VOL I & II).
2. Java Network Programming, 4th Edition, Developing Networked Applications, By Elliotte Harold, O'Reilly Publications.
3. Window Socket Programming by Bobb Quinn and Dave Schutes.

Optional Materials: Reference Books

1. Windows Network Programming, Davis. R., Addison Wesley.
2. Network Programming With Windows Socket By Baner .P., PH New Jersey.

Advanced Algorithms

[6th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Advanced Algorithms	3-0-0, (3)	EPR	CS106202CS

[Pre-requisites:

1. Data Structure,
2. Design Analysis & Algorithm]

Course Objectives

1. To introduce and practice advanced algorithms and programming techniques necessary for developing sophisticated computer application programs
2. To get accustomed with various programming constructs such as divide-and-conquer, backtracking, and dynamic programming.
3. To understand and use various data structures in applications
4. To learn new techniques for solving specific problems more efficiently and for analyzing space and time requirements.

Course Content

Unit-1 Amortized and Dynamic Programming Algorithms:

Amortized Analysis: Aggregate Analysis, Accounting Method and Potential Method; Dynamic Programming: Matrix Chain Multiplication, Optimal binary search trees, Travelling Salesman Problem, Multistage Graph.

Unit-2 Graph and Computational Geometry:

Graph Algorithms: Topological Sorting, Strongly Connected Components, Single Source Shortest Paths in DAG,All-Pairs Shortest Paths:Johnson's Algorithmfor sparse graphs; Computational Geometry: Geometric Searching Algorithms, Segment Intersection Problems.

Unit-3 Backtracking and Branch & Bound:

Backtracking: N-Queens problem, Sum of Subsets problem, Hamiltonian Cycle, Branch and Bound: Job Sequencing with deadline, Travelling Salesman Problem. B trees and B+ Trees for Databases.

Unit-4 Approximation and Randomized Algorithms:

Approximation Algorithms: Vertex Cover Problem, Travelling Salesman Problem, Randomized Algorithms: Randomized Quicksort, Las Vegas and Monte Carlo Algorithm.

Course Materials

Required Text: Text books

1. T. H. Cormen, C. E. Leiserson, R. L. Rivest, Introduction to Algorithms, Prentice hall.

Optional Materials: Reference Books

1. Sartaj Sahni and Sanguthevar Rajasekaran Ellis Horowitz, Fundamentals of Computer Algorithms, Universities Press.
2. Mark De Berg et al., Computational geometry:Algorithms and Application, 3rd edition, Springer.
3. H. S. Wilf, Algorithms and complexity, Prentice hall.

Computer Vision

[6th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Computer Vision	3-0-0, (3)	EPR	CS106203CS

[Pre-requisites: Nil]

Course Objectives

1. Introduce the fundamental problems of computer vision.
2. Provide understanding of techniques, mathematical concepts and algorithms used in computer vision to facilitate further study in this area.
3. Provide pointers into the literature and exercise a project based on a literature search and one or more research papers.
4. Practice software implementation of different concepts and techniques covered in the course.
5. Utilize programming and scientific tools for relevant software implementation.

Course Content

Unit-1 Introduction & Image Formation:

Overview of computer vision, related areas, and applications; overview of software tools; overview of course objectives; Introduction to OpenCV, Image formation and representation: imaging geometry, radiometry, digitization, cameras and projections, rigid and affine transformations. Filtering: convolution, smoothing, differencing, and scale space.

Unit-2 Feature detection & Model fitting:

Edge detection, corner detection, line and curve detection, active contours, SIFT and HOG descriptors, shape context descriptors. Hough transform, line fitting, ellipse and conic sections fitting, algebraic and Euclidean distance measures. Camera calibration: camera models; intrinsic and extrinsic parameters; radial lens distortion; direct parameter calibration; camera parameters from projection matrices; orthographic, weak perspective, affine, and perspective camera models.

Unit-3 Epipolar geometry & Model reconstruction:

Introduction to projective geometry; epipolar constraints; the essential and fundamental matrices; estimation of the essential/fundamental matrix, reconstruction by triangulation; Euclidean reconstruction; affine and projective reconstruction. Motion analysis: the motion field of rigid objects; motion parallax; optical flow, the image brightness constancy equation, affine flow; differential techniques; feature-based techniques; regularization and robust estimation; motion segmentation through EM.

Unit-4 Motion Tracking & Object Recoginition:

Motion tracking: statistical filtering; iterated estimation; observability and linear systems; the Kalman filter; the extended Kalman filter, Object recognition and shape representation: alignment, appearance-based methods, invariants, image eigenspaces, data-based techniques.

Course Materials

Required Text: Text books

1. Computer Vision: Algorithms and Applications, R. Szeliski, Springer.
2. Computer Vision: A Modern Approach, D. Forsyth and J. Ponce, Prentice Hall, 2nd ed.

Optional Materials: Reference Books

1. Introductory techniques for 3D computer vision, E. Trucco and A. Verri, Prentice Hall.

Soft Computing

[6th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Soft Computing	3-0-0, (3)	EPR	CS106204CS

[Pre-requisites: Nil]

Course Objectives

1. To understand Soft Computing concepts, technologies, and applications
2. To understand the underlying principle of soft computing with its usage in various applications.
3. To understand different soft computing tools to solve real life problems.

Course Content

Unit-1 Introduction of Soft Computing:

Concept of Soft Computing, Difference between Soft and Hard computing, different components of soft computing, requirement ,different tools and techniques, usefulness and applications of soft computing.

Unit-2 Fuzzy Logic:

Fuzzy Logic: Fuzzy set theory, Fuzzy set versus crisp set, crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions. Fuzzy rule base system: Fuzzy propositions, formation, decomposition & aggregation of fuzzy Rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.

Unit-3 Genetic Algorithm:

Genetic algorithms basic concepts, encoding, fitness function, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator ,Generational Cycle, reproduction- Roulette wheel, Boltzmann, tournament, rank, and steady state selections, Convergence of GA, Applications of GA case studies, Differences & similarities between GA and ; other traditional methods, Introduction to genetic programming-basic concepts.

Unit-4 Neural Network:

Neural Network: Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference b/w ANN and human brain, characteristic and applications of ANN, Activation functions,. **Perceptron:** Linear separability, Widrow and; Hebb's learning rule/Delta rule,supervised (feedforward, backpropagation, Gaussian) and unsupervised networks (Self organizing maps, adaptive resonance theory).

Course Materials

Required Text: Text books

1. R. Rajasekaran and G. A and Vijayalakshmi Pa, Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications, Prentice Hall of India.
2. D. E. Goldberg, Genetic Algorithms in Search, Optimisation, and Machine Learning, Addison - Wesley.
3. Principles of Soft Computing by S.N. Sivanandam and S.N. Deepa, Wiley India.

Optional Materials: Reference Books

1. L. Fausett, Fundamentals of Neural Networks, Prentice Hall.
2. T. Ross, Fuzzy Logic with Engineering Applications, Tata McGraw Hill

Cloud Computing

[6th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Cloud Computing	3-0-0, (3)	EPR	CS106301CS

[Pre-requisites:

1. Computer Architecture,
2. Computer Networks,
3. Operating System]

Course Objectives

1. This course aims to provide the basic concepts of cloud computing Foundations,
2. To provide in depth knowledge of Computer Clusters for Scalable Parallel Computing, Virtual Machines and Virtualization of Clusters and Data Centers, Cloud Platform Architecture over Virtualized Data Centres.
3. To understand the relevance of Cloud Programming and Software Environments.

Course Content

Unit-1 Introduction:

Overview of Distributed Computing; Cloud introduction and overview; Cloud Computing in a Nutshell, Roots of Cloud Computing, Layers and Types of Clouds, Desired Features of a Cloud, Different types of cloud services; Deployment models; Advantages and Disadvantages; Companies in the Cloud.

Unit-2 Virtualization:

CPU Virtualization, Storage Virtualization, ISCSI, Network Virtualization, Implementation Levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Virtualization of CPU, Memory, and I/O Devices, Virtual Clusters, Virtualization for Data-Center Automation

Unit-3 Deployment Models & Scheduling:

Infrastructure as a Service (IaaS): Introduction, Platform/Software as a Service (PaaS / SaaS): From IaaS to PaaS, Introduction PaaS properties and Characteristics PaaS Techniques: File System GFS, HDFS, PaaS: Programming Model – Map Reduce Storage System , BigTable, HBase; Software as a Service (SaaS): Web Service, Applications and Web Portal, Task Scheduling in Cloud - Scheduling Algorithms for Computing Clouds Fair Queuing Start Time Fair Queuing Borrowed Virtual Time Cloud Scheduling Subject to Deadlines Scheduling Map Reduce Applications Subject to Deadlines, Workflow Scheduling and its application in cloud computing, Cloud provisioning, types of Cloud Provisioning, challenges, tools used in provisioning.

Unit-4 Cloud Security and Case Study:

Security in Cloud Environment: Cloud Computing Threats, Security for Cloud Computing. Case Studies: Amazon EC2, Google App Engine, IBM Clouds, Microsoft's Windows Azure.

Course Materials

Required Text: Text books

1. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, "Cloud Computing: principles and paradigms (Wiley Series on Parallel and Distributed Computing), Wiley Publishing (c).
2. Kai Hwang. Geoffrey C. Fox, Jack J. Dongarra, "Distributed and Cloud Computing from parallel processing to the internet of things", Elsevier.
3. Cloud and Distributed Computing-Algorithms and Systems, Rajiv Mishra, Yashwant Singh Patel, Weily.

Optional Materials: Reference Books

1. Craig Gentry, A fully Homomorphic Encryption Scheme, Doctoral Dissertation.
2. Ajay D. Kshemkalyani and Mukesh Singhal, Distributed Computing: Principles, Algorithms, and Systems, Cambridge.

Applied Machine Learning

[6th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Applied Machine Learning	3-0-0, (3)	EPR	CS106302CS

[Pre-requisites: Nil]

Course Objectives

1. To understand machine learning concepts, techniques, and applications.
2. To understand the underlying principle of machine learning techniques.
3. To understand different machine learning tools to solve real life problems.

Course Content

Unit-1 Introduction:

Introduction to Machine Learning, Types of Machine Learning, Application of Machine Learning, Mathematical Foundations of Machine Learning, Random Variables and Probabilities, Probability Theory, Probability Distributions, Basics of statistics, exploratory data analysis.

Unit-2 Supervised Learning:

Concept of supervised learning, Regression, different types of regressions, Lasso/Ridge regression/ElasticNet, locally weighted linear regression Classification, Generative and discriminative models, K-nearest neighbors, Naive Bayes, DecisionTrees, Neural Networks, Support Vector Machines, Bias-Variance, Feature engineering, Feature selection, Validation techniques, Evaluation Measures.

Unit-3 Ensemble Learning:

Concept of ensemble learning, Bagging, Random forests, Boosting, Gradient Boosting, Stacking, Parameter tuning: Hyperparameter tuning, regularization and generalization. Effects of Underfitting and overfitting, Hidden Markov models.

Unit-4 Unsupervised Learning:

Clustering, different types of clustering, evaluation measures, recommendation systems, The Curse of Dimensionality, Dimensionality Reduction, Principal Component Analysis, Independent Components Analysis.

Course Materials

Required Text: Text books

1. T. M. Mitchell, Machine Learning (1 ed.), McGraw Hill. ISBN 978-1259096952.
2. E. Alpaydin, Introduction to Machine Learning (3 ed.), PHI. ISBN 978-8120350786.

Optional Materials: Reference Books

1. Machine Learning: An Algorithmic Perspective by Stephen Marsland, published by CRC Press.
2. Understanding Machine Learning: From Theory to Algorithms by Shai Shalev-Shwartz and Shai Ben-David, Cambridge University Press.
3. Hands-On-Machine-Learning-with-Scikit-Learn-and-TensorFlow (O'reiley)
4. Probabilistic Graphical Models: Principles and Techniques (Adaptive Computation and Machine Learning series) 1st Edition by Daphne Koller, Nir Friedman

E-Commerce

[6th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
E-Commerce	3-0-0, (3)	EPR	CS106303CS

[Pre-requisites: Nil]

Course Objectives

1. To learn the concepts of business/networks, network technology, business integration processes and business server.
2. To learn about the electronic basic structure of business like protocols, web pages, portals of business, operating system etc.
3. To gain knowledge about client service, network service, different business servers and their applications with respect to e-commerce.
4. To understand different mechanisms of business security and applications towards e-commerce.

Course Content-

Unit-1 Introduction:

Introduction to Business/Network Concepts, Technology and business integration, The Hardware of E-commerce: Introduction to networks, Introduction to the business server, Electronic Business Structure: Protocols, The Web pages, Portals of Business, Web salesmanship, Introduction to the client machine and OS.

Unit-2 Business Servers & Business Netiquette:

Business servers: Mail, Applications, Proxy, Entertainment, ISP, Banking. Advertising on the Network: Web software infrastructure, personalization and tracking, Web Billboards, The 'Hit' Theory, Intellectual property for sale, 'Bots'. Business Netiquette: Do's and Don't of Web pages, Client service, Personnel, Technical support, Network services, Accounting and statistics, integration of catalogs and other trading information.

Unit-3 Business Security:

Business Security: The Credit card on the Net, Secure transmission, Internal security of telephony, Email security, auctions and trading mechanisms, safe exchange, payment mechanisms and protocols, searching hyperlink structures, data mining, copyright protection and security.

Unit-4 Introduction to M-Commerce:

What is M-Commerce, M-Commerce Value Chain, The Technologies of M-Commerce, Mobile Communication: The Transition to 3G, Mobile Security and Payment, Mobile Commerce Services Today, Next-Generation M-Commerce.

Course Materials

Required Text: Text book

1. W. Hanson, Principles of Internet Marketing, South Western Publishing
2. K. K. Bajaj & D. Nag, E Commerce, Tata McGraw Hill .
3. P. Chadace Deans, University of Richmond, USA, E-Commerce and M-Commerce Technologies.
4. Norman Sadesh, M-Commerce, Technologies, Services and Business Models.

Optional Materials: Reference Books

1. R. Kalakota and A.B. Whiston, Frontiers of Electronic Commerce, Addison-Wesley.
2. Marilyn Greensein and Todd M Feinman, Electronic Commerce Security, Risk management and Control, Tata McGraw Hill.

Information Retrieval

[6th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Information Retrieval	3-0-0, (3)	EPR	CS1056304CS

[Pre-requisites: Nil]

Course Objectives

1. To understand the basics of information retrieval with pertinence to modeling, query operations and indexing.
2. To get an understanding of machine learning techniques for text classification and clustering.
3. To understand the various applications of information retrieval giving emphasis to multimedia IR, web search.
4. To understand the concepts of digital libraries.

Course Content

Unit-1 Introduction: Motivation:

Basic Concepts – Practical Issues - Retrieval Process – Architecture - Boolean Retrieval – Retrieval Evaluation – Open Source IR Systems–History of Web Search – Web Characteristics– The impact of the web on IR ––IR Versus Web Search–Components of a Search engine.

Unit-2 Modeling:

Taxonomy and Characterization of IR Models – Boolean Model – Vector Model - Term Weighting – Scoring and Ranking –Language Models – Set Theoretic Models - Probabilistic Models – Algebraic Models – Structured Text Retrieval Models – Models for Browsing.

Unit-3 Indexing & Classification:

Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents. Flat Clustering – Hierarchical Clustering –Matrix decompositions and latent semantic indexing – Fusion and Meta learning Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents.

Unit-4 Search of Web:

Searching the Web–Structure of the Web–IR and web search–Static and Dynamic Ranking –Web Crawling and Indexing –Link Analysis -XML Retrieval Multimedia IR: Models and Languages-Indexing and Searching Parallel and Distributed IR-Digital Libraries.

Course Materials

Required Text: Text books

1. An Introduction to Information Retrieval: Christopher D. Manning, PrabhakarRaghavan, HinrichSchütze, Cambridge University Press.
2. Speech and Language Processing :Jurafsky Dan and Martin James, Pearson Publication.
3. Natural Language Understanding : Allen James , Pearson Publication.

Optional Materials: Reference Books

1. Ricardo Baeza – Yates, Berthier Ribeiro – Neto, "Modern Information Retrieval: The concepts and Technology behind Search" (ACM Press Books), Second Edition.
2. Stefan Buttcher, Charles L. A. Clarke, Gordon V. Cormack, "Information Retrieval Implementing and Evaluating Search Engines", The MIT Press, Cambridge, Massachusetts London, England.

Data Warehousing and Data Mining & AI Lab

[6th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Data Warehousing and Data Mining & AI Lab	0-0-2, (1)	EPR	CS106401CS

[Pre-requisites: Nil]

Course Objectives

1. To implement data mining techniques and methods to large data sets.
2. To be able to use data mining tools.
3. Ability to compare and contrast the various classifiers.
4. Ability to learn Prolog.
5. To implement the different problem on knowledge base.
6. To implement the game search algorithm.

Course Content

1. Experiments on Input Techniques: Concepts, instances, attributes.
2. Experiments on Output Techniques: Knowledge Representation.
3. Classification Experiments - Basic methods.
4. Classification Using Decision Trees.
5. Classification Using C4.5.
6. Classification Using CART
7. Bayesian Classification.
8. K-means clustering.
9. Experiments on Clustering Techniques.
10. Experiments on Associations Techniques.
11. Experiments on Visualization Techniques.
12. Experiments on Summarization Techniques.
13. Creating a Data Warehouse – Defining Dimension and Fact Table.
14. Implementation of Star Data Warehouse Schema.
15. Implementation of Snowflake Data Warehouse Schema.
16. Implementation of Fact Constellation Warehouse Schema
17. Write a prolog program to find the rules for parent, child, male, female, son, daughter, brother, sister, uncle, aunt, ancestor given the facts about father and wife only.
18. Write a program to find the length and last element of a given list.
19. Write a program to delete the first occurrence and also all occurrences of a particular element in a given list.
20. Write a program to find union and intersection of two given sets represented as lists.
21. Write a program to read a list at a time and write a list at a time using the well defined read & write functions.
22. Write a program given the knowledge base, If x is on the top of y, y supports x. If x is above y and they are touching each other, x is on top of y. A cup is above a book. The cup is touching that book. Convert the following into wffs, clausal form; Is it possible to deduce that `The book supports the cup'.
23. Solve the classical Water Jug problem of AI.
24. Solve the classical Monkey Banana problem of AI.
25. Solve the classical Travelling Salesman Problem of AI.
26. Write a program to search any goal given an input graph using AO* algorithm.
27. Write a python program to implement Mini-Max search.
28. Write a python program to implement Alpha Beta pruning.
29. Write a python program to implement Baye's theorem. Example: When there are 2 boxes A and B containing balls of 3 colors. Number of balls with each color in both the boxes are given. When a random ball is picked and its color is given, the program should be able to find the probabilities of the ball being taken from box A and box B. W
30. Write a program to solve the classical Travelling Salesman Problem of Artificial Intelligence using python.
31. Write a program to solve the classical Water Jug problem of Artificial Intelligence using python.

Course Materials

Required Text: Text books

1. J. Han and M. Kamber, "Data Mining Tools and Techniques", Morgan Kaufmann Publishers.
2. M.H. Dunham, "Data Mining Introductory and Advanced Topics", Pearson Education.
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Pearson Education.
4. Ivan Bratko : Logic & prolog programming

5. Carl Townsend : Introduction to Turbo Prolog, (BPB, Publication).

Optional Materials: Reference Books

1. Prabhu, "Data warehousing - concepts, Techniques, Products and Applications", Prentice Hall of India.
2. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw Hill Edition, Tenth Reprint.
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Pearson Education.
4. W.F. Clocksin & Mellish : Programming in PRLOG (Narosa Publication House)
5. Paul Barry, "Head-First Python: A Brain-Friendly Guide", O'Reilly Media.

Cryptography and Network Security Lab

[6th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Cryptography and Network Security Lab	0-0-2, (1)	EPR	CS106402CS

[Pre-requisites: Nil]

Course Objectives

1. To design robust cryptosystems for real time applications.
2. To analyze the robustness of Cryptosystems.
3. To know the implementation of various protocols and cryptographic techniques.

Course Content

1. Write a Program to find the frequency of occurrence of characters.
2. Write a program to implement the concept of Caesar Cipher.
3. Write a program to implement the concept of Playfair Cipher.
4. Write a program to implement the concept of Hill Cipher.
5. Write a program to implement the concept of Vigenere Cipher.
6. Write a program to implement the concept of Rail fence – row & Column Transformation.
7. Write a program to implement the concept of DES algorithm.
8. Write a program to implement the concept of AES algorithm.
9. Write a program to implement the concept of RSA algorithm.
10. Write a program to implement the concept of Diffie- Hellman Key Exchange Algorithm.
11. Write a program to implement the concept of MD5.
12. Write a program to implement the concept SHA-1.
13. Write a program to implement the concept of Elliptic Curve Cryptosystem..
14. Write a program to implement the concept of ElGamal Cryptosystem.
15. Write a program to implement the concept of Chinese Remainder Theorem.
16. Write a program to implement the concept of Digital Signature.
17. Write a program for Kerberos Authentication Protocol.

Course Materials

Required Text: Text books

1. Cryptography and Network Security: Principles and Practice, 6th Edition, William Stallings, Pearson, ISBN 13:9780133354690.
2. Forouzan, Behrouz A., and Debdeep Mukhopadhyay. Cryptography and network security. McGraw Hill Education (India) Private Limited.

Optional Materials: Reference Books

1. Paar, Christof, and Jan Pelzl. Understanding cryptography: a textbook for students and practitioners. Springer Science & Business Media.
2. Kahate, Atul. Cryptography and Network Security, 3e. Tata McGraw-Hill Education.