

**ACADEMIC REGULATIONS
PROGRAM STRUCTURE
and
DETAILED SYLLABUS**

Master of Technology

(Computer Science and Engineering)

(Two Year Regular Programme)

(Applicable for Batches admitted from 2018)



Gokaraju Rangaraju Institute of Engineering and Technology

(Autonomous)

Bachupally, Kukatpally, Hyderabad- 500 090



Gokaraju Rangaraju Institute of Engineering and Technology

(Autonomous)

Department of Computer Science and Engineering

Computer Science and Engineering

I YEAR - I SEMESTER

Sl. No	Group	Subject	Credits			Credits	Int. Marks	Ext. Marks	Total Marks
			L	T	P				
1	Core I	Mathematical Foundation For Computer Science Applications	3	-	-	3	30	70	100
2	Core II	Advanced Data Structures	3	-	-	3	30	70	100
3	PE I	1. Advanced Data Mining 2. Information Security 3. Advanced Python Programming	3	-	-	3	30	70	100
4	PE II	1. Computer System Design 2. Object Oriented Modelling 3. Distributed Computing	3	-	-	3	30	70	100
5	Core	Advanced Data Mining Lab/ Information Security Lab/ Advanced Python Programming Lab	-	-	4	2	30	70	100
6	Core	Advanced Data Structures Lab	-	-	4	2	30	70	100
7	Core	Research Methodology and IPR	2	-	-	2	30	70	100
8	Audit	Audit course -1	2	-	-	0	30	70	100
Total			16	-	8	18	240	560	800

I YEAR - II SEMESTER

Sl. No	Group	Subject	Credits			Credits	Int. Marks	Ext. Marks	Total Marks
			L	T	P				
1	Core III	Machine Learning and Applications	3	-	-	3	30	70	100
2	Core IV	Advanced Problem Solving	3	-	-	3	30	70	100
3	PE III	1. Image Processing 2. Advanced Data Science 3. Data Analytics	3	-	-	3	30	70	100
4	PE IV	1. Cloud computing and Applications 2. High Performance Computing 3. Advanced Computer Networks	3	-	-	3	30	70	100
5	Core	Image Processing Lab/Advanced Data Science Lab/Data Analytics Lab	-	-	4	2	30	70	100
6	Core	Machine Learning and Applications Lab	-	-	4	2	30	70	100
7	Audit	Audit course – 2	2	-	-	2	30	70	100
8	Core	Mini-Projects	2	-	-	0	30	70	100
Total			16	-	8	18	240	560	800

II YEAR - I SEMESTER

Sl. No	Group	Subject	Credits			Credits	Int. Marks	Ext. Marks	Total Marks
			L	T	P				
1	PE V	1. Mobile Applications and Services 2. Information Storage and Retrieval 3. Optimization Techniques	3	-	-	3	30	70	100
2	Open Elective	1. Business Analytics 2. Industrial Safety 3. Operations Research 4. Cost Management of Engineering Projects 5. Composite Materials 6. Waste to Energy	3	-	-	3	30	70	100
3	Dissertation	Dissertation Phase - I	-	-	20	10	30	70	100
Total			6	-	20	16	90	210	300

II YEAR - II SEMESTER

Sl. No	Group	Subject	Credits			Credits	Int. Marks	Ext. Marks	Total Marks
			L	T	P				
1	Dissertation	Dissertation Phase - II	-	-	32	16	30	70	100
Total					32	16	30	70	100

Audit course 1 & 2

1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Indian Constitution
6. Pedagogy Studies
7. Stress Management by Yoga
8. Personality Development through Life Enlightenment Skills.

SEMESTER - I

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE APPLICATIONS

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- To understand the mathematical fundamentals that is prerequisites for a variety of courses like Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning.
- To develop the understanding of the mathematical and logical basis to many modern techniques in information technology like machine learning, programming language design, and concurrency.
- Developing an appreciation for the use of to multivariate statistical models like regression and classification problems, principal components analysis, problem of over fitting model.
- To study various sampling and classification problems.
- Designing and Developing planar Graphs, Euler circuits, Graph Coloring, Hamiltonian graphs and their applications

Course Outcomes: After completion of course, students would be able to

- Understand the basic notions of distribution functions, discrete and continuous probability.
- Formulate the methods of statistical inference and the role that sampling distributions play in those methods.
- Perform correct and meaningful statistical analysis of simple to moderate complexity.
- Solve mathematical as well as graphical problems in systematic and logical manner and also familiarity in calculating number of possible outcomes of elementary combinatorial processes such as permutations and combinations.
- Apply discrete structures in computer science for various engineering applications.

Unit I

Probability mass, density, and cumulative distribution functions, parametric families of distributions, Expected value, variance, conditional expectation, Applications of the univariate and multivariate Central Limit Theorem, Probabilistic inequalities, Markov chains

Unit II

Random samples, sampling distributions of estimators, Methods of Moments and Maximum Likelihood

Unit III

Statistical inference, Introduction to multivariate statistical models: regression and classification problems, principal components analysis, The problem of over fitting model

assessment.

Unit IV

Graph Theory: Isomorphism, Planar graphs, graph Coloring, Hamilton circuits and Euler cycles.

Permutations and Combinations with and without repetition. Specialized techniques to solve combinatorial enumeration problems

Unit V

Computer science and engineering applications: Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning.

Recent Trends in various distribution functions in mathematical field of computer science for varying fields like bioinformatics, soft computing, and computer vision.

Reference Books:

1. John Vince, Foundation Mathematics for Computer Science, Springer.
2. K. Trivedi. Probability and Statistics with Reliability, Queuing, and Computer Science Applications. Wiley.
3. M. Mitzenmacher and E. Upfal. Probability and Computing: Randomized Algorithms and Probabilistic Analysis.
4. Alan Tucker, Applied Combinatorics, Wiley

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ADVANCED DATA STRUCTURES

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- The student should be able to choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem.
- Students should be able to understand the necessary mathematical abstraction to solve problems.
- To familiarize students with advanced paradigms and data structure used to solve algorithmic problems.
- Student should be able to come up with analysis of efficiency and proofs of correctness.
- Express algorithms in a language independent manner (as pseudo codes), thus exemplifying the professional ethics imbibed through this course.

Course Outcomes: After completion of course, students would be able to

- Understand the implementation of symbol table using hashing techniques.
- Develop and analyze algorithms for red-black trees, B-trees and Splay trees.
- Develop algorithms for text processing applications.
- Identify suitable data structures and develop algorithms for computational geometry problems.
- Compare and contrast various computational geometry methods for efficiently solving new evolving problems.

Unit I

Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries.
Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

Unit II

Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists.

Unit III

Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees.

Unit IV

Text Processing: String Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.

Unit V

Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quad trees, k-D Trees. Recent Trends in Hashing, Trees, and various computational geometry methods for efficiently solving the new evolving problem.

Reference Books:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.
2. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ADVANCED DATA MINING

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives: Students undergoing this course are expected to

- Understand data mining functionalities and pattern mining.
- Learn different classification techniques for mining patterns.
- Describe advanced clustering methods with real time applications.
- Discuss types of web mining and text mining techniques.
- Understand spatial and temporal mining applications in data mining,

Course Outcomes: At the end of the course, the student will be able to

- Summarize the basic data mining tasks and various types of pattern mining.
- Apply classification techniques for data mining.
- Evaluate the performance of different advanced clustering algorithms.
- Analyse recent trends in data mining such as web mining, text mining and spatial mining.
- Construct temporal association rules and sequence mining algorithms.

UNIT I

Data mining Overview and Advanced Pattern Mining: Data mining tasks – mining frequent patterns, associations and correlations, classification and regression for predictive analysis, cluster analysis , outlier analysis; advanced pattern mining in multilevel, multidimensional space – mining multilevel associations, mining multidimensional associations, mining quantitative association rules, mining rare patterns and negative patterns.

UNIT- II

Advanced Classification: Classification by back propagation, support vector machines, classification using frequent patterns, other classification methods – genetic algorithms, roughest approach, and fuzzy set approach.

UNIT-III

Advanced Clustering: Density - based methods –DBSCAN, OPTICS, DENCLUE; Grid - Based methods – STING, CLIQUE; Expectation – maximization algorithm; clustering High - Dimensional Data; Clustering Graph and Network Data.

UNIT-IV

Web and Text Mining: Introduction, web mining, web content mining, web structure mining, web usage mining, Text mining – unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

UNIT-V

Temporal and Spatial Data Mining: Introduction; Temporal Data Mining – Temporal Association Rules, Sequence Mining, GSP algorithm, SPADE, SPIRIT Episode Discovery, Time Series Analysis, Spatial Mining – Spatial Mining Tasks, Spatial Clustering, Data Mining Applications.

Text Books:

1. Data Mining Concepts and Techniques, Jiawei Han Micheline Kamber, Jianpei, Morgan Kaufmann.
2. Data Mining Techniques – Arun K pujari, Universities Press.

Reference Books:

1. Introduction to Data Mining – Pang - Ning Tan, Vipinkumar, Michael Steinbach, Pearson.
2. Data Mining Principles & Applications – T.V Suresh Kumar, B.Eswara Reddy, JagadishSKalimani, Elsevier.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INFORMATION SECURITY

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- To demonstrate the principal concepts, major issues, technologies and basic approaches in information security.
- To illustrate the concepts of cryptograph, how it has evolved and some key encryption techniques used today.
- To interpret security policies (such as authentication, integrity and confidentiality) as well as digital signatures to perform secure message exchanges.
- To Interpret network security designs using available secure solutions (such as PGP, S/MIME and IPSec).
- To implement security protocols and discuss about Intruders and firewalls.

Course Outcomes: On successful completion of the course students will be able to

- Analyze information security governance, and related issues.
- Illustrate various cryptography algorithms.
- Apply authentication mechanisms and Hash functions to provide secure data exchange.
- Access network security design using available secure solutions (such as PGP, S/MIME and IPSec).
- Infer advanced security issues and technologies.

UNIT I

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

UNIT II

Symmetric key Ciphers: Block Cipher principles & Algorithms(DES, AES, Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution Asymmetric key Ciphers: Principles of public key cryptosystems1 Algorithms(RSA, Diffie-Hellman, ECC), Key Distribution

UNIT III

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm Authentication Applications:

Kerberos, X.509 Authentication Service, Public — Key Infrastructure, Biometric Authentication

UNIT IV

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, key management.

UNIT V

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections

Text Books:

1. Cryptography and Network Security: William Stallings, Pearson Education, 4th Edition.
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 2nd Edition.

Reference Books:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 2nd Edition.
3. Information Security, Principles and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH.
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ADVANCED PYTHON PROGRAMMING

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- To understand why Python is a useful scripting language for developers.
- To learn how to design and program Python applications.
- To learn how to use lists, tuples, and dictionaries in Python programs.
- To learn how to identify Python object types.
- To learn how to use indexing and slicing to access data in Python programs.

Course Outcomes: On successful completion of the course students will be able to

- Demonstrate understanding of modern version control tools.
- Demonstrate understanding of the role of testing in scientific computing, and write unit tests in Python.
- Use command line tools to write and edit code.
- Implement publication-ready graphics from a dataset.
- Summarize sorting techniques

UNIT I

Algorithmic Problem Solving: Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, and guess an integer number in a range, Towers of Hanoi.

UNIT II

Data, Expressions, Statements: Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III

Control Flow, Functions: Conditionals, Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV

Lists, Tuples, Dictionaries: Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing – list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

UNIT V

Files, Modules, Packages: Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

Text Books:

1. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist“, 2nd edition, Updated for Python 3, Shroff/O‘Reilly Publishers, 2016 (<http://greenteapress.com/wp/think-python/>)
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

Reference Books:

1. John V Guttag, —Introduction to Computation and Programming Using Python“, Revised and expanded Edition, MIT Press , 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, —Exploring Python, Mc-Graw Hill Education (India) Private Ltd.,, 2015.
4. Kenneth A. Lambert, —Fundamentals of Python: First Programs, CENGAGE Learning, 2012.
5. Charles Dierbach, —Introduction to Computer Science using Python: A Computational Problem- Solving Focus, Wiley India Edition, 2013.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COMPUTER SYSTEM DESIGN

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives: Students undergoing this course are expected to

- Understand the components of the computer and its working and also basic concepts of number system.
- Understand the concepts of Input-Output interface and its organization.
- Understand the concepts of memory management, i.e cache, associative and virtual, auxiliary memory's and its organization.
- Understand different approaches to memory management.
- Learn and understand the security aspects of a UNIX

Course Outcomes: At the end of the course, the student will be able to

- Learn IA-32 Pentium processor architecture and Computer I/O operations
- Compare hardwired control and micro programmed control in processing unit.
- Learn the management of different type of memories in the computer system
- Determine the reasons of deadlocks and understand the different types of IPC mechanisms.
- Compare and analyze different file systems being used in different operating systems

UNIT I

Computer structure: Hardware, software, system software, Von-Neumann architecture – case study. IA -32 Pentium: registers and addressing, instructions, assembly language, program flow control, logic and shift/rotate instructions, multiply, divide MMX, SIMD instructions, I/O operations, subroutines. Input/output organization, interrupts, DMA, Buses, Interface circuits, I/O interfaces, device drivers in windows, interrupt handlers.

UNIT II

Processing Unit: Execution of a complete instruction, multiple bus organization, hardwired control, micro programmed control. Pipelining: data hazards, instruction hazards, influence on instruction sets, data path & control consideration, and RISC architecture introduction.

UNIT III

Memory: types and hierarchy, model level organization, cache memory, performance considerations, mapping, virtual memory, swapping, paging, segmentation, replacement policies

UNIT IV

Processes and Threads: processes, threads, inter process communication, classical IPC problems, Deadlocks.

UNIT V

File system: Files, directories, Implementation, UNIX file system Security: Threats, intruders, accident data loss, basics of cryptography, user authentication.

Text Books:

1. Computer Organization – Car Hamacher, ZvonksVranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI

Reference Books:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Morris Mano -Computer System Architecture –3rd Edition-Pearson Education.
3. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
OBJECT ORIENTED MODELLING

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- Create a requirements model using UML class notations and use-cases based on statements Of user requirements, and to analyze requirements models given to them for correctness and Quality
- Create the OO design of a system from the requirements model in terms of a high Level architecture description, and low-level models of structural organization and dynamic Behavior using UML class, object, and sequence diagrams.
- Design the architectural and Behavioral UML Diagrams for Real time applications and Enough Java to see how to create software the implements the OO designs modeled Using UML. Understand the Unified Process Models and Design and implement and to realize the Use cases and design the architecture centric process model.
- Create the iterative incremental and generic iteration workflow phases in Unified Process.
- Construct the Modern Software Development life Cycle Phase.

Course Outcomes: At the end of the course, the student will be able to

- Able to know the fundamental principles of OO programming and key principles in OO analysis, design, and development.
- Able to Design Behavioral and Architerutal Modeling UML Diagrams for Real time Applications.
- Demonstrate the Unified Process Phases and uses of the Use cases in architecture
- Understand the iterative and incremental and generic iteration work flows in unified process.
- Develop software applications using inception, elaboration, construction and transition phases

UNIT I

Introduction to UML: The meaning of Object Orientation, object identity, Encapsulation, information hiding, polymorphism, generosity, importance of modelling, principles of modelling, object oriented modelling, conceptual model of the UML, Architecture. Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams. Class & Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams. Collaboration Diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration diagrams, iterated messages, use of self in messages. Sequence Diagrams: Terms, concepts, depicting asynchronous messages with/without priority, call back mechanism, broadcast messages.

UNIT-II

Basic Behavioural Modelling: Use cases, Use case Diagrams, Activity Diagrams. Advanced Behavioural Modelling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Architectural Modelling: Component, Deployment, Component diagrams and Deployment diagrams.

UNIT-III

The Unified process: use case driven, architecture centric, iterative, and incremental

The Four Ps: people, project, product, and process

Use case driven process: why use case, capturing use cases, analysis, design, and implementation to realize the use cases, testing the use cases

Architecture-centric process: architecture in brief, why we need architecture, use cases and architecture, the steps to architecture, an architecture description.

UNIT-IV

Iterative incremental process: Iterative incremental in brief, why iterative incremental development? The iterative approach is risk driven, the generic iteration.

The Generic Iteration workflow: phases are the first division workflow, planning proceeds doing, risks affect project planning, use case prioritization, resource needed, assess the iteration and phases.

Inception phase: early in the inception phase, the archetypal inception iteration workflow, execute the core workflows, requirements to test.

UNIT-V

Elaboration Phase: elaboration phase in brief, early in the elaboration phase, the architectural elaboration iteration workflow, execute the core workflows-Requirements to test.

Construction phase: early in the construction phase, the archetypal construction iteration workflow, execute the core workflow.

Transition phase: early in the transition phase, activities in transition phase Case Studies: Automation of a Library, Software Simulator application (2-floor elevator simulator).

Text Books:

- The Unified Modeling Language User Guide By Grady Booch, James Rumbaugh, Ivar Jacobson 2nd Edition, Pearson Education.
- UML 2 Toolkit by Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado WILEY-Dreamtech India Pvt. Ltd.
- The Unified Software Development Process by Ivar Jacobson, Grady Booch, James Rumbaugh, Pearson Education

Reference Books:

- Fundamentals of Object Oriented Design in UML By Meilir Page-Jones, Pearson Education
- Object Oriented Analysis & Design By AtulKahate, The McGraw-Hill.
- Practical Object-Oriented Design with UML By Mark Priestley, TATA Mc Graw Hill
- Object Oriented Analysis & Design By Brett D McLaughlin, Gary Pollice and David West, O'REILY.
- Object-Oriented Analysis and Design using UML by Simon Bennet, Steve Mc Robb and Ray Farmer, 2nd Edition, TATA Mc Graw Hill.
- Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger, Robert B Jackson and Stephen D Burd, THOMSON Course Technology.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
DISTRIBUTED COMPUTING

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives: Students undergoing this course are expected to

- To differentiate among concurrent, networked, distributed, and mobile
- To study about different computing paradigms
- To demonstrate the remote method invocation and compare with CORBA
- To describe and learn about Distributed Document Based systems.
- To distinguish about Grid computing and Cluster computing.

Course Outcomes: At the end of the course, the student will be able to

- Compare and differentiate between different form computing techniques and computing paradigms.
- Demonstrate of the remote method invocation and its comparison with CORBA
- Define and study the Distributed Document Based systems and distributed multimedia systems.
- Capable to understand the characteristics of distributed multimedia systems.
- Express the outline of Grid computing concept and cluster computing concept.

UNIT I

Introduction: The different forms of computing – Monolithic, Distributed, parallel and cooperative computing, the meaning of Distributed computing, Examples of Distributed systems, the strengths and weaknesses of Distributed computing, operating system concepts relevant to distributed computing, the architecture of distributed applications.

UNIT II

Distributed computing Paradigms: Paradigms for Distributed Applications – Message passing Paradigm, The Client-Server Paradigm (JAVA Socket API), The peer-to-peer paradigm, Message System (or MOM) Paradigm – the Point-to-point message model and the publish/subscribe message model, RPC model, The Distributed Objects Paradigms-RMI,ORB, the object space Paradigm, The Mobile Agent Paradigm, the Network Services Paradigm, The Mobile Agent Paradigm, the Network Services Paradigm, The collaborative application (Groupware Paradigm), choosing a Paradigm for an application.

UNIT III

Distributed Objects Paradigm (RMI): Message passing versus Distributed Objects, An Archetypal Distributed Object Architecture, Distributed Object Systems, RPC, RMI, The Java RMI Architecture, Java RMI API, A sample RMI Application, steps for building an RMI application,

testing and debugging, comparison of RMI and socket API Distributed Object Paradigm (CORBA): The basic Architecture, The CORBA object interface, Inter-ORB Protocols, object servers and object clients, CORBA Object references, CORBA Naming Service and the Interoperable Naming Service, CORBA object services, Object Adapters, Java IDL, An example CORBA application.

UNIT IV

Distributed Document-based Systems: WWW, Lotus Notes, comparison of WWW and Lotus Notes, Distributed Coordination-based systems- Introduction to coordination models, TIB, JINI, comparison of TIB and JINI Software Agents, Agent Technology, Mobile Agents. Distributed Multimedia Systems – characteristics of multimedia data, QOS of service management, Resource Management, Stream Adaption.

UNIT V

Grid Computing: Definition of grid, grid types – computational grid, data grid, grid benefits and applications, drawback of grid computing, grid components, grid architecture and its relation to various Distributed Technologies. Cluster Computing Parallel computing overview, cluster computing – Introduction, Cluster Architecture, parallel programming models and Paradigms, Applications of Clusters.

Text Books:

1. Distributed, Computing, Principles and applications, M.L.Liu, Pearson Education
2. Distributed Systems, Principles and paradigms, A.S. Tannenbaum and M.V. Steen, Pearson Education
3. Client-Server Programming with Java and CORBA 2nd edition, R. Orfali& Dan Harkey, John Wiley & Sons
4. Grid Computing, J. Joseph & C. Fellenstein, Pearson Education
5. High Performance cluster computing, RajKumarBuyya, Pearson Education

Reference Books:

1. A Networking Approach to grid computing, D.Mimoli, Wiley & Sons
2. Grid Computing: a practical guide to technology and applications, A. Abaus, Firewall media
3. Java Network Programming, E.R. Harold, 2nd Edition, O. Reilly, SPD.
4. Distributed systems, concepts and Design, 3rd edition, G. Coulouris, J. Dollimore, and Tim Kindbirg, Pearson Education.
5. Java programming with CORBA, 3rd Edition, Brose, Vogel, Duddy, Wiley Dreamtech.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
RESEARCH METHODOLOGY AND IPR

Course Code:

L/T/P/C: 3/0/0/3

Course objectives:

- To familiarise students with the different aspects of research.
- To provide an idea of good scientific writing and proper presentation skills.
- To provide an understanding of philosophical questions behind scientific research.
- To provide a brief background on the historical legacy of science.
- To provide an insight of nature of Intellectual Property and new developments in IPR.

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

- Understand research problem formulation.
- Analyze research related information and follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasise the need of information about Intellectual Property Right to be promoted among students in general & engineering.
- Understand the nature of Intellectual Property and IPR in International scenario.

Unit I

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit II

Effective literature studies approaches, analysis Plagiarism, Research ethics,

Unit III

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

Unit IV

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit V

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Reference Books:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2 nd Edition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill,1992.
6. Niebel , "Product Design", McGraw Hill,1974.
7. Asimov , "Introduction to Design", Prentice Hall,1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age",2016. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand,2008

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ADVANCED DATA STRUCTURES LAB

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- To design and implementation of various basic and advanced data structures.
- To introduce various techniques for representation of the data in the real world
- To familiarize students with advanced paradigms and data structure used to solve algorithmic problems.
- Student should be able to come up with analysis of efficiency and proofs of correctness.
- To improve the logical ability

Course Outcomes:

- Student will be able to choose appropriate data structure as applied to specified problem definition.
- Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
- Students will be able to use linear and non-linear data structures like stacks, queues , linked list etc..
- Students will be able to Implement various searching and sorting algorithms
- Students will be able to apply the various data structures in real time applications.

Task 1: Implement a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer

Task 2: Implement a Java program to implements List ADT using arrays and linked lists

Task 3: Implement a java program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression.

Task 4: Implement a Java programs to implement the deque (double ended queue) ADT using (a) Array (b) Doubly linked list.

Task 5: Implement a Java program to perform the following operations:

- Insert an element into a binary search tree.
- Delete an element from a binary search tree.
- Search for a key element in a binary search tree

Task 6: Implement a Java program to perform the following operations

Insertion into an AVL-tree
Deletion from an AVL-tree

Task 7: Implement a Java program to implement all the functions of a dictionary (ADT) using Hashing

Task 8: Implement a Java programs for implementing Graph colouring

Task 9: Implement a Java programs for implementing the following sorting methods:

- Bubble sort
- Selection sort
- Insertion sort
- Quick sort

Task 10: Implement a Java program for implementing KMP pattern matching algorithm

**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ADVANCED DATA MINING LAB**

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives: Students undergoing this course are expected to

- Differentiate On-line Transaction Processing and On-line Analytical processing
- Learn Multidimensional schema suitable for data warehousing
- Understand various data mining functionalities
- Understands the various classification and clustering algorithms
- Understands the Analysis Procedure by using various Decision tree algorithms.

Course Outcomes: At the end of the course, the student will be able to

- Adapt to new data mining tools.
- Explore recent trends in data mining such as web mining, spatial-temporal mining
- To understand the basic principles, concepts and applications of data warehouse and data mining.
- Ability to create training data set using data mining tools.
- Explores knowledge on Clustering and Classification analysis.

Task 1: Credit Risk Assessment Description:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the bank's profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient. To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant. Case histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

The German Credit Data:

Actual historical credit data is not always easy to come by because of confidentiality

rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. credit dataset (original) Excel spreadsheet version of the German credit data. In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer !)

A few notes on the German dataset DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter). owns_telephone. German phone rates are much higher than in Canada so fewer people own telephones. foreign_worker. There are millions of these in Germany (many from Turkey). It is very hard to get German citizenship if you were not born of German parents. There are 20 attributes used in judging a loan applicant. The goal is to classify the applicant into one of two categories, good or bad.

Subtasks : (Turn in your answers to the following tasks)

1. List all the categorical (or nominal) attributes and the real-valued attributes separately.
2. What attributes do you think might be crucial in making the credit assessment. Come up with some simple rules in plain English using your selected attributes.
3. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training.
4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy?
5. Is testing on the training set as you did above a good idea? Why or Why not?
6. One approach for solving the problem encountered in the previous question is using cross-validation? Describe what is cross-validation briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why?
7. Check to see if the data shows a bias against "foreign workers" (attribute 20), or "personal-status" (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. To remove an attribute you can use the preprocess tab in Weka's GUI Explorer. Did removing these attributes have any significant effect? Discuss.
8. Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.)
9. Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifications equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your

Decision Tree again and report the Decision Tree and cross-validation results. Are they significantly different from results obtained in problem 6 (using equal cost)?

10. Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model?
11. You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you obtain? Also, report your accuracy using the pruned model. Does your accuracy increase?
12. (Extra Credit): How can you convert a Decision Tree into "if-then- else rules". Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules. PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one! Can you predict what attribute that might be in this dataset? One R classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and one R.

Task Resources

- Mentor lecture on Decision Trees
- Andrew Moore's Data Mining Tutorials (See tutorials on Decision Trees and Cross Validation)
- Decision Trees (Source: Tan, MSU)
- Tom Mitchell's book slides (See slides on Concept Learning and Decision Trees)

Weka Resources

- Introduction to Weka (html version) (download ppt version)
- Download Weka
- Weka Tutorial
- ARFF format
- Using Weka from command line

Task 2:

Hospital Management System Data Warehouse consists of Dimension Table and Fact Table. REMEMBER the following Dimension the dimension object (Dimension): _ Name_ Attributes (Levels), with one primary key _ Hierarchies One time dimension is must. About Levels and Hierarchies Dimension objects (dimension) consist of a set of levels and a set of hierarchies defined over those levels. The levels represent levels of aggregation. Hierarchies describe parent-child relationships among a set of levels.

For example, a typical calendar dimension could contain five levels. Two hierarchies can be defined on these levels: H1: YearL>QuarterL>MonthL>WeekL>DayL H2: YearL>WeekL>DayL The hierarchies are described from parent to child, so that Year is the parent of Quarter, Quarter the parent of Month, and so forth. About Unique Key Constraints When you create a definition for a hierarchy, Warehouse Builder creates an identifier key for each level of the hierarchy and a unique key constraint on the lowest level (Base Level) Design

a Hospital Management system data warehouse (TARGET) consists of Dimensions Patient, Medicine, Supplier, Time. Where measures are 'NO UNITS', UNIT PRICE. Assume the Relational database (SOURCE) table schemas as follows TIME (day, month, year), PATIENT (patient_name, Age, Address, etc.,) MEDICINE (Medicine_Brand_name, Drug_name, Supplier, no_units, Unit_Price, etc.,) SUPPLIER :(Supplier_name, Medicine_Brand_name, Address, etc.,) If each Dimension has 6 levels, decide the levels and hierarchies, Assume the level names suitably. Design the Hospital Management system data warehouse using all schemas. Give the example 4-D cube with assumption names.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INFORMATION SECURITY LAB

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- Explain different types of ciphers used for encryption and decryption.
- Emphases on symmetric encryption algorithms.
- Demonstrate on asymmetric encryption algorithms.
- Experiment on Hash algorithms.
- Illustrate programs related to digital certificates and digital signatures.

Course Outcomes: On successful completion of the course students will be able to

- Use the concepts of different ciphers for encryption and decryption.
- Implement symmetric encryption algorithms.
- Examine asymmetric encryption algorithms.
- Interpret hash algorithms and their functionalities.
- Solve the problems on digital signatures and digital certificates.

List of programs:

1. Write a Java program to perform encryption and decryption using the following algorithms a. Ceaser cipher b. Substitution cipher c. Hill Cipher
2. Write a C/ JAVA program to implement the DES algorithm logic.
3. Write a C/JAVA program to implement the Blowfish algorithm logic.
4. Write a C/JAVA program to implement the AES algorithm logic.
5. Write the RC4 logic in Java.
6. Implement DES-2 and DES-3 using Java cryptography package.
7. Write a Java program to implement RSA algorithm.
8. Implement the Diffie-Hellman Key Exchange mechanism
9. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
10. Calculate the message digest of a text using the MD5 algorithm in JAVA.
11. Explore the Java classes related to digital certificates.
12. Write a program in java, which performs a digital signature on a given text.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
ADVANCED PYTHON PROGRAMMING LAB

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- To improve the logical ability in programming
- To understand concepts about searching and sorting techniques
- To understanding about python script and step by step approach in solving problems with the help of fundamental data structures
- Provide you with the knowledge and expertise to become a Python programmer
- Produce Python code to statistically analyze the data

Course Outcomes:

- Take a huge step towards OOP, Object Orientated Programming
- Learn many advanced Python methods and variables
- Adequately use Python programming in functions, modules
- Ability to summarize searching and sorting techniques
- Learn matrix arithmetic and ability to design graphics for video games

LIST OF TASKS:

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

Text Books:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
<http://greenteapress.com/wp/thinkpython/>
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

SEMESTER - II

MACHINE LEARNING AND APPLICATIONS

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- Understand Supervised and Unsupervised Learning methods with a modern outlook focusing on recent advances.
- Discuss the Statistical Learning Theory and Ensemble methods.
- Explore Deep learning techniques and various feature extraction strategies.
- Describe Scalable machine Learning and Bayesian Learning.
- Understand the recent trends in various machine learning methods for IOT applications

Course Outcomes: After completion of course, students would be able to

- Compare Supervised and Unsupervised Learning methods.
- Demonstrate various Ensemble methods and apply Statistical Learning Theory to real world problems.
- Analyse Deep Learning and Feature Representation techniques.
- Categorize the Scalable Machine Learning techniques.
- Summarize the recent trends in various machine learning methods for IOT applications.

UNIT I

Supervised Learning (Regression/Classification), Basic methods: Distance-based methods, Nearest-Neighbors, Decision Trees, Naive Bayes, Linear models: Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Nonlinearity and Kernel Methods, Beyond Binary Classification: Multi-class/Structured Outputs, Ranking.

UNIT II

Unsupervised Learning Clustering: K-means/Kernel K-means, Dimensionality Reduction: PCA and kernel PCA, Matrix Factorization and Matrix Completion, Generative Models (mixture models and latent factor models).

UNIT III

Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests)

UNIT IV

Sparse Modelling and Estimation, Modelling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning.

UNIT V

Scalable Machine Learning (Online and Distributed Learning), A selection from some other advanced topics, e.g., Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference. Recent trends

in various learning techniques of machine learning and classification methods for IOT applications. Various models for IOT applications.

Reference Books:

1. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

ADVANCED PROBLEM SOLVING

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives: Students undergoing this course are expected to

- Describe the concepts and features of object oriented programming.
- Analyze the performance of the algorithms.
- Demonstrate Linear and Nonlinear data structure operations and applications.
- Explain the various Searching and Sorting techniques.
- Illustrate Pattern matching algorithms and Tries for Text processing.

Course Outcomes: At the end of the course, the student will be able to

- Apply object oriented programming features and concepts for solving a given problem
- Experiment the operations and applications of linear and nonlinear data structures using Java
- Compare and contrast Linear and Nonlinear data structures.
- Illustrate different algorithms to perform searching and sorting
- Examine text processing techniques

UNIT I

OOP Using Java - Class and Objects, Variables, Operators, Expressions, Methods, Decision statements, Loops, Arrays, OOP concepts- Encapsulation, Inheritance, Polymorphism, Abstraction, Modularity, Exception handling, Input and Output, Java and Pointers, Interfaces, Packages, Abstract classes, Casting in Inheritance hierarchy, Casting with Interfaces, Vectors in java.util, Data Structures And OOP, Writing a java program-Design, coding, testing and debugging. Basic concepts (Review)- Abstract Data Types, Data structures, Algorithms- Characteristics of Algorithms, Performance analysis- Time complexity and Space complexity, Asymptotic Analysis-Big O, Omega and Theta notations.

UNIT II

Linear data structures- The List ADT, Array and Linked Implementations, Singly Linked Lists Operations - Insertion, Deletion, Traversals, Doubly Linked Lists – Operations - Insertion, Deletion, Skip Lists-implementation, Stack ADT, definitions, operations, Array and Linked implementations, applications-infix to postfix conversion, recursion implementation, tail recursion, nontail recursion, indirect recursion, Queue ADT, definitions and operations ,Array and Linked Implementations, Priority Queue ADT, Dequeue ADT, Implementation using doubly linked lists, Stacks and Queues in java.util.

UNIT III

Non Linear data structures-Trees-Basic Terminology, Binary tree ADT, array and linked representations, iterative traversals, threaded binary trees, Applications-Disjoint-Sets, Union and Find algorithms, Huffman coding, General tree to binary tree conversion, Realizing a Priority Queue using Heap. Search Trees- Binary Search Tree ADT, Implementation, Operations- Searching, Insertion and Deletion, Balanced Search trees-AVL Trees, Operations – Insertion and Searching-Trees, B-Tree of order m, Operations- Insertion, Deletion and Searching, Introduction to Red-Black Trees, Splay Trees*-Trees, B+-Trees(Elementary treatment), Comparison of Search Trees, Trees in java.util.

UNIT IV

Searching- Linear Search, Binary Search, Hashing-Hash functions, Collision-Handling schemes, Hashing in java.util, Dictionary ADT, Linear list representation, Skip list representation, Hash table representation, Comparison of Searching methods. Sorting- Bubble Sort, Insertion Sort, Shell sort, Heap Sort, Radix Sort, Quick sort, Merge sort, Comparison of Sorting methods, Sorting in java.util.

UNIT V

Graphs–Basic Terminology, Graph Representations- Adjacency matrix, Adjacency lists, Adjacency multi lists, Graph traversals- DFS and BFS, Spanning trees-Minimum cost spanning trees, Kruskal’s Algorithm for Minimum cost Spanning trees, Shortest paths- Single Source Shortest Path Problem, All Pairs Shortest Path Problem. Text Processing - Pattern matching algorithms- The Knuth-Morris-Pratt algorithm, The Boyer Moore algorithm, Tries- Standard Tries, Compressed Tries, and Suffix tries.

Text Books:

1. Data structures and Algorithms in Java, Adam Drozdek, Cengage Learning
2. Data structures and Algorithms in Java, Michael T.Goodrich and R.Tomassia, Wiley
3. India edition.
4. Data structures, Algorithms and Applications in Java, S.Sahani, Universities Press.

Reference Books:

1. Data structures and algorithms in Java, Robert Lafore, Pearson Education.
2. Data structures with Java, W.H.Ford and W.R.Topp, Pearson Education.
3. Classic Data structures in Java, T.Budd, Pearson Education.
4. Data Structures using Java, D.S. Malik and P.S.Nair, Cengage Learning,
5. An Introduction to Data structures and Algorithms, J.A.Storer, Springer.
6. Data structures and Java Collections Frame Work, W.J.Collins, McGraw Hill.
7. Data structures with Java, J.R.Hubbard and A.Huray, PHI.
8. Data Structures using Java, Y.Langsam, M.Augenstein, A.Tanenbaum, Pearson Education.

IMAGE PROCESSING

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives

- Describe and explain basic principles of digital image processing.
- Design and implement algorithms that perform basic image processing
- Design and implement algorithms for image compression
- Design and implement algorithms for image segmentation.
- Assess the performance of image processing algorithms and systems.

Course Outcomes

- Analyze general terminology of digital image processing and image transforms.
- Examine various types of images, Filtering techniques.
- Examine Image Restoration models.
- Evaluate the methodologies for image segmentation.
- Implement image processing compression.

UNIT I

Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels, Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT II

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement Through Point Operation, Types of Point Operation, Histogram Manipulation, Linear and Non — Linear Gray Level Transformation, Local or Neighborhood Operation, Median Filter, Spatial Domain High-Pass Filtering.

Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Obtaining Frequency Domain Filters from Spatial Filters, Generating Filters Directly in the Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

UNIT III

Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT IV

Image Segmentation: Detection of Discontinuities, Edge Linking And Boundary Detection, Thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, The Hit or

Miss Transformation.

UNIT V

Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

Text Books:

1. Digital Image Processing – Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008
2. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- TMH, 2010.

Reference Books:

1. Digital Image Processing using MATLAB — Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Edition, TMH, 2010.
2. Fundamentals of Digital Image Processing — A.K.Jain, PHI, 1989
3. Digital Image Processing with MATLAB & Labview — Vipula Singh, Elsevier.

MACHINE LEARNING AND APPLICATIONS

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- Understand the Data Science process and toolkit.
- Learn how to collect, store and manage data from multiple data sources.
- Identify different Machine Learning algorithms for data analysis.
- List the types and technologies of data visualization.
- Discuss the applications of Data Science for real world problems.

Course Outcomes: On completion of the course the student should be able to

- Examine Data Science process and use its toolkit for a problem.
- Interpret how data is collected, stored and managed from multiple sources.
- Differentiate various Machine Learning algorithms used for data analysis.
- Practice different data visualization techniques.
- Categorize the applications of Data Science and summarize the recent trends for application development using data science.

Unit I

Introduction to core concepts and technologies: Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications.

Unit II

Data collection and management: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data sources.

Unit III

Data analysis: Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.

Unit IV

Data visualization: Introduction, Types of data visualization , Data for visualization: Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings.

Unit V

Applications of Data Science, Technologies used for visualization, Bokeh (Python). Recent trends in various data collection and analysis techniques, various visualization techniques, application development methods used in data science.

Text Books:

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline.O'Reilly./
2. Jure Leskovek, AnandRajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge UniversityPress.

DATA ANALYTICS

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- To introduce the terminology, technology and its applications
- To introduce the concept of Analytics for Business
- To introduce the tools, technologies & programming languages which is used in day to day analytics cycle
- To Master the R programming and understand how various statements are executed in R
- Understand and use linear, non-linear regression models, and classification techniques for data analysis.

Course Outcomes: After completion of course, students would be able to

- Understand the introduction of R programming for data analytics, develop and analyze Summary Statistics.
- Analyze connecting of R to SQL databases and identify suitable Regression analysis and correlation.
- Compare and contrast various Verticals - Engineering, Financial and others.
- Apply how to manage our work to meet requirements.
- Come up with analysis of working effectively with Colleagues.

Unit I

Introduction to Analytics and R programming

Introduction to R, RStudio (GUI): R Windows Environment, introduction to various data types, Numeric, Character, date, data frame, array, matrix etc., Reading Datasets, Working with different file types .txt, .csv etc. Outliers, Combining Datasets, R Functions and loops. Summary Statistics - Summarizing data with R, Probability, Expected, Random, Bivariate Random variables, Probability distribution. Central Limit Theorem etc.

Unit II

SQL using R & Correlation and Regression Analysis

Introduction to NoSQL, Connecting R to NoSQL databases. Excel and R integration with R connector.

Regression Analysis, Assumptions of OLS Regression, Regression Modelling. Correlation, ANOVA, Forecasting, Heteroscedasticity, Autocorrelation, Introduction to Multiple Regression etc.

Unit III

Understand the Verticals - Engineering, Financial and others

Understanding systems viz. Engineering Design, Manufacturing, Smart Utilities, Production lines, Automotive, Technology etc.

Understanding Business problems related to various businesses

Unit IV

Manage your work to meet requirements

Understanding Learning objectives, Introduction to work & meeting requirements, Time Management, Work management & prioritization, Quality & Standards Adherence,

Unit V

Work effectively with Colleagues

Introduction to work effectively, Team Work, Professionalism, Effective Communication skills, etc.

Text Books:

1. **Student's Handbook for Associate Analytics.**
2. Introduction to Scientific Programming and Simulation Using R, Owen Jones, Robert Maillardet and Andrew Robinson, Second Edition, CRC Press, 2014
3. A First Course in Statistical Programming with R, Braun W. J., Murdoch D. J.. — Cambridge University Press, 2007
4. Data Manipulation with R, Jaynal Abedin and Kishor Kumar Das, Second Edition, Packt publishing, BIRMINGHAM – MUMBAI.
5. Beginning R The Statistical Programming language- Mark Gardener, John Wiley & Sons, Inc., 2012

Reference Books:

1. Introduction to Probability and Statistics Using R, ISBN: 978-0-557-24979-4, is a textbook written for an undergraduate course in probability and statistics.
2. An Introduction to R, by Venables and Smith and the R Development Core Team. This may be downloaded for free from the R Project website (<http://www.r-project.org/>, see Manuals). There are plenty of other free references available from the R Project website.
3. Time Series Analysis and Mining with R, Yanchang Zhao
4. Graphics for Statistics and Data Analysis with R – Kevin J. Keen, CRC Press, 2010
5. Data Analysis and Graphics Using R, Third Edition, John Maindonald, W. John Braun, Cambridge University Press, 2010
6. Exploratory Data Analysis with R – Roger D. Peng, Leanpub publications, 2015
7. Introduction to Probability and Statistics Using R, G. Jay Kerns, First Edition, 2011
8. The Art of Data Science- A Guide for anyone Who Works with Data – Roger D. Peng and Elizabeth Matsui, Leanpub Publications, 2014
9. Montgomery, Douglas C., and George C. Runger, Applied statistics and probability for engineers. John Wiley & Sons, 2010. The Basic Concepts of Time Series Analysis. <http://anson.ucdavis.edu/~azari/sta137/AuNotes.pdf>

CLOUD COMPUTING AND APPLICATIONS

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives: Students undergoing this course are expected to

- Understand the emerging area of "cloud computing" and how it is related to the traditional models of computing.
- Understand various types of cloud services and models of cloud computing.
- Provide strong foundation of the Cloud computing, so that students will be able to start using and adopting Cloud Computing services and tools in their real life.
- Develop and Deploy an Application on a Cloud.
- Understand various Schedules and task managements, collaborating on project management and social networks

Course Outcomes: At the end of the course, the student will be able to

- Understand the key dimensions, advantages and challenges of Cloud computing.
- Understand, Explain and characterize different types of clouds.
- Examine the different services offered by cloud and exploring the state of art of major cloud players.
- Provide cloud computing solutions for individual users as well as enterprises.
- Understand the assessment of the economics, financial, and technological implications for selecting cloud computing for an organization

UNIT I

UNDERSTANDING CLOUD COMPUTING: Cloud Computing –Introduction about Cloud Computing –Cloud Architecture–Cloud Storage–Why Cloud Computing Matters–Advantages of Cloud Computing –Disadvantages of Cloud Computing –Companies in the Cloud Today –Cloud Services

UNIT II

DEVELOPING CLOUD SERVICES: Web-Based Application –Pros and Cons of Cloud Service Development –Types of Cloud service Development –Software as a Service –Platform as a Service –Web Services –On-Demand Computing –Discovering Cloud Services Development Services and Tools –Amazon Ec2 –Google App Engine –IBM Clouds, Virtualization.

UNIT III

CLOUD COMPUTING FOR EVERYONE: Centralizing Email Communications–Collaborating on Schedules –Collaborating on To-Do Lists –Collaborating Contact Lists –Cloud Computing for the Community –Collaborating on Group Projects and Events –Cloud Computing for the Corporation

UNIT IV

USING CLOUD SERVICES: Collaborating on Calendars, Schedules and Task Management

– Exploring Online Scheduling Applications –Exploring Online Planning and Task Management – Collaborating on Event Management –Collaborating on Contact Management –Collaborating on Project Management –Collaborating on Word Processing -Collaborating on Databases –Storing And Sharing Files

UNIT V

OTHER WAYS TO COLLABORATE ONLINE: Collaborating via Web-Based Communication Tools –Evaluating Web Mail Services –Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware –Collaborating via logs and Wikis.

Text Books:

1. “Cloud Computing: Principles and Paradigms”, Raj Kumar Bunya, James Bromberg, Andrej Kosciusko, Wiley, New York, USA.

Reference Books:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work ND Collaborate Online, Qu Publishing, August 2008.
2. Kumar Sarah, “Cloud Computing –Insights into New Era Infrastructure”, Wiley Indian Edition, 2011.
3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes For On-demand Computing, Applications and Data Centers in the Cloud with SLAs.

HIGH PERFORMANCE COMPUTING

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives: Students undergoing this course are expected to

- Improvise and recollect in the basic concepts of parallelism and gain the exposure of architectures.
- Understand and utilize the architecture and design models.
- Aware of all issues and deploy the shared memory programming models.
- Comprehend and recall the Distributed memory programming.
- Manipulate and Illustrate the General-purpose computing on graphics
- Processing units (GPUs) in digital applications.

Course Outcomes: At the end of the course, the student will be able to

- Understand and recall the basic concepts of parallelism such as SIMD, SIMT, SPMD.
- Analyze the data decomposition techniques such as data level parallelism, task level parallelism and data flow parallelism.
- Aware and recognize the implementation of shared memory programming and to know the real time design issues.
- Able to develop parallel programs using MPI/OMP in multicore system.
- Distinguish and design the General-purpose computing on graphics processing units in real time processing.

UNIT I

Parallel Processing Concepts: Levels of parallelism (instruction, transaction, task, thread, memory, function), Models: SIMD, MIMD, SIMT, SPMD, Dataflow Models, Demand-driven Computation etc., Architectures: N-wide superscalar architectures, multi-core, multi-threaded, Motivating high performance applications

UNIT II

Designing Parallel Programs: Automatic vs. Manual Parallelization, Understand the Problem and the Program, Partitioning, Communications, Synchronization, Data Dependencies, Load Balancing, Granularity, Limits and Costs of Parallel Programming, Performance Analysis and Optimization tuning

UNIT III

Shared memory programming: Fundamentals of Shared Memory Programming, Basic Open MP concepts, PARALLEL directive, Data scoping rules, Basic Open MP constructs/directives/calls, Examples: Parallelizing an existing code using Open MP, More advanced Open MP directives & functions, Open MP Performance issues, Running threaded/Open MP programs on multicore system.

UNIT IV

Distributed memory programming, Fundamentals of message passing concepts, MPI message passing APIs, send, receive, collective operations. Groups, Contexts and Communicators, Topologies, Runtime and Environment Management, MPI profiling interface and tracing, Open MP 3.0 enhancements.

UNIT V

GPGPU Programming with CUDA and Opens – Introduction to GPGPU Programming and CUDA: Programming Model, CUDA API, CUDA Memory Model, Short introduction to Opens. Application case study. Future of Computing: Pataskala computing.

Text Books:

1. Parallel Computer Architecture: A hardware/Software Approach”, by David Culler Jaswinder Pal Singh, Morgan Kaufmann, 1999.(I&II)
2. CUDA by Example: An Introduction to General Purpose GPU Programming, by Jason Sanders and Edwards Kandrot, Addison Wesley, 2011.(unit- V)
3. Using MPI - 2nd Edition: Portable Parallel Programming with the Message Passing Interface by, William Gropp, Ewing L. Lusk, and Anthony Skjellum. Scientific and Engineering Computation, 2nd edition, 1999(unit-IV)
4. Using OpenMP: Portable Shared Memory Parallel Programming by Barbara Chapman, Gabriele Jost and Rudvander Pas. Scientific and Engineering Computation, 2nd edition(unit-III)

Reference Books:

1. Parallel Programming: Techniques and Application Using Networked Workstations and Parallel Computers, 2nd edition, by B. Wilkinson and M. Allen, Prentice Hall Inc., 2005
2. Heterogeneous Computing with OpenCL. Benedict Gaster, Lee Howes, David R. Kaeli, PerhaadMistry, Dana Schaa, Elsevier, 2011.
3. Scalable Parallel Computing, by Kai Hwang, McGraw Hill 1998.
4. Introduction to Parallel Computing, AnanthGrama, Anshul Gupta, George Karypis, and Vipin Kumar, 2nd edition, Addison-Welsey, 2003.
5. Petascale Computing: Algorithms and Applications, David A. Bader (Ed.), Chapman & Hall/CRC Computational Science Series, 2007.

ADVANCED COMPUTER NETWORKS

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives: The objective of the course is to provide the student

- Understanding about the Network Technologies and to know the differences between wired and wireless technologies.
- Analysis of different types of Wireless Networks, IP Addressing Schemes and Routing Protocols at Network Layer
- To differentiate between Intra-domain, Inter-domain and Cellular Network and Mobile Ad hoc Networks
- Clear idea about Optical Networks and how to allocate wavelengths in Optical Networks
- Capability to distinguish between Ad hoc Networks and Wireless Sensor Networks

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

- Find the difference, advantages, disadvantages between Wired and Wireless Networking Technologies and different transmission technologies
- Set-up IP addresses in different systems and practically realize the path of routing.
- Differentiate between Uni-casting, Broadcasting and Multicasting and develop the routing protocols.
- Implement virtual Cellular communication and Ad hoc communication and measure the performance of the network using Network Simulators.
- Demonstrate the Optical Network and Wireless Sensor Network.

UNIT I

Computer Networks and the Internet: What is the Internet, The Network edge, The Network core, Access Networks and Physical Media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks. Foundation of Networking Protocols: 5-layer TCP/IP Model, 7-Layer OSI Model, Equal-Sized Packets Model-ATM

UNIT II

The Link Layer and Local Area Networks: Link Layers: Introduction and Services, Error Detection and Error-Correction techniques, Multiple Access protocols, Link Layer Addressing, Point to Point Protocol (PPP). Networking Devices: Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure. Routing and Internetworking: Network-Layer Routing, Least –cost-path algorithms, non-least cost-path algorithms, Intra-domain Routing Protocols, Inter-domain Routing Protocols, Congestion control at Network Layer

UNIT III

Logical Addressing: IPV4 Addresses, IPV6 Addresses – Internet Protocol: Internetworking, IPV4, IPV6, Transitions from IPV4 to IPV6 – Multicasting Techniques and Protocols: Basic Definitions and Techniques, Intra-domain Multicast Protocols, Inter-domain Multicast Protocols. Transport and End-to-End Protocols: Transport Layer, Transmission Control Protocols (TCP), User Datagram Protocol (UDP) Applications, The Web and HTTP, FTP, Electronic Mail in the Internet, Domain Name System (DNS) , P2P File sharing, Socket Programming with TCP and UDP

UNIT IV

Wireless Networks and Mobile IP: Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs) Optical Networks and WDM Systems: Overview of Optical Networks, Basic Optical Networking Devices, Large- Scale Optical Switches, Optical Routers, Wavelength Allocations in Networks, Case Study: An All-optical Switch

UNIT V

VPNs, Tunneling and Overlay Networks: Virtual Private Networks (VPNs) , Multiprotocol Label Switching (MPLS), Overlay Networks – VoIP and Multimedia Networking : Overview of IP Telephony , VoIP Signaling Protocols, Real-Time Media Transport Protocols, Stream Control Transmission Protocol-Mobile Ad-Hoc Networks : Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks.

Text Books:

1. Computer Networking: A Top down Approach Featuring the Internet, James F. Kurose, Keith W. Ross, Third edition, Pearson Education, 2007
2. Computer and Communication networks, Nader F. Mir, Pearson Education, 2007

Reference Books:

1. Data communications and Networking, Beerhouse Z. Frozen, Fourth Edition, Tata McGraw Hill, 2007
2. Guide to Networking Essentials, Greg Tomcod, Ed Title, David Johnson, Fifth Edition, Thomson.
3. An Engineering Approach to Computer Networking, S. Kasha, Pearson Education.
4. Campus Network design Fundamentals, Diane Tear, Catherine Piquet, Pearson Education (CISCO Press)
5. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Prentice Hall. 6. The Internet and Its protocols, A. Farrel, Elsevier

MACHINE LEARNING AND APPLICATIONS LAB

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- Learn the basic concepts of python / R-Tool
- Understand Python script and Pandas.
- Describe various supervised learning algorithms.
- Discuss different unsupervised learning algorithms
- Explore various ensemble methods

Course Outcomes: After completion of course, students would be able to

- Illustrate various basic features of python or R-Tool.
- Implement Python script for simple problems and apply pandas for creation of databases.
- Design and analyze various supervised learning mechanisms.
- Design and analyze various unsupervised learning algorithms.
- Illustrate Random Forest Ensemble method.

Note: Implement the following Machine Learning Tasks using Python / R-Tool

Task 1: Implement a Python script for creating and sorting of array elements

Task 2: Apply Python pandas for creation of student database.

Task 3: Plot the graphs for Bank database using Matplotlib

Task 4: Implement Simple Linear Regression

Task 5: Implement Logistic Regression

Task 6: Construct Decision Tree for classification of any data set

Task 7: Design non-linear model using Support Vector Machines

Task 8: Implement K-means Clustering Algorithm

Task 9: Implement Principle Component Analysis for Dimensionality Reduction and plot the graph.

Task 10: Implement Random Forest ensemble method

Reference Books:

1. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

IMAGE PROCESSING LAB

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- Describe and explain basic principles of digital image processing.
- Design and implement algorithms that perform basic image processing
- Design and implement algorithms for image compression
- Design and implement algorithms for image segmentation.
- Assess the performance of image processing algorithms and systems.

Course Outcomes: At the end of the course, students will demonstrate the ability to

- Implement Denoise of images, Linear filtering of images
- Apply the principles of segmentation, grouping and modeling in image processing and computer vision.
- Evaluate the methodologies for image segmentation, restoration etc.
- Implement image process with morphological operations.
- Implement image processing compression.

Laboratory assignments:

1. Image Manipulation: Read, write, view images and conversion between different formats.
2. Special Transformations: Convolution and correlation
3. Frequency Transformations: Fourier transform, explore histogram as an enhancement technique.
1. Filtering, Noise identification and removing the same using filtering techniques
4. Morphological Transformations: Dilatation and erosion as fundamental morphological operations.
5. Segmentation using Edge Detection: Detection of boundaries between two regions using different gradient approximations.
6. Segmentation using Thresholding: Divide the image in regions depending on the gray level.
7. DCT based image compression
8. Image stitching
9. Object tracking

ADVANCED DATA SCIENCE LAB

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- Discuss the concepts of R Statistical package.
- Understand how to remove outliers and perform the summary statistics on the data.
- Know how to plot and test the hypothesis for given data.
- Describe how to Use the R -Studio environment to code OLS models
- Learn how to Use the R -Studio environment to code Linear Regression models

Course Outcomes:

- Summarize the concepts of R Statistical package.
- Set up to perform the summary statistics on the data and apply methods for outlier removal from the data.
- Demonstrate how to plot and test the hypothesis for given data.
- Examine how to use the R -Studio environment to code OLS models.
- Inspect how to use the R -Studio environment to code Linear Regression models.

Basic Statistics, Visualization, and Hypothesis Tests

Task-1: Reload data sets into the R statistical package

Task-2: Perform summary statistics on the data

Task-3: Remove outliers from the data

Task-4: Plot the data using R

Task-5: Plot the data using lattice and ggplot

Task-6: Test a hypothesis about the data

Linear Regression

Task-7: Use the R -Studio environment to code OLS models

Task-8: Review the methodology to validate the model and predict the dependent variable for a set of given independent variables

Task-9: Use R graphics functions to visualize the results generated with the model

Logistic Regression

Task-10: Use R -Studio environment to code Logistic Regression models

Task-11: Review the methodology to validate the model and predict the dependent variable for a set of given independent variables

Task-12: Use R graphics functions to visualize the results generated with the model

DATA ANALYTICS LAB

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- Create competitive advantage from both structured and unstructured data.
- Study and analyse various models and its visualization.
- Imparting the R programming concepts
- Work with R and R Hadoop to analyze structured, unstructured, and big data.
- Introduce programming tools PIG & HIVE in Hadoop ecosystem.

Course Outcomes: Student is Able to

- Demonstrate proficiency with statistical analysis of data.
- Construct and assess data-based models.
- Apply data modelling techniques to large data sets.
- Design applications for data analytics using R programming.
- Identify tools for data analytic solution.

Task1: Basic Statistics, Visualization, and Hypothesis Tests

1. Reload data sets into the R statistical package
2. Perform summary statistics on the data
3. Remove outliers from the data
4. Plot the data using R
5. Plot the data using lattice and ggplot
6. Test a hypothesis about the data

Task 2: Linear Regression

1. Use the R -Studio environment to code OLS models
2. Review the methodology to validate the model and predict the dependent variable for a set of given independent variables
3. Use R graphics functions to visualize the results generated with the model

Task 3: Logistic Regression

1. Use R -Studio environment to code Logistic Regression models

2. Review the methodology to validate the model and predict the dependent variable for a set of given independent variables
3. Use R graphics functions to visualize the results generated with the model

Task 4: Hadoop, HDFS, MapReduce and Pig Purpose

1. Run Hadoop and Hadoop fs and collect help information
2. Run a shell script to perform a word count activity
3. Run a MapReduce job to produce similar output
4. Investigate the UI for MapReduce/HDFS components to track system behavior
5. Run "Pig" statements to execute the same tasks done with MapReduce

Reference Books

- R Commands - Quick Reference
- Surviving LINUX - Quick Reference
- Hadoop Commands
- HDFS Commands

MINI PROJECT WITH SEMINAR

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- To improve the technical presentation skills of the students.
- To train the students to do literature review.
- To impart critical thinking abilities for problem solutions.
- To learn different implementation techniques.
- To prepare technical reports

Course Outcomes: At the end of the course, the student will be able to

- Choose the problem domain in the specialized area under computer science and engineering.
- Acquire and categorize the solution paradigms with help of case studies
- Design and code using selected hardware, software and tools.
- Execute, Implement and demonstrate the problem statement by using the selected hardware, software and tools.
- Document the thesis and publish the final work in a peer reviewed journal.

Syllabus Contents:

Mini Project will have mid semester presentation and end semester presentation. Mid semester presentation will include identification of the problem based on the literature review on the topic referring to latest literature available.

End semester presentation should be done along with the report on identification of topic for the work and the methodology adopted involving scientific research, collection and analysis of data, determining solutions highlighting individuals' contribution. Continuous assessment of Mini Project at Mid Sem and End Sem will be monitored by the Departmental committee.

SEMESTER - III

MOBILE APPLICATIONS AND SERVICES

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives:

- To aware of mobile computing environment and to learn about developing mobile applications using Android.
- To develop user interface, to design data storing and retrieval techniques for mobile data.
- To develop application using mobile Memory management, networking, clock and notification.
- To make the application available in android package, using of multimedia, location aware services and mobile agents.
- To learn about IOT in mobile communications and its applications.

Course Outcomes: On completion of the course the student should be able to

- To identify the mobile application environment and to recite about developing mobile applications using android.
- To design and implement the user interface, data storing and retrieval in mobile environment.
- To implement an application using mobile Memory management, networking, clock and notification.
- To comprehend about IOT in mobile communications and its applications.

UNIT I

J2ME Overview: Java 2 Micro Edition and the World of Java, Inside J2ME, J2ME and Wireless Devices. Small Computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants. J2ME Architecture and Development Environment: J2ME Architecture, Small Computing Device Requirements, Run-Time Environment, MIDlet Programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME Wireless Toolkit.

UNIT II

J2ME Best Practices and Patterns: The Reality of Working in a J2ME World, Best Practices Commands, Items, and Event Processing: J2ME User Interfaces, Display Class, The Palm OS Emulator, Command Class, Item Class, Exception Handling.

UNIT III

High-Level Display: Screens: Screen Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class. **Low-Level Display:** Canvas: The Canvas, User Interactions, Graphics, Clipping Regions, Animation. **Record Management System:** Record Storage, Writing and Reading Records, Record Enumeration, Sorting Records, Searching Records, Record Listener.

UNIT IV

Mobile Services: Evolution of Mobile Services, Types of Mobile Services, Personal Services, CommModuley Services, Introduction to Consumer Services, Various Consumer Services, SMS, MMS, Games, Proprietary vs. Standardize Interface, Various Developer Services, SMS Web Service, MMS Web Service

UNIT V

Mobile platform and NW environment: Mobile App Testing Environment, OTA App Provisioning. Mobile Applications: What is Web App?, Context of Mobile Applications, Pros and Cons of Mobile Web App, SIM based Mobile App Development, What is SIM?, SIM as a Platform, SIM as Service Differentiator, Introduction to UI, Principles for UI development Module -IV: Mobile Services 8 hrs. Evolution of Mobile Services, Types of Mobile Services, Personal Services, CommModuley Services

Text Books:

1. J2ME: The Complete Reference, James Keogh, Tata McGrawHill.
2. Professional Mobile Application Development by Jeff McWherter, Scott Gowell, 2012

Reference Books:

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Beginning Java ME Platform, Ray Rischpater, Apress, 2009.
3. Beginning J2ME: From Novice to Professional, Third Edition, Sing Li, Jonathan B. Knudsen, Apress, 2005.
4. Kicking Butt with MIDP and MSA: Creating Great Mobile Applications, First Edition, J.Knudsen, Pearson.

INFORMATION STORAGE AND RETRIEVAL

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives: Students undergoing this course are expected to

- Describe Information Retrieval System capabilities
- Learn various data structures involved in IRS.
- Demonstrate Document and term clustering, Cataloging and Indexing
- Compare and contrast software text search algorithms and hardware text search systems.
- Learn about multimedia information retrieval systems

Course Outcomes: At the end of the course, the students will be able to

- Distinguish IRS capabilities
- Illustrate the data structures used in IRS.
- Use search techniques and information visualization technologies and Analyze the accuracy for various clustering algorithms
- Differentiate software text search algorithms and hardware text search systems
- Construct multimedia retrieval systems.

UNIT I

Introduction: Definition, Objectives, Functional Overview, And Relationship to DBMS, Digital libraries and Data Warehouses, Information Retrieval System Capabilities: Search, Browse, Miscellaneous

UNIT II

Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction. Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure. Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages

UNIT III

Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters. User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext. Information Visualization: Introduction, Cognition and perception, Information visualization technologies.

UNIT IV

Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems. Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

UNIT V

Multimedia Information Retrieval- Models and Languages- Data Modeling, Query Languages, Indexing and Searching – Libraries and Bibliographical Systems – Online IR Systems, OPACs, Digital Libraries.

Text Books:

1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.

Reference Books:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Modern Information Retrieval by Yates Pearson Education.
3. Information Storage S&Retrieval by Robert Korfhage – John Wiley & Sons

OPTIMIZATION TECHNIQUES

Course Code:

L/T/P/C: 3/0/0/3

Course Objectives: The objective of this course is to

- Provide insight to the mathematical formulation of real world problems.
- Optimize mathematical problems using nature based algorithms so that solution is useful specially for NP-Hard problems
- Know and being able to use the most important methods for solving discrete and continuous optimization problems
- Learn different algorithms like Ant colony, particle swarm optimization etc.
- Develop and promote research interest in applying optimization techniques in problems of Engineering and Technology

Course Outcomes: After completion of course, students would be

- Formulate optimization problems.
- Understand and apply the concept of optimality criteria for various types of optimization problems.
- Solve various constrained and unconstrained problems in Single variable as well as multivariable.
- Apply the methods of optimization in real life situation.
- estimate the rate of convergence and complexity requirements of various optimization algorithms

Unit I

Engineering application of Optimization, Formulation of design problems as mathematical programming problems.

Unit II

General Structure of Optimization Algorithms, Constraints, The Feasible Region.

Unit III

Branches of Mathematical Programming: Optimization using calculus, Graphical Optimization, Linear Programming, Quadratic Programming, Integer Programming, Semi Definite Programming.

Unit IV

Optimization Algorithms like Genetic Optimization, Particle Swarm Optimization, Ant Colony Optimization etc.

Unit V

Real life Problems and their mathematical formulation as standard programming problems. Recent trends: Applications of ant colony optimization, genetics and linear and quadratic programming in real world applications.

Reference Books:

1. Laurence A. Wolsey (1998). Integer programming. Wiley. ISBN 978-0-471-28366-9.
2. Practical Optimization Algorithms and Engineering Applications Andreas Antoniou.
3. An Introduction to Optimization Edwin K., P. Chong & Stanislaw h. Zak.
4. Dimitris Bertsimas; Robert Weismantel (2005). Optimization over integers. Dynamic Ideas. ISBN 978-0-9759146-2-5.
5. John K. Karlof (2006). Integer programming: theory and practice. CRC Press. ISBN 978-0-8493-1914-3.
6. H. Paul Williams (2009). Logic and Integer Programming. Springer. ISBN 978-0-387-92279-9.
7. Michael Jünger; Thomas M. Liebling; Denis Naddef; George Nemhauser; William R. Pulleyblank; Gerhard Reinelt; Giovanni Rinaldi; Laurence A. Wolsey, eds. (2009). 50 Years of Integer Programming 1958-2008: From the Early Years to the State-of-the-Art. Springer. ISBN 978-3-540-68274-5.
8. Der-San Chen; Robert G. Batson; Yu Dang (2010). Applied Integer programming: Modeling and Solution. John Wiley and Sons. ISBN 978-0-470-37306-4.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
BUSINESS ANALYTICS
(OPEN ELECTIVE)

Course Code:
3/0/0/3

L/T/P/C:

UNIT I

Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.

UNIT II

Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

UNIT III

Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes.

Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

UNIT IV

Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models .Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

UNIT V

Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making. Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

Reference Books:

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FTPress.
2. Business Analytics by James Evans, persons Education.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
INDUSTRIAL SAFETY
(OPEN ELECTIVE)

Course Code:

L/T/P/C: 3/0/0/3

UNIT I

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT II

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT III

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT IV

Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one Machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT V

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for

periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference Books:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
BUSINESS ANALYTICS
(OPEN ELECTIVE)

Course Code:

L/T/P/C: 3/0/0/3

UNIT I

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models.

UNIT II

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming.

UNIT III

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

UNIT IV

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

UNIT V

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation.

Reference Books:

1. H.A. Taha, Operations Research, An Introduction, PHI,2008
2. Wagner, Principles of Operations Research, PHI, Delhi,1982.
3. J.C. Pant, Introduction to Optimization: Operations Research, Jain Brothers, Delhi,2008
4. Hitler Libermann Operations Research: McGraw Hill Pub.2009
5. Pannerselvam, Operations Research: Prentice Hall of India2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India2010

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
COST MANAGEMENT OF ENGINEERING PROJECTS
(OPEN ELECTIVE)

Course Code:

L/T/P/C: 3/0/0/3

Unit I

Introduction and Overview of the Strategic Cost Management Process, Cost concepts in decision-making; relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Unit II

Project: meaning, Different types, why to manage, cost overruns centers, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non- technical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Unit III

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis.

Unit IV

Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

Unit V

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

Reference Books:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi.
2. Charles T. Horngren and George Foster, Advanced Management Accounting.
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting.
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher.
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co.Ltd.

COMPOSITE MATERIALS

(OPEN ELECTIVE)

Course Code:

L/T/P/C: 3/0/0/3

UNIT I

INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

UNIT II

REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

UNIT III

Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT IV

Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT V

Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first ply failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

Text Books:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition,2007.

Reference Books:

1. Hand Book of CompositeMaterials-ed-Lubin.
2. Composite Materials –K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L.Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W.Tasi.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY
WASTE TO ENERGY
(OPEN ELECTIVE)

Course Code:

L/T/P/C: 3/0/0/3

Unit I

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Unit II

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit III

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit IV

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit V

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

Reference Books:

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd.,1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd.,1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd.,1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY

ENGLISH FOR RESEARCH PAPER WRITING

Course Code:

L/T/P/C: 2/0/0/2

Course objectives:

- To state how to put research on paper
- To demonstrate how to write an abstract
- To apply the process of research
- To appraise the key skills involved in writing the title, abstract, introduction and review of literature
- To compose a paper which is good and has the qualities of acceptance and publication

Course Outcomes:

- Will be able to understand how to write a research paper
- Will outline the drafting of an abstract
- Will acquire the skills of various elements of research
- Will be in a position to write a good paper
- Will result in increasing the chance of publication

Unit I

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.

Unit II

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction.

Unit III

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

Unit IV

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.

Unit V

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusion.

Unit VI

Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.

Reference Books:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)

2. Day R (2006) *How to Write and Publish a Scientific Paper*, Cambridge University Press
3. Highman N (1998), *Handbook of Writing for the Mathematical Sciences*, SIAM.
Highman's book .
4. Ian Wallwork , *English for Writing Research Papers*, Springer New York Dordrecht Heidelberg London, 2011.

DISASTER MANAGEMENT

Course Code:

L/T/P/C: 2/0/0/2

Course Objectives:

- Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Critically understand the strengths and weaknesses of disaster management approaches,
- Planning and programming in different countries, particularly their home country or the countries they work in.

Course Outcomes:

- Capacity to integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available.
- Capacity to describe, analyze and evaluate the environmental, social, cultural, economic, legal and organizational aspects influencing vulnerabilities and capacities to face disasters.
- Capacity to work theoretically and practically in the processes of disaster management (disaster risk reduction, response, and recovery) and relate their interconnections, particularly in the field of the Public Health aspects of the disasters.
- Capacity to manage the Public Health aspects of the disasters.
- Capacity to obtain, analyze, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios with the ability to clearly present and discuss their conclusions and the knowledge and arguments behind them.

Unit I

Introduction: Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

Unit II

Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. **Natural Disasters:** Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

Unit III

Disaster Prone Areas in India: Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides and Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

Unit IV

Disaster Preparedness and Management: Preparedness: Monitoring Of Phenomena

Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

Unit V

Risk Assessment: Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co- Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

Unit VI

Disaster Mitigation: Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

Reference Books:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "New Royal book Company
2. Sahni, Pardeep Et.Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration And Management Text And Case Studies" ,Deep &Deep Publication Pvt. Ltd., New Delhi.

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SANSKRIT FOR TECHNICAL KNOWLEDGE

Course Code:

L/T/P/C: 2/0/0/2

Course objectives:

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects
- Enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Course Outcomes:

- Understanding basic Sanskrit alphabets and Understand tenses in Sanskrit Language.
- Enable students to understand roots of Sanskrit language.
- Students learn engineering fundamentals in Sanskrit.
- Students can attempt writing sentences in Sanskrit.
- Ancient Sanskrit literature about science & technology can be understood

Unit I Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences

Unit II Order, Introduction of roots, Technical information about Sanskrit Literature

Unit III Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Reference Books:

1. "Abhyaspustakam" – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

VALUE EDUCATION

Course Code:

L/T/P/C: 2/0/0/2

Course Objectives:

- Understand value of education and self- development
- Imbibe good values in students
- Let the should know about the importance of character
- To understand the significance of human conduct and self-development
- To enable students to imbibe and internalize the value and Ethical behaviour in personal and professional lives.

Course outcomes: Students will be able to

- Knowledge of self-development
- Learn the importance of Human values
- Developing the overall personality
- Student will be able to realize the significance of ethical human conduct and self-development
- Students will be able to inculcate positive thinking, dignity of labour and religious tolerance.

Unit I Values and self-development –Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non- moral valuation, Standards and principles, Value judgement.

Unit II Importance of cultivation of values, Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline

Unit III Personality and Behavior Development - Soul and Scientific attitude, Positive Thinking, Integrity and discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of labour, Universal brotherhood and religious tolerance, True friendship, Happiness vs suffering, love for truth, Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature.

Unit IV Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

Reference Books:

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi.

INDIAN CONSTITUTION

Course Code:

L/T/P/C: 2/0/0/2

Course Objectives:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional
- Role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.
- To understand the role and functioning of Election Commission of India.

Course Outcomes: Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.
- Discuss the significance of Election Commission of India.

Unit I

History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working).

Unit II

Philosophy of the Indian Constitution: Preamble Salient Features.

Unit III

Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

Unit IV

Organs of Governance: Parliament-Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

Unit V

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

Unit VI

Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

Reference Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

PEDAGOGY STUDIES

Course Code:

L/T/P/C: 2/0/0/2

Course Objectives:

- Review existing evidence on the review topic to inform Programme design and policy making
- Undertaken by the DFID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.
- Establishing coordination among people in order to execute pedagogy methods.
- To study pedagogy as a separate discipline.

Course Outcomes: Students will be able to understand

- What pedagogical practices are being used by teachers in formal classrooms in developing countries?
- What pedagogical practices are being used by teachers in informal classrooms in developing countries?
- Synergy from the work force.
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

Unit I

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

Unit II

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

Unit III

Evidence on the effectiveness of pedagogical practices, Methodology for the in-depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Unit IV

Professional development: alignment with classroom practices and follow- up support, Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large class sizes

Unit V

Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

Reference Books:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, *Compare*, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, *Journal of Curriculum Studies*, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? *International Journal Educational Development*, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, ‘learning to read’ campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

STRESS MANAGEMENT BY YOGA

Course Code:

L/T/P/C: 2/0/0/2

Course Objectives:

- To achieve overall Good Health of Body and Mind.
- To lower blood pressure and improve heart health.
- To become non-violent and truthfulness.
- To increase the levels of happiness.
- To eliminate all types of body pains.

Course Outcomes: Students will be able to

- Develop healthy mind in a healthy body thus improving social health also improve efficiently.
- Develop body awareness. Learn how to use their bodies in a healthy way. Perform well in sports and academics.
- *Will balance, flexibility, and stamina, strengthen muscles and connective tissues enabling good posture.*
- Manage stress through breathing, awareness, meditation and healthy movement.
- Build concentration, confidence and positive self-image.

Unit I

Definitions of Eight parts of yog. (Ashtanga)

Unit II

Yam and Niyam. Do`s and Don`t`s in life. Ahinsa, satya, astheya, bramhacharya and aparigraha Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

Unit III

Asan and Pranayam, Various yog poses and their benefits for mind & body. Regulaization of breathing techniques and its effects-Types of pranayam

Reference Books:

1. ‘Yogic Asanas for Group Tarining-Part-I’ : Janardan Swami Yogabhyasi Mandal, Nagpur
2. ‘Rajayoga or conquering the Internal Nature’ by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

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PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

Course Code:

L/T/P/C: 2/0/0/2

Course Objectives:

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students
- To differentiate three types of happiness (Sukham)
- To describe the character traits of a spiritual devotee

Course Outcomes:

- Study of Shrimad- Bhagwad-Gita will help the student in developing his personality and achieve the highest goal in life
- The person who has studied Geeta will lead the nation and mankind to peace and prosperity
- To develop self-developing attitude towards work without self-aggrandizement
- To develop tranquil attitude in all favorable and unfavorable situations
- To develop high spiritual intelligence

Unit I

Neetisatakam-Holistic development of personality

- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)
- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

Unit II

Approach to day to day work and duties.

- Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,
- Chapter 18-Verses 45, 46, 48.

Unit III

Statements of basic knowledge.

- Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

Reference Books:

1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

