# BCA (Bachelor of Computer Applications) Data Science-2020

## CURRICULUM

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SYLLABUS
SEMESTER 1

18CUL101 CULTURAL EDUCATION I 2002

Course Outcomes

Syllabus:

Introduction to Indian Culture
Introduction to Amma’s life and Teachings

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<td>Helps the students to imbibe values into their inner spirit and put it into real life practice.</td>
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<td>CO2</td>
<td>Help the students towards achieving the best through the process of transformation of their inner self</td>
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<tr>
<td>CO3</td>
<td>Provides the students an insight into the vision of optimistic future.</td>
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Symbols of Indian Culture
Science and Technology in Ancient India
Education in Ancient India
Goals of Life – Purusharthas
Introduction to Vedanta and Bhagavad Gita
Introduction to Yoga
Nature and Indian Culture
Values from Indian History
Life and work of Great Seers of India (1)

TEXTBOOKS:

1. The Glory of India (in- house publication)
2. The Mother of Sweet Bliss. (Amma’s Life & Teachings)

CO – PO Affinity Map

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Course Outcomes

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<td>Students will attain and enhance competence in the four modes of literacy: writing, speaking, reading and listening</td>
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<td>Students will improve their reading fluency skills through extensive reading</td>
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Unit-I
Kinds of sentences, usage of preposition, use of adjectives, adverbs for description, Tenses, Determiners- Agreement (Subject – Verb, Pronoun- Antecedent) collocation, Phrasal Verbs, Modifiers, Linkers/ Discourse Markers, Question Tags

Unit-II
Paragraph writing – Cohesion - Development: definition, comparison, classification, contrast, cause and effect - Essay writing: Descriptive and Narrative

Unit-III
Letter Writing - Personal (congratulation, invitation, felicitation, gratitude, condolence etc.) Official (Principal / Head of the department/ College authorities, Bank Manager, Editors of newspapers and magazines)

Unit-IV
Reading Comprehension – Skimming and scanning- inference and deduction – Reading different kinds of material –Speaking: Narration of incidents / stories/ anecdotes- Current News Awareness

Unit-V
Prose: John Halt’s ‘Three Kinds of Discipline’ [Detailed]
Max Beerbohm’s ‘The Golden Drugget’ [Detailed]
Poems: Ogden Nash- ‘This is Going to Hurt Just a Little Bit’ [Detailed]
Wole Soyinka- ‘Telephone Conversation’ [Non-Detailed]

Kamala Das- ‘The Dance of the Eunuchs’[Non-Detailed]

Short Stories: Edgar Allan Poe’s ‘The Black Cat’, Ruskin Bond’s ‘The Time Stops at Shamili’ [Non-Detailed]

**CORE READING:**

2. Syamala, V. *Speak English in Four Easy Steps*, Improve English Foundation Trivandrum: 2006
5. Online sources

**References:**

8. Murphy, Raymond, *Murphy’s English Grammar*, CUP, 2004
9. Online sources

**CO – PO Affinity Map**

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**18ENV300**  
ENVIRONMENTAL SCIENCE AND SUSTAINABILITY  
3 0 0 3

**Course Outcomes**

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<tr>
<td>CO1</td>
<td>Understanding sustainable developments, need for environmental education, Contribution of famous personalities in Environment.</td>
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<tr>
<td>CO2</td>
<td>Make out the abiotic and boytic factors of environment, Understanding the importance of different types of ecosystems</td>
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</table>
CO3 | Study of bio diversity, different types of diversity in nature giving importance to India as a mega diversity nation.

CO4 | Understanding linear and cyclic resource management with more emphasis to air, water, soil resources.

CO5 | Be familiar with Environment Impact Assessment & Environment Management Plan

**Syllabus**

**Unit 1**
State of Environment and Unsustainability, Need for Sustainable Development, Traditional conservation systems in India, People in Environment, Need for an attitudinal change and ethics, Need for Environmental Education, Overview of International Treaties and Conventions, Overview of Legal and Regulatory Frameworks.

Environment: Abiotic and biotic factors, Segments of the Environment, Biogeochemical Cycles, Ecosystems (associations, community adaptations, ecological succession, Food webs, Food chain, ecological pyramids), Types of Ecosystems – Terrestrial ecosystems, Ecosystem Services, Economic value of ecosystem services, Threats to ecosystems and conservation strategies.

Biodiversity: Species, Genetic & Ecosystem Diversity, Origin of life and significance of biodiversity, Value of Biodiversity, Biodiversity at Global, National and Local Levels, India as a Mega-Diversity Nation (Hotspots) & Protected Area Network, Community Biodiversity Registers. Threats to Biodiversity, Red Data book, Rare, Endangered and Endemic Species of India. Conservation of Biodiversity. People’s action.

Impacts, causes, effects, control measures, international, legal and regulatory frameworks of: Climate Change, Ozone depletion, Air pollution, Water pollution, Noise pollution, Soil/land degradation/pollution

**Unit 2**
Linear vs. cyclical resource management systems, need for systems thinking and design of cyclical systems, circular economy, industrial ecology, green technology. Specifically apply these concepts to: Water Resources, Energy Resources, Food Resources, Land & Forests, Waste management.

Discuss the interrelation of environmental issues with social issues such as:


**Unit 3**

Global and national state of housing and shelter, Urbanization, Effects of unplanned development case studies, Impacts of the building and road construction industry on the environment, Eco-homes/Green buildings, Sustainable communities, Sustainable Cities.
Ethical issues related to resource consumption, Intergenerational ethics, Need for investigation and resolution of the root cause of unsustainability, Traditional value systems of India, Significance of holistic value-based education for true sustainability.

TEXTBOOKS/REFERENCES:


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20CSA101 COMPUTER ESSENTIALS FOR DATA SCIENCE 3 0 0 3

Course Outcomes

CO1: Understand the fundamental concepts of electronic communication and their use in computer applications, the basic structure and operation of a digital computer, identify the logic gates and their functionality, perform Number Conversions from one System to another System, Design basic electronic Circuits (combinational circuits), and understand the Construction of Memory.

CO2: Understand the internal organization of computers, CPU, memory unit and Input/Outputs and the relations between its main components and understand contemporary microprocessor designs and identify various design techniques employed

CO3: Understand the role of a database management system in an organization, use of Structured Query Language (SQL) and learn SQL syntax, needs of database processing and learn techniques for controlling the consequences of concurrent data access.
CO4: Understand the concept of a database transaction and related database facilities, including concurrency control, backup and recovery, locking and related protocols. Importance of modeling in the software development life, the UML notation and symbols. Identify classes/entities of data, their attributes, and relationships. Design the logical and physical structure of a relational database for efficient data storage.

CO5: Understanding the flow of a data science process, and the skill sets needed to be a data scientist, significance of exploratory data analysis in data science.

SYLLABUS

Unit I  Digital Fundamentals: Number Systems-Binary, Hexadecimal, Octal, Conversion, Data encoding, Operations on Binary number system, representation of positive and negative integer, compliment operations, real number system, Boolean Algebra, Logic Gates, SOP and POS – K map Simple arithmetic circuits, Combinational circuits- Sequential circuits (10 hrs)

Unit II  
Basic Computer Organization: Registers, Instruction Formats, Types of instructions, Execution of a Complete Instruction, Bus Organization, Control Unit Organizations-Hard-wired Control, Micro programmed Control. – Input Out organizations Central processing units and different CPU organizations – Subroutines -Memory – Memory Hierarchy- Types (10 hrs)

Unit-3  
Introduction to Database Management Systems-Database, DBMS, Why Database -File system vs DBMS, Database applications, Database users, Introduction to SQL, Data types, Classification of SQL-DDL with constraints, DML, DCL, TCL

Unit-4  
Data representation, Data organization, Data models using UML,Types of Data, structured, unstructured, semi structured, examples of real world data, data collection techniques, data interpretation mechanisms. Data storage mechanisms, Hierarchy of storage, Characteristics of storage, Storage media, storage related technologies, online and offline storage mechanisms

Unit 5  
Introduction to Data Science- Steps – Skills – Data – Datasets – Existing data sources – data models, Applications

TextBook

Course Outcomes:

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<th>Apply algorithmic thinking to understand, define and solve problems</th>
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<td>Design and implement algorithm(s) for a given problem</td>
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<td>CO3</td>
<td>Apply the basic programming constructs for problem solving</td>
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<td>CO4</td>
<td>Understand an algorithm by tracing its computational states, identifying bugs and correcting them</td>
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Syllabus

Unit 1
Problem Solving and Algorithmic Thinking Overview – problem definition, logical reasoning; Algorithm – definition, practical examples, properties, representation, algorithms vs programs.

Unit 2
Algorithmic thinking – Constituents of algorithms – Sequence, Selection and Repetition, input-output; Computation– expressions, logic; Problem Understanding and Analysis – problem definition, input-output, variables, name binding, data organization: lists, arrays etc. algorithms to programs.

Unit 3
Problem solving with algorithms – Searching and Sorting, Evaluating algorithms, modularization, recursion. Any programming language for problem solving – Introduction, structure of programs, data types, data input, output statements, control structures.

**Text Book(s)**

**Reference(s)**

**Evaluation Pattern:**

Internal Assessment: 50
End Semester Examination: 50

**Internal Assessment:**
Periodical1-15 marks
Periodical2-15 marks
Continuous Assesment-20 marks (Quizzes, assignments, tutorials, viva-voce)

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**20CSA181 PROBLEM SOLVING AND PROGRAMMING LAB 0031**

Course Outcomes
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<th>CO1</th>
<th>Develop flowcharts using flowgorithm</th>
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<td>CO2</td>
<td>Develop programs that uses conditional and iterative statements, arrays, strings, functions</td>
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**Unit 1:**

Graphical Authoring Tool (eg: Flowgorithm) Variables, Operators- Arithmetic, Relational, assignment, logical, increment and decrement, Bitwise-Modularisation, Selection statements, Repetition statements, Data organization-Arrays

**Unit II**

Recursion , Introduction to arrays, Searching and Sorting

**Unit 3:**

Introduction to Programming Language and implementation of algorithms

Operators- Arithmetic, Relational, Ternary, Logical, Bitwise

Control Statements-if, if-else, nested if, if-else if,

Looping Control-while, for, do-while

Arrays

**Evaluation Pattern:**

Internal Assessment: 80

End Semester Examination: 20

**Internal Assessment:**

Periodical1-30 marks

Periodical2-30 marks

Continuous Assessment-20 marks (Quizzes, assignments, tutorials, viva-voce)

**CO – PO Affinity Map**
20CSA182 COMPUTER ESSENTIALS FOR DATA SCIENCE

LAB 0 0 3 1

Course Outcomes

CO1: Provide hands-on use of Microsoft Office applications Word, Excel, Access and PowerPoint. Completion of the assignments will result in MS Office applications knowledge and skills.

CO2: Understand the functional components of a computer system (processor, storage and input/output) in terms of assembly language commands. Understand the relationship between high level programming languages and machine level implementation. Understand computer architecture and its relationship to higher level machine abstractions. Also able to how to represent integers, real numbers, and character data, representation of negative numbers, storage capacity and its effect on numeric magnitude. Perform arithmetic operations on binary and hexadecimal notations. Convert numbers between decimal, binary and hexadecimal notations.

CO3: Must be able to construct simple and advanced database queries using Structured Query Language (SQL)

CO4: Understand the concept Identify Business Requirements. Entity Relationship Data Modeling, Normalization, Advanced Data Modeling Concepts, Transform a Data Model into a Functional Database. Create conceptual models of relational databases based on requirement specification documents

CO5: Understand the data storage concepts, data storage equipment's that are used to store the user / computer generated data.

SYLLABUS

PC Assembly Data representation and operations on Binary data

SQL - Create: Table and column level constraints- Primary key, Foreign key, Null/ Not null, Unique, Default. Check, Alter, Drop, Insert, Update, Delete, Truncate, Select: using WHERE, AND, OR, IN, NOT IN

Data collection and interpretation

Data storage mechanism and tools

CO – PO Affinity Map
SEMESTER 2

18CUL111  CULTURAL EDUCATION II  2002

Syllabus:

Bhagavad Gita and Life Management
Historicity of Ramayana and Mahabharata
Overview of Patanjali’s Yoga Sutras
Highlights of Indian Mythology
Indian Society: Its Strengths and Weaknesses
Role & Position of Women in Indian Society
Indian Models of Economy, Business and Management

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CO1 Helps the students to imbibe values into their inner spirit and put it into real life practice.

CO2 Help the students towards achieving the best through the process of transformation of their inner self.

CO3 Provides the students an insight into the vision of optimistic future.

Health and Lifestyle related issues
Conservation of cultural heritage
Life and work of Great Seers of India (2)

TEXTBOOKS:
1. The Glory of India (in-house publication)
2. Sanatana Dharma (A Compilation of Amma’s teachings on Indian Culture)

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18ENG121 PROFESSIONAL COMMUNICATION 1-0-2-2

Course outcomes:

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<th>Understand the role of communication in personal &amp; professional success.</th>
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<td>Develop awareness of appropriate communication strategies.</td>
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<td>Build and maintain healthy and effective relationships.</td>
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<td>Identify and apply strategies to improve communication especially in meetings</td>
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<td>CO5</td>
<td>Enables students to build up language and specialized abilities such as meeting, management and documentation, argumentation, conflict resolution, interpersonal and intercultural skills, professional presentations and employment starters.</td>
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Syllabus

Unit I

Vocabulary Building: Prefixes and Suffixes; One word substitutes, Modal auxiliaries, Error Analysis: Position of Adverbs, Redundancy, misplaced modifiers, Dangling modifiers – Reported Speech

Unit II

Instruction, Suggestion & Recommendation - Sounds of English: Stress, Intonation - Essay writing: Analytical and Argumentative

Unit III
Circulars, Memos – Business Letters - e - mails

**Unit IV**

Reports: Trip report, incident report, event report - Situational Dialogue - Group Discussion

**Unit V**

Listening and Reading Practice - Book Review

**References**


**References**


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Unit I
Measures of Central Tendency (Mean, Median, Mode), Measures of Dispersion (Range, Interquartile range, Standard deviation), skewness and kurtosis.

Unit II

Unit III
Random variables, Probability Distributions and Probability mass functions, Cumulative Distribution functions, mathematical expectation, variance, moments and moment generating function.

Unit IV

Unit-V
Two dimensional random variables-Joint, marginal and conditional probability distributions for discrete case only. Conditional mean, conditional variance, covariance and correlation. Correlation Analysis, Regression analysis, Method of least squares - Fitting a straight line.

Textbooks:

Reference books:
Course Outcomes

| CO1 | Master the basic concepts of DBMS and its types. Understand the concepts of data independence and three schema architecture. |
| CO2 | Be familiar with the CODD's rules and E-R Model and also have clear picture about the structure of the relational databases. |
| CO3 | Master the concept of normalization and different types of normalization. Design normalised database objects and process the data in an optimized way. |
| CO4 | Be familiar with the basics of query evaluation techniques and query optimization and also to get a clear picture about transaction processing. |
| CO5 | Comprehend the conversion of queries into relational algebra and to construct query transactions having atomic, consistent, isolated and durable properties. |

UNIT 1

Introduction to Data and Database. Significance of Database Management System, Various Types of DBMS. Data Independence - The Three Levels Of Architecture - The External Level - Conceptual Level - Internal Level - Client/Server Architecture- System Structure, Instance and schema,

UNIT 2


UNIT 3

Normalization –Anomalies- Functional Dependency: Armstrong’s axioms- closure of a relation and closure of attribute– Lossless decomposition-1NF, 2NF, 3NF, Boyce - Codd Normal Form

UNIT 4


TEXTBOOKS:

REFERENCE:

1. C.J. Date: An Introduction To Database Systems - Eighth Edition - PearsonEducation Asia


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20CSA112 OBJECT ORIENTED PROGRAMMING USING JAVA 3 1 0 4

Course Outcomes

CO1: Identify classes, objects, members of a class and relationships among them needed for a specific problem.

CO2: Write Java application programs using OOP principles and proper program structuring

CO3: Demonstrate the concepts of polymorphism, inheritance and thread and document a Java program using Javadoc.

CO4: Use Java AWT and Swing classes to build GUIs and understand how collection interface is implemented.
CO5: Demonstrate the Conceptual model of UML, activity diagram and their modelling techniques.

Syllabus

Unit 1
Introduction to object oriented software design, Comparison of programming methodologies, Object Basics, Java Environment, Classes and Object, Data Members, Access Specifiers, Arrays within a Class, Array of Objects, Constructors, Default Constructors, Destructors, Static Members, Constant Members,

Unit 2
Overview of Streams, Bytes vs. Characters, File Object, Binary Input and Output, Reading and Writing Objects, Method Overriding, Polymorphism, Super, Interfaces and Abstract Classes, Packages, Exception

Unit 3
Introduction to Threads, Creating Threads, Thread States, Runnable Threads, Coordinating Threads, Interrupting Threads, Runnable Interface, Synchronization.

Unit 4
Collection framework, Collection interfaces and classes, AWT, Swing, Event Handling, Javadoc

Unit 5
Object Oriented Design with UML, Class, object diagrams and sequence diagrams. Use case diagrams and activity diagrams.

TEXTBOOK:

REFERENCES:

CO – PO Affinity Map

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20CSA113 OPERATING SYSTEMS 3 1 0 4

Course Outcomes

CO1: Understand the basic concepts of operating system with different types of OS, services and system calls

CO2: Get knowledge of process management, Inter process communication and various CPU scheduling algorithms

CO3: Learn about deadlocks, methods of handling deadlocks and preventing deadlocks.

CO4: Understand the concept of memory management - paging and segmentation.

CO5: Learn about various I/O systems and mass storage structures

syllabus

UNIT 1

Introduction to Operating Systems: Mainframe systems-Desktop systems-Multiprocessor systems-Distributed systems-Clustered systems-Real-time systems-Handheld systems.

Operating System Structures: System components-Operating System services-System calls-System Programs.

UNIT 2


UNIT 3


UNIT 4

UNIT 5

I/O Systems: Overview, I/O Hardware
Mass storage structure- Disk structure, disk scheduling, disk management.
Case study on desktop and mobile operating system

TEXT BOOK:


REFERENCES:


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20CSA183 OBJECT ORIENTED PROGRAMMING USING JAVA LAB 0 0 3 1

Course Outcomes

CO1: The skills to apply OOP in Java programming in problem solving.

CO2: Write a complete class definition and with in the class definition, write constructor and overloaded methods.

CO3: Conceptualize, Analyze and write programs to solve more complicated problems using the concepts of multi-threading and Exception handling.

CO4: Use Java AWT and Swing classes to build GUIs and understand how collection interface is implemented.
CO5: Demonstrate event handling in GUIs.

syllabus

Input / Output statements, Manipulators, Structures, Classes, Objects, Static members and functions, Constructors and destructors, Constructor overloading, Function overloading, Forms of inheritance, Exception handling, Interfaces, Multithreading, Thread Synchronization, Collection Framework, AWT, Swing, Event Handling.

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20CSA184 Database Management System Lab 0 0 3-1

Course Outcomes

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<tr>
<td>CO1</td>
<td>Master the basic commands of SQL and its usage</td>
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<td>Design tables and insert Relevant data for query manipulation</td>
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<td>CO3</td>
<td>Understand the application of SQL functions, sub queries and joins</td>
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<td>CO4</td>
<td>Construct interactive PL/SQL programs for database applications</td>
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</tbody>
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Syllabus

Basic SQL Commands DML- Select, insert, Delete

DDL Commands-Create, Drop, Alter

Built in SQL functions- Set operations, Sub Queries-Joins-DCL – TCL- Views – Sequences – Index – Locks

PL/SQL Basics – Exceptions – Cursors - Stored Functions – Triggers

Programming with PL/SQL
TEXTBOOKS:


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SEMESTER 3

18AVP201 AMRITA VALUES PROGRAMME I 1 0 0 1

Course Outcomes:

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<td>CO1</td>
<td>To make students familiar with the rich tapestry of Indian life, culture, arts, science and heritage.</td>
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<tr>
<td>CO2</td>
<td>To give exposure to students about richness and beauty of Indian way of life.</td>
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Syllabus: Courses offered under the framework of Amrita Values Programmes I and II

Insights into Indian Classical Music
The course introduces the students into the various terminologies used in Indian musicology and their explanations, like Nadam, Sruti, Svaram – svara nomenclature, Stayi, Graha, Nyasa, Amsa, Thala,- Saptatalas and their angas, Shadangas, Vadi, Samavadi, Anuvadi. The course takes the students through Carnatic as well as Hindustani classical styles.

Insights into Traditional Indian Painting
The course introduces traditional Indian paintings in the light of ancient Indian wisdom in the fields of aesthetics, the Shadanga (Six limbs of Indian paintings) and the contextual stories from ancient texts from where the paintings originated. The course introduces the painting styles such as Madhubani, Kerala Mural, Pahari, Cheriyal, Rajput, Tanjore etc.

Insights into Indian Classical Dance
The course takes the students through the ancient Indian text on aesthetics the Natyasastra and its commentary the Abhinava Bharati. The course introduces various styles of Indian classical dance such as Bharatanatyam, Mohiniyatton, Kuchipudi, Odissy, Katak etc. The course takes the students through both contextual theory as well as practice time.

**Indian Martial Arts and Self Defense**
The course introduces the students to the ancient Indian system of self-defense and the combat through various martial art forms and focuses more on traditional Kerala’s traditional Kalari Payattu. The course introduces the various exercise technique to make the body supple and flexible before going into the steps and techniques of the martial art. The advanced level of this course introduces the technique of weaponry.

**Social Awareness Campaign**
The course introduces the students into the concept of public social awareness and how to transmit the messages of social awareness through various media, both traditional and modern. The course goes through the theoretical aspects of campaign planning and execution.

**Temple Mural Arts in Kerala**
The traditional percussion ensembles in the Temples of Kerala have enthralled millions over the years. The splendor of our temples makes art enthusiast spellbound, warmth and grandeur of color combination sumptuousness of the outline, crowding of space by divine or heroic figures often with in vigorous movement are the characteristics of murals.

The mural painting specially area visual counterpart of myth, legend, gods, dirtyies, and demons of the theatrical world, Identical myths are popular the birth of Rama, the story of Bhīma and Hanuman, Shiva, as Kirata, and the Jealousy of Uma and ganga the mural painting in Kerala appear to be closely related to, and influenced by this theatrical activity the art historians on temple planes, wood carving and painting the architectural plane of the Kerala temples are built largely on the pan-Indians almost universal model of the vasthupurusha.

**Organic Farming in Practice**
Organic agriculture is the application of a set of cultural, biological, and mechanical practices that support the cycling of farm resources, promote ecological balance, and conserve biodiversity. These include maintaining and enhancing soil and water quality; conserving wetlands, woodlands, and wildlife; and avoiding use of synthetic fertilizers, sewage sludge, irradiation, and genetic engineering. This factsheet provides an overview of some common farming practices that ensure organic integrity and operation sustainability.

**Ayurveda for Lifestyle Modification:**
Ayurveda aims to integrate and balance the body, mind, and spirit which will ultimately leads to human happiness and health. Ayurveda offers methods for finding out early stages of diseases that are still undetectable by modern medical investigation. Ayurveda understands that health is a reflection of when a person is living in harmony with nature and disease arises when a person is out of harmony with the cycles of nature. All things in the universe (both living and non-living) are joined together in Ayurveda. This leaflet endow with some practical knowledge to rediscover our pre-industrial herbal heritage.

**Life Style and Therapy using Yoga**
Yoga therapy is the adaptation of yogic principles, methods, and techniques to specific human ailments. In its ideal application, Yoga therapy is preventive in nature, as is Yoga itself, but it is also restorative in many instances, palliative in others, and curative in many others. The therapeutic effect comes to force when we practice daily and the body starts removing toxins and the rest is done by nature.
18SSK201  LIFE SKILLS I  1 0 2 2

Course outcomes

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Soft Skills:

At the end of the course, the students would have developed self-confidence and positive attitude necessary to compete and challenge themselves. They would also be able to analyse and manage their emotions to face real life situations.

At the end of the course, the students shall learn to examine the context of a Group Discussion topic and develop new perspectives and ideas through brainstorming and arrive at a consensus.

At the end of the course, the students will have the ability to prepare a suitable resume. They would also have acquired the necessary skills, abilities and knowledge to present themselves confidently. They would be sure-footed in introducing themselves and facing interviews.

At the end of the course the students will have the ability to analyse every question asked by the interviewer, compose correct responses and respond in the right manner to justify and convince the interviewer of one’s right candidature through displaying etiquette, positive attitude and courteous communication.

Aptitude:

At the end of the course, the student will have acquired the ability to analyse, understand and classify questions under arithmetic, algebra and logical reasoning and solve them employing the most suitable methods. They will be able to analyse, compare and arrive at conclusions for data analysis questions.

At the end of the course, students will be able to interpret, critically analyse and solve logical reasoning questions. They will have acquired the skills to manage time while applying methods to solve questions on arithmetic, algebra, logical reasoning, statistics and data analysis and arrive at appropriate conclusions.
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Soft skills and its importance: Pleasure and pains of transition from an academic environment to work-environment. Need for change. Fears, stress and competition in the professional world. Importance of positive attitude, self-motivation and continuous knowledge upgradation.

Self Confidence: Characteristics of the person perceived, characteristics of the situation, Characteristics of the Perceiver. Attitude, Values, Motivation, Emotion Management, Steps to like yourself, Positive Mental Attitude, Assertiveness.

Presentations: Preparations, Outlining, Hints for efficient practice, Last minute tasks, means of effective presentation, language, Gestures, Posture, Facial expressions, Professional attire.

Vocabulary building: A brief introduction into the methods and practices of learning vocabulary. Learning how to face questions on antonyms, synonyms, spelling error, analogy etc. Faulty comparison, wrong form of words and confused words like understanding the nuances of spelling changes and wrong use of words.

Listening Skills: The importance of listening in communication and how to listen actively.

Prepositions and Articles: A experiential method of learning the uses of articles and prepositions in sentences is provided.

Problem solving; Number System; LCM &HCF; Divisibility Test; Surds and Indices; Logarithms; Ratio, Proportions and Variations; Partnership; Time speed and distance; work time problems;

Data Interpretation: Numerical Data Tables; Line Graphs; Bar Charts and Pie charts; Caselet Forms; Mix Diagrams; Geometrical Diagrams and other forms of Data Representation.

Logical Reasoning: Family Tree; Linear Arrangements; Circular and Complex Arrangement; Conditionalities and Grouping; Sequencing and Scheduling; Selections; Networks; Codes; Cubes; Venn Diagram in Logical Reasoning.

**TEXTBOOKS:**

4. The Hard Truth about Soft Skills, by Amazon Publication.

REFERENCES:
1. Quantitative Aptitude, by R S Aggarwal, S Chand Publ.
3. Data Interpretation, R S Aggarwal, S Chand Publ.
4. Nova GRE, KAPAL GRE, Barrons GRE books;
5. Quantitative Aptitude, The Institute of Chartered Accountants of India.
7. The BBC and British Council online resources
8. Owl Purdue University online teaching resources
9. www.thesgrammarbook.com online teaching resources
10. www.englishpage.com online teaching resources and other useful websites.

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EXPLORATORY DATA ANALYSIS USING PYTHON

20CS201
Course Outcomes

| CO1   | Give basic knowledge about python variables, operators and data types |
| CO2   | Helps to get an idea about python control structures |
| CO3   | To be aware of python complex data types |
| CO4   | Familiarize with Python files, databases and advanced python objects. |
| CO5   | Get an overall idea about various python packages and GUI programming along with thorough understanding of data and its formatting. |

Unit 1
Introduction to Python: Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric data types: int, float etc.

Unit 2
Python Program Flow Control Conditional blocks: if, else and else if, Simple for loops in python, For loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.

Unit 3
Python Complex data types: Using string data type and string operations, Defining list and list slicing, Use of Tuple data type. String, List and Dictionary, Manipulations Building blocks of python programs, string manipulation methods, List manipulation. Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions.

Unit 4
Advanced Python Objects, map(),Advanced Python Lambda and List Comprehensions, Advanced Python Demonstration: The Numerical Python Library (NumPy), The Series Data Structure, Querying a Series, The Data Frame Data Structure, Data Frame Indexing and Loading, Querying a Data Frame, Indexing Data frames, Missing Values.

Unit 5
Understanding the Python Packages for Data Science- SciKit Learn, Mat PlotLib, Importing and Exporting Data in Python, Getting Started Analyzing Data in Python, Understanding the Data, Dealing with Missing Values in Python, Data Formatting in Python

Text Book/References

**CO – PO Affinity Map**

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**20CSA202 DATA STRUCTURES AND ALGORITHMS 3 1 0 4**

**Course Outcomes**

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<tr>
<td>CO1</td>
<td>Student will be able to understand the basic pseudocode conventions and methods of analysing algorithms</td>
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<tr>
<td>CO2</td>
<td>Learn the working of various searching and sorting algorithms</td>
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<td>CO3</td>
<td>Able to develop applications using suitable data structures</td>
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<tr>
<td>CO4</td>
<td>Understand the tree and tree traversal concepts</td>
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<tr>
<td>CO5</td>
<td>Gives an idea about graphs and finding shortest path</td>
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**Unit 1. Algorithm Analysis**

Basic mathematical review, RAM model of computation, Pseudocode conventions, Worst case, Average case and Best case analysis, Asymptotic Analysis, Back Substitution Method, masters method, Euclid's algorithm, Exponentiation.

**Unit 2: Searching and Sorting**

Linear Search, Binary Search – Analysis, Bubble Sort, Insertion Sort, Merge sort, Quick Sort

**Unit 3. Linear Data Structures**
Abstract Data Type, List ADT: Singly linked lists, Doubly linked lists, Circular Linked Lists, Stack ADT implementation and applications, Queue ADT: Implementation and Application. Circular Queue, Priority Queue

**Unit 4. Non-Linear Data Structures.**

Basic concepts of trees, Implementation of trees, Traversal, Binary tree, Expression tree, Binary search tree, AVL tree, Heaps.

**Unit 5. Graphs**

Adjacency matrix, Adjacency list, BFS, DFS, MST, PRIMS and KRUSKAL’S, DIJKSTRA’S algorithm

**Text Book:** Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education


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**20CSA203 COMPUTER NETWORKS 3-1-0-4**

**Course Outcomes**

This course studies the standard models for the layered approach to communication between autonomous machines in a network, and the main characteristics of data transmission across various physical link types. It considers how to design networks and protocols for diverse situations, analyses several protocols, and identifies significant problem areas in networked communications.

**COURSE OUTCOMES**

CO1: Understand the basic network concepts, including the structure and operation of the different types of networks

CO2: Must be able to understand the design of different networks and related reference models used.

CO3: Comprehend the basic working principles behind switching techniques used in communication channels.

CO4: Familiarize the routing techniques and congestion control mechanisms used in Routers. Must be able to understand and successfully apply routing algorithms for optimization.
CO5: Must be able to understand, how is the end-to-end connection mechanism works at the transport layer.

SYLLABUS

Unit 1: Introduction to Computer Networks

Introduction To Computer Networks: Introduction: Definition of a Computer Network; Components of a computer network; Classification of networks; Transmission Medium; Wireless transmission; Local area networks, Metropolitan area networks, Wide area networks, Wireless networks; Data transmission modes;

Unit 2: Layered architecture


Unit 3: Physical layer

Physical Layer: Network topologies; Switching; Circuit switching, Message switching, Packet switching, Relationship between Packet Size and Transmission time, Comparison of switching techniques: Multiplexing; FDM, WDM, TDM

Unit 4: Network Layer

Network Layer: Design issues of Network layer; Nature of the service provided, Routing, Congestion control, Types of routing algorithms, Classes of routing algorithms, Properties of routing algorithms, Optimality principle: Routing algorithms; Shortest path algorithm, Flooding, Distance vector routing, Hierarchical routing, Link state routing, Factors of congestion, Comparison of flow control and congestion control, General principles of congestion control

Unit 5: Transport Layer

Transport Layer: Services of Transport layer; Service primitives: Connection establishment: Connection Release: Transport Protocols;

Text Books:


Reference text books:

2. Computer Networks top down approach by Mcgraw hill:- Forouzan
3. Computer Networks top down approach by pearson :- James F Kurose

CO – PO Affinity Map
20MAT202 INFERENTIAL STATISTICS 2 1 0 3

Unit-I

Unit II
Interval Estimation: Introduction - confidence Interval for mean of a Normal Distribution with Variance known and unknown - Confidence Interval for the two means of a Normal Distribution with Variance known and unknown, Confidence interval for one and two Population Proportions, Confidence interval for the variance and ratio of variances.

Unit-III
Inference theory - introduction to hypothesis testing - large sample tests for single mean and two means - large sample tests for single proportion and two proportions.

Unit-IV
Small sample tests for single mean and two means – paired t-test - test for single variance – test for equality of two variances.

Unit-V
Chi-square goodness of fit for Binomial, Poisson and Normal distributions, Independence of attributes, test for homogeneity, Non-parametric tests - sign test, signed rank test and Mann-Whitney U test.

Textbooks:

Reference books:
Course Outcomes

<table>
<thead>
<tr>
<th>CO1</th>
<th>Student will be able to implement various sorting algorithms</th>
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<tbody>
<tr>
<td>CO2</td>
<td>Learn to apply array, Linked list, stack and queue concepts to solve real world problems</td>
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<tr>
<td>CO3</td>
<td>Learn to implement binary search trees, traversal algorithms and various operations</td>
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<tr>
<td>CO4</td>
<td>Understand graph and traversal algorithms</td>
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Syllabus

**Topic 1: Sorting – Searching**
1. Write a program to implement Bubble Sort.
2. Write a program to implement selection sort.
3. Write a program to implement Quick Sort.
4. Write a program to implement Insertion Sort.
5. Write a program to implement Merge Sort.
6. Write a program to implement Binary Search.

**Topic 2: Arrays – Stacks – Recursion**
7. Write and test a function that transposes a square matrix.
8. Write and test a recursive function that prints all the permutations of the first n characters of a string.
9. Write and test a recursive function that returns the power \( x^n \).
10. Write a program to implement a stack of strings (illustrate the operations push(), pop(), size(), empty() and top()).
11. Write a program to show the linked implementation of the Stack class.
12. Write a program to covert infix to postfix.
13. Write a program to implement Towers of Hanoi using Stack.

**Queues-Linked-Lists**
14. Write a program to implement a linear list and perform the operation such as insert(), search() and delete().
15. Write a program to implement a queue by adding the functions such as
   (i) Determine the size
   (ii) input queue
   (iii) output a queue
   (iv) split a queue into two queues
16. Write a program to search a circular linked list with a header node.

**Topic 3: Binary Trees - Binary Tree Traversal**
17. Write a program to implement Binary Search Tree.
18. Priority queue implementation.
19. Write a program to create a binary tree and find the height of a binary tree.
20. Write a program to perform the binary tree traversals.
21. Write a program to perform a deletion from a Binary Tree (using a delete () function).

**Topic 4: Graphs**

20. Matrix representation of graphs
21. DFS traversal
22. BFS traversal

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**20CSA282 DATA SCIENCE USING SPREADSHEET MODELLING LAB 0-0-3-1**

**Course Outcomes**

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<tr>
<td>CO1</td>
<td>Presentation and Analysis of quantitative data using graphs and charts.</td>
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<td>CO2</td>
<td>Presentation of Qualitative data using IF, data sort and filter.</td>
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<td>CO3</td>
<td>Perform conditional formatting using autosum, vlookup, hlookup, math functions.</td>
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<td>CO4</td>
<td>Analysis of qualitative data using pivot table and charts.</td>
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<tr>
<td>CO5</td>
<td>Develop macros and perform inferential statistics of data using Chi-square, z-test and ANOVA.</td>
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**Syllabus:**

Presentation of quantitative data: Data Visualization – types of graphs and charts

Analysis of quantitative data – Descriptive Statistics

Presentation of qualitative data: Preparation, Data Conversion using IF, Data conversion from non-excel sources, Data Queries with sort, filter and advanced filter

Conditional formatting, format as table, autosum, fill, Vlookup, Hlookup, Math functions, Name manager, Group and Ungroup data

Analysis of qualitative data – Dealing with errors - Trace, Pivot reports – Pivot table and charts

Data Validation, Macros

Inferential statistics of data – Chi-square test, z-test, t-test, confidence intervals for sample statistics, ANOVA

**CO – PO Affinity Map**
Amrita University's Amrita Values Programme (AVP) is a new initiative to give exposure to students about richness and beauty of Indian way of life. India is a country where history, culture, art, aesthetics, cuisine and nature exhibit more diversity than nearly anywhere else in the world.

Amrita Values Programmes emphasize on making students familiar with the rich tapestry of Indian life, culture, arts, science and heritage which has historically drawn people from all over the world.

Students shall have to register for any two of the following courses, one each in the third and the fourth semesters, which may be offered by the respective school during the concerned semester.

**Courses offered under the framework of Amrita Values Programmes I and II**

**Insights into Indian Classical Music**

The course introduces the students into the various terminologies used in Indian musicology and their explanations, like Nadam, Sruti, Svaram – svara nomenclature, Stayi, Graha, Nyasa, Amsa, Thala, Saptatalas and their angas, Shadangas, Vadi, Samavadi, Anuvadi. The course takes the students through Carnatic as well as Hindustani classical styles.

**Insights into Traditional Indian Painting**

The course introduces traditional Indian paintings in the light of ancient Indian wisdom in the fields of aesthetics, the Shadanga (Sixs limbs of Indian paintings) and the contextual stories from ancient texts from where the paintings originated. The course introduces the painting styles such as Madhubani, Kerala Mural, Pahari, Cheriyal, Rajput, Tanjore etc.

**Insights into Indian Classical Dance**

The course takes the students through the ancient Indian text on aesthetics the Natyasastra and its commentary the AbhinavaBharati. The course introduces various styles of Indian classical dance such as Bharatanatyam, Mohiniyatton, Kuchipudi, Odissy, Katak etc. The course takes the students through both contextual theory as well as practice time.

**Indian Martial Arts and Self Defense**
The course introduces the students to the ancient Indian system of self-defense and the combat through various martial art forms and focuses more on traditional Kerala’s traditional Kalari Payattu. The course introduces the various exercise technique to make the body supple and flexible before going into the steps and techniques of the martial art. The advanced level of this course introduces the technique of weaponry.

Social Awareness Campaign

The course introduces the students into the concept of public social awareness and how to transmit the messages of social awareness through various media, both traditional and modern. The course goes through the theoretical aspects of campaign planning and execution.

Temple Mural Arts in Kerala

The traditional percussion ensembles in the Temples of Kerala have enthralled millions over the years. The splendor of our temples makes art enthusiast spellbound, warmth and grandeur of color combination sumptuousness of the outline, crowding of space by divine or heroic figures often with in vigorous movement are the characteristics of murals.

The mural painting specially area visual counterpart of myth, legend, gods, dirties, and demons of the theatrical world, Identical myths are popular the birth of Rama, the story of Bhima and Hanuman, Shiva, as Kirata, and the Jealousy of Uma and ganga the mural painting in Kerala appear to be closely related to, and influenced by this theatrical activity the art historians on temple planes, wood carving and painting the architectural plane of the Kerala temples are built largely on the pan-Indians almost universal model of the vasthupurusha.

Organic Farming in Practice

Organic agriculture is the application of a set of cultural, biological, and mechanical practices that support the cycling of farm resources, promote ecological balance, and conserve biodiversity. These include maintaining and enhancing soil and water quality; conserving wetlands, woodlands, and wildlife; and avoiding use of synthetic fertilizers, sewage sludge, irradiation, and genetic engineering. This factsheet provides an overview of some common farming practices that ensure organic integrity and operation sustainability.

Ayurveda for Lifestyle Modification:

Ayurveda aims to integrate and balance the body, mind, and spirit which will ultimately leads to human happiness and health. Ayurveda offers methods for finding out early stages of diseases that are still undetectable by modern medical investigation. Ayurveda understands that health is a reflection of when a person is living in harmony with nature and disease arises when a person is out of harmony with the cycles of nature. All things in the universe (both living and non-living) are joined together in Ayurveda. This leaflet endow with some practical knowledge to rediscover our pre-industrial herbal heritage.

Life Style and Therapy using Yoga

Yoga therapy is the adaptation of yogic principles, methods, and techniques to specific human ailments. In its ideal application, Yoga therapy is preventive in nature, as is Yoga itself, but it is also restorative in many instances, palliative in others, and curative in many others. The therapeutic effect comes to force when we practice daily and the body starts removing toxins and the rest is done by nature.

Group Discussions: Advantages of Group Discussions, Structured GD – Roles, Negative roles to be avoided, Personality traits to do well in a GD, Initiation techniques, How to perform in a group discussion, Summarization techniques.

**Listening Comprehension advanced:** Exercise on improving listening skills, **Grammar basics:** Topics like clauses, punctuation, capitalization, number agreement, pronouns, tenses etc.

Reading Comprehension advanced: A course on how to approach middle level reading comprehension passages.

Problem solving – Money Related problems; Mixtures; Symbol Based problems; Clocks and Calendars; Simple, Linear, Quadratic and Polynomial Equations; Special Equations; Inequalities; Functions and Graphs; Sequence and Series; Set Theory; Permutations and Combinations; Probability; Statistics.

Data Sufficiency: Concepts and Problem Solving.

Non-Verbal Reasoning and Simple Engineering Aptitude: Mirror Image; Water Image; Paper Folding; Paper Cutting; Grouping Of Figures; Figure Formation and Analysis; Completion of Incomplete Pattern; Figure Matrix; Miscellaneous.

Special Aptitude: Cloth, Leather, 2D and 3D Objects, Coin, Match Sticks, Stubs, Chalk, Chess Board, Land and geodesic problems etc., Related Problems

**TEXTBOOKS:**
4. The Hard Truth about Soft Skills, by Amazon Publication.

**REFERENCES:**
1. Quantitative Aptitude, by R S Aggarwal, S Chand Publ.
5. The BBC and British Council online resources
6. Owl Purdue University online teaching resources
7. www.thegrammarbook.com online teaching resources
8. www.englishpage.com online teaching resources and other useful websites.

**DATA MINING**

Course Outcomes

**CO1:** To understand data mining process and the resulting patterns, types of data, attributes and knowledge discovery process

**CO2:** To study the different data preprocessing techniques before applying the data mining process
CO3: To characterize the kinds of patterns that can be discovered by association rule mining

CO4: To learn the different prediction, classification and clustering algorithms

CO5: To categorize and carefully differentiate between situations for applying different data-mining techniques for different applications

Unit 1

Introduction: Introduction to Data Mining-Types of Data and Patterns Mined- Technologies- Applications-Major Issues in Data Mining. Introduction to Data Warehousing: Basic Concepts and Techniques

Unit 2

Knowing about Data- Data Preprocessing: Cleaning– Integration–Reduction–Data Transformation and Discretization

Unit 3

Mining Frequent Patterns: Basic Concept – Frequent Item Set Mining Methods -Apriori and FP Growth algorithms -Mining Association Rules

Unit 4

Classification and Predication: Issues – Algorithms- Decision Tree Induction - Bayesian Classification –k Nearest Neighbor- Prediction - Accuracy- Precision and Recall

Unit 5

Clustering: Overview of Clustering – Types of Data in Cluster Analysis – K Means and K Medoid, Hierarchical Clustering Algorithms

TEXTBOOKS / REFERENCES:

1. Jiawei Han, Micheline Kamber and Jian Pei, “Data mining concepts and Techniques”, Third Edition, Elsevier Publisher, 2006.

CO – PO Affinity Map

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20CSA212 PROGRAMMING FOR DATA SCIENCES 2-0-3 3

Course Outcomes

CO-01: Learn the basic syntax of R programming language
CO-02: Pre-process raw data in R for further analysis.
CO-03: Conduct exploratory data analysis using R
CO-04: Create insightful visualizations to identify patterns from data.
CO-05: Use statistical estimates to make meaningful predictions from data.

Syllabus

Unit 1

Introduction to data science, Knowledge discovery in databases, The Data Science Process - data collection, pre-processing, transformation and modeling, data mining, interpretation and evaluation.

The R Programming Language - Basic concepts, definitions and notations, R as a calculator, Identifiers, constants, R data types, R- Objects: Vectors, Lists, Matrices, Arrays, Factors, Data Frames; Atomic and Recursive Variables, R-Operators.

Unit 2

Conditional statements and Control structures, Looping constructs and Loop control statements.

Function in R Programming - Components of a Function, Built in and user defined Functions, Vector and Matrix manipulation functions, R -strings and string manipulation functions.

Unit 3

Scoping rules in R, Package in R - Installing and Loading Packages in R, using help, access functions from packages.

Getting Data In and Out of R - Importing data from excel, Working with data from files, importing larger Data Sets, loading data from databases, Working with structured and unstructured data, Reading from URL, Storing data using R functions.

Unit 4

R for managing data-Data cleansing, Treating missing values, data transformations, sampling data for modeling- test and training splits, creating sample groups, Data reduction.

**Unit 5**

R for Basic Statistics- Descriptive Statistics: arithmetic mean, median, Measure of dispersion - Minimum and Maximum values, quantiles, percentiles, IQR, standard deviation, variance.

Linear regression – using linear and logistic regression and making predictions. Characterizing prediction quality. Using correlation to find relations between variables –Pearson, Kendall and Spearman tests.

**Lab:**
1. Basic Programming assignments to understand the R Syntax, R – objects conditional and loops.
2. Use R functions and packages to extend the R programming environment.
3. Data analysis case study: loading and processing data, visually inspecting and analyzing using statistical estimates.

**Text Books:**
2. Practical Data Science with R, Nina Zumel and John Mount, Dreamtech/Manning, 2014

**References:**
1. “R for Data Science”, Hadley Wickham and Garett Grolemund, , O’Reilly, 2017

**CO – PO Affinity Map**

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20CSA213 SOFTWARE ENGINEERING 21 0 3
Course Outcomes

CO1: Learn to apply the knowledge of software engineering methodologies to identify, formulate, and solve software engineering problems.

CO2: Understand the ability to analyse the complex system by applying analytical, engineering and knowledge-based techniques to clearly understand the requirements.

CO3: an ability to design a system, component, or process to meet desired needs within realistic constraints relevant to the system

CO4: an ability to implement, verify, validate, test and maintain software systems developed using modern techniques, skills and engineering tools.

CO5: an ability to function on multi-disciplinary teams with an understanding of professional and ethical responsibility to create solutions for significant application domains.

Syllabus

Unit 1

Unit 2

Unit 3

Text books:

Reference book:


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20CSA214 WEBTECHNOLOGIES 3034

Course Outcomes

CO-01: Learn the basic web programming technologies
CO-02: Equip with latest web development tools
CO-03: Understand the industrial standards with frameworks
CO-04: Create a full fledged CRUD web application on their own.
CO-05: Learn scripting skills with PHP

Unit-1 : Web Development Basics
Web History; Client-Server ; Browser-Web Server; W3 Consortium;
HTML5 and CSS3
HTML5- Basic Tags, Tables, Forms, Input tag, HTML Graphics, HTML media, HTML Graphics, HTML APIs.
CSS - Background, Borders, margin, Box model. Styling text, fonts, list, links, tables. CSS overflow, float, inline blocks, pseudoclasses, pseudo-elements. CSS border images, rounded corners

Unit-2 : Client side scripting : JavaScript
Introduction to JavaScript, internal and external Java script files, variables, control statements, loops, Arrays, string handling, functions in JavaScript, Form Handling, Input Validation, Regular Expression, Event Handling
DOM concept, creating html elements using java script. Drawing 2D shapes. Introduction to AJAX

Unit-3 : JavaScript Framework
Building Single page applications with Angular JS Single page application – introduction, two way data binding, MVC in angular JS, controllers, getting user inputs, loops, Client side routing – accessing URL data, various ways to provide data in angular JS.
Unit 4: Server Side Programming - PHP
Server side scripting, Difference between client side and server side scripting languages.
Introduction to PHP, variables, control statements, loops, Arrays, string handling, PHP forms, Global variables in PHP, Regular expression and pattern matching,
Database programming: inputting and outputting data from MySQL using PHP, insertion, deletion and updating data.
State management in web applications, cookies, Application and session state.

Unit 5: XML & JSON
Introduction to XML, usage of XML, XML tags, elements and attributes, attribute type, XML validation: DTD and XSD, XML DOM; XML & PHP; JSON.

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Textbook/Reference:
The Complete Reference, HTML and CSS by Thomas A Powell latest edition
XML Bible by Horold, Elliotte Rusty
Web Reference:- W3Schools.com

20CSA283 DATA MINING Lab 0-0-3-1
(In Python) and Use Kaggle
Using Pandas Data frames
Visualization and plots - seaborn
Data Preparation – Cleaning – Missing data, Data Reduction – PCA, Data Transformation – Normalization, Binning, distance measures, similarity
Association mining
Regression – Linear
Naïve Bayes Classifier, Decision tree, KNN
KMeans, Hierarchical clustering
Course Outcomes

CO-01: Understand current applications, practices and challenges in the field of data science.

CO-02: Form connections between specific academic topics and real-world problems and applications.

CO-03: Help the student to conduct thorough literature review on the problem domain which facilitate interdisciplinary learning.

CO-04: Refine analytical, presentation and leadership skills as demonstrated by written and oral communications.

CO-05: Reinforce active listening skills, as demonstrated by response to and further development of ideas presented by classmates.

Course Syllabus

Unit 1
Research Process, Quantitative vs. Qualitative Approaches to Research, Exploratory vs. Confirmatory Research, Experimental vs Theoretical Research. Introduction to Case study research. Designing CSR.

Unit 2
Conducting Literature Review, Referencing, Information Sources, Information Retrieval, Role of libraries in Information Retrieval, Tools for identifying literatures, Indexing and abstracting services, Citation indexes

Unit 3
Experimental Research: Cause effect relationship, Development of Hypothesis, Data collection, Numerical and Graphical Data Analysis: Sampling, Observation, Surveys, Inferential Statistics, and Interpretation of Results.

Unit 4
Preparation of Dissertation and Research Papers, Guidelines for writing the abstract, introduction, methodology, results and discussion, conclusion. References, Citation and listing system of documents, Intellectual property rights (IPR), Ethics of Research- Scientific Misconduct-Plagiarism

Unit 5
Selection of a case study research work for critical analysis. (The case study work may be a book, 3 – 5 articles, a dissertation, or technical report on a topic of interest.)
Case study proposal: A description of the case study and reasons/rationale for the choice. Briefly summarize the case study research and explain why it was selected for analysis.

Critical Review: Identify the conceptual, methodological, and other relevant criteria used in the study research; and identify the “lessons learned,” through the analysis of this case study research, for own research design.

Presentation: Talk on the case study to the class that addresses key learnings or findings, significant dilemmas or issues of interest, and/or other points. The purpose of the talk/presentation is to share one’s work with others and deepen our understanding of case study research methods.

Paper submission: to propose a case study research project of their own. The paper should describe the phenomenon under investigation, the theoretical background in which this study will be grounded, and the key questions to be investigated.

Text Books:


References


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Semester 5

Facing an Interview: Foundation in core subject, Industry Orientation/ Knowledge about the company, Professional Personality, Communication Skills, activities before interview, upon entering interview room, during the interview and at the end. Mock interviews.

Advanced Grammar: Topics like parallel construction, dangling modifiers, active and passive voices, etc.

Syllogisms, Critical reasoning: A course on verbal reasoning. Listening Comprehension advanced: An exercise on improving listening skills.

Reading Comprehension advanced: A course on how to approach advanced level of reading, comprehension passages. Exercises on competitive exam questions.

Specific Training: Solving campus recruitment papers, National level and state level competitive examination papers; Speed mathematics; Tackling aptitude problems asked in interview; Techniques to remember (In Mathematics). Lateral Thinking problems. Quick checking of answers techniques; Techniques on elimination of options, Estimating and predicting correct answer; Time management in aptitude tests; Test taking strategies.

**TEXTBOOKS:**
4. The Hard Truth about Soft Skills, by Amazon Publication.

**REFERENCES:**
1. Speed Mathematics, Secrets of Lightning Mental Calculations, by Bill Handley, Master Mind books;
2. The Trachtenberg Speed System of Basic Mathematics, Rupa& Co., Publishers;
5. Quick Arithmetics, by Ashish Agarwal, S Chand Publ.;
8. The BBC and British Council online resources
9. Owl Purdue University online teaching resources
10. www.thergrammarbook.com online teaching resources
11. www.englishpage.com online teaching resources and other useful websites.
Course Outcomes

CO1: Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.

CO2: Understand basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

CO3: Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent systems.

CO4: Explore the current scope, potential, limitations, and implications of intelligent systems.

CO5: Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.

CO6: Experiment with an AI model for simulation and analysis.

Unit 1


Unit 2


Unit 3


Statistical Reasoning – Probability and Baye’s Theorem – Bayesian Networks – Fuzzy Logic.

Unit 4
Game Playing - The Minimax Search Procedure – Adding Alpha-Beta Cutoffs.

Understanding – What is Understanding? What makes Understanding hard?

Unit 5


TEXTBOOKS:

REFERENCES:
4. Introduction to Artificial Intelligence – Eugene Charnaik, Drew McDermott (Pearson Education Asia)

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20CSA302 MACHINE LEARNING 3-0-0-3

Course Outcomes

CO1: Have a good understanding of the fundamental ideas of machine learning: data, model selection, model complexity, etc.

CO2: Understand the strengths and weaknesses of many popular machine learning approaches.

CO3: Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.

CO4: Be able to design and implement various machine learning algorithms in a range of real-world applications.

CO5: Develop the ability to evaluate and interpret the results of the algorithms

CO6: Ability to recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.
Unit 1

Introduction to Machine learning: Supervised learning, Unsupervised learning, some basic concepts in machine learning, Review of probability,
The log-sum-exp trick, Feature selection using mutual information, Linear Regression

Unit 2

Computational Learning theory- Sample complexity, \( \varepsilon \)- exhausted version space, PAC learning, agnostic learner, VC dimensions, Sample complexity.
Bayesian Learning, curse of dimensionality, overfitting.
Parametric Estimators - estimator bias and variance, active learning

Unit 3

Dimensionality reduction, Clustering – choosing the number of clusters, Spectral clustering, Evaluating cluster quality. Margin and generalization (EM) algorithm, EM, regularization

Unit 4

Non-parametric methods – KNN
Linear discrimination - Support vector machine (SVM) and kernels,
Classification errors, regularization, logistic regression,

Unit 5


TEXTBOOKS:

20CSA303 CLOUD COMPUTING 3-0-0-3

Course Outcomes

CO1: Understand the fundamental ideas behind cloud computing and different types of cloud services – Delivery models, Deployment models
CO2: Learn the virtualization and its role in cloud computing
CO3: Learn different features of containers and their orchestration in cloud
CO4: Learn storage technologies, networking, application development and deployment in the cloud
CO5: Understand the role of cloud computing in IoT, Bigdata and machine learning domains

SYLLABUS

UNIT 1

UNIT 2

UNIT 3
Containers, Docker Architecture, Docker Engine, Docker Images, Docker Hub, Kubernetes,

UNIT 4
Storage options in cloud, Cloud SQL, Application development and deployment in cloud, Cloud API,

UNIT 5
Monitoring and load balancing, Cloud Networking, Cloud in machine learning, bigdata analytics and IoT

TEXTBOOK:

REFERENCES:
Course Outcomes

CO1: Familiarize widely used cloud platforms
CO2: Create and configure virtual machines
CO3: Learn how to create containers and its orchestration
CO4: Development, deployment and monitoring of cloud applications
CO5: Understand the storage and networking options in cloud

SYLLABUS

Create accounts in AWS and Google cloud, Explore the various services offered by Amazon and Google, Virtualization concept in Virtualbox, Create and configure Virtual machine, Host a web server in the virtual machine, Create containers using docker, Kubernetes and orcherstation of containers, Structured and unstructured storage in the cloud, CloudSQL, Application development and deployment in cloud, Load balacing and monitoring of cloud applications. Various networking options in cloud, Case study- private cloud setup using openstack

REFERENCES:

2. https://sites.google.com/google.com/gcp-teachingresources/home?pli=1&authuser=1
Evaluation measures

- **Supervised Learning**
  - Find-s algorithm
  - Candidate elimination algorithm - algorithm implementation
  - Naïve Bayes algorithm - algorithm implementation
  - Decision tree algorithm
  - Nearest Neighbor algorithm - algorithm implementation
  - SVM algorithm - using simulation tool

- **Unsupervised Learning**
  - K means algorithm - algorithm implementation
  - EM algorithm
  - HMM

- **Instance based learning**
  - Locally weighted regression algorithm

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**20CSA391 MINOR PROJECT 4 Credits**

**Preamble:**
Data Scientists, employ techniques and theories drawn from many fields within the broad areas of mathematics, statistics, information science, and computer science, in particular from the subdomains of machine learning, classification, cluster analysis, data mining, databases, and visualization to derive actionable insights and help meet specific business needs and goals. The goal of this Minor Project course is to help the student apply the theories and important tools they studied in this program to practice data science and mobilize the students for the next semester Major Project course.

**Course Objectives:**

**CO-01:** Provide opportunities to identify real world problems.

**CO-02:** Conduct thorough literature review on the problem domain.

**CO-03:** Specialize data science methods, applications and tools.

**CO-04:** Demonstrate independence and originality in thought and application.

**CO-05:** Provide opportunity to work as a team and evaluate the developed product/algorithm both from individuals’ and teams’ perspective.
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Semester 6

20CSA311  BIG DATA ANALYTICS AND VISUALIZATION  3-0-0-3

Course Outcomes

CO1: Understand the basic concepts in Big Data Analytics and gain the ability to choose the right solution for a task involving big data, including databases, architectures and cloud services.

CO2: Understand the different methods to analyze and visualize the big data.

CO3: Develop the skillset to build effective solutions for Big Data issues using Hadoop and its Eco-System.

CO4: Get insights into different data visualization techniques and standard tools.

CO5: Understanding of real life issues faced by different organizations and its effective solutions through case studies.

UNIT 1

Introduction to Big Data, Types of Digital Data, Characteristics of Big Data, Evolution of Big Data, Definition of Big Data, Data Appliance, Challenges with Big Data, Big data sources, Best practices in Big Data Analytics, Introduction to Data Modelling

UNIT 2

Introduction to elementary data analysis: Measures of center: Mean, Median, Mode, Variance, Standard deviation, Range, Normal Distribution :Center, Spread, Skewed Left, Skewed Right, Outlier, Correlation Patterns, Magnitude and Direction in relationship, Introduction to Bayesian Model

UNIT 3

History of Visualization, Goals of Visualization, Types of Data Visualization: Scientific Visualization, Information Visualization, Visual Analytics, Impact of visualization, Big Data Visualization Tools: Tableau, Google Chart
UNIT 4

Introduction to Big Data Processing and Apache Hadoop, Installation and Configuration of Hadoop in Ubuntu, HDFS Concepts, Map Reduce Framework, Anatomy of a Map Reduce Job Run, Job Scheduling, Shuffle and Sort, Task Execution

UNIT 5

Introduction to Hadoop Eco System, Apache Hive, Apache Mahout, Apache Pig, Case studies: Analyzing big data with twitter, Big data for Ecommerce, Big data for blogs.

TEXTBOOKS:


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20CSA312 DATA GOVERNANCE 3-0-0-3

CO1: Explain how organizations use data governance to address the challenges of data management and Articulate the Challenges of Data Governance

CO2: Create and document the steps necessary to implement a data governance program
CO3: Explain Data Governance Maturity Models and Understand How to Mitigate Regulatory and Operational Risk Through Data Governance

CO4: Create a Data Governance Document that Describes the Business Need for Data Governance

CO5: Analyze the need for data policy standards and the stakeholders who manage data quality

CO6: Evaluate and describe the impact of big data on organizational policies

Unit 1

Understand what data is and how it works - Explain data’s role in representing objects, events and concepts - Describe the relationship between data and information - Understand the concept of data ownership and the relationships between people in a business enterprise - Analyze what data is and how it is used in organizations - Assess the business issues that data management can resolve - Evaluate and explain the challenges inherent in data management and governance

Unit 2

Data Governance - Understand The Need for Data Governance - Understand How Data Governance fits into Organizational Strategy - Explain Data Governance Maturity Models - Describe the Data Governance Life Cycle - Explain how to Manage Risk with Data Governance - Explain How Organizational Culture Affects Data Governance - Articulate the Challenges of Data Governance

Unit 3

Describe the Metadata Framework - Evaluate and Explain Master Data Management - Explain the Various Types of Assets that Require Governance - Analyze and Describe Metadata Use for Data Governance - Evaluate the Varying Data Models and Their Bearing on Governance

Understand How to Mitigate Regulatory and Operational Risk Through Data Governance - Describe The Relationship Between IT and Business in an Organization - Explain an Information Governance Framework - Explain How to Optimize Performance with Data Governance - Describe How Formal Structure Impacts Data Governance - Create a Data Governance Document that Describes the Business Need for Data Governance

Unit 4

Data Stewardship and Governance – How they fit together – Types of data stewardship – Roles and responsibilities

Unit 5

Understand how Data Governance can be applied to Business - Review the challenges of Data Governance in a Big Data world - Describe the Framework for successful Data Governance strategies - Explain how Information Exchanges work - Articulate the possible future Data Governance challenges.
Textbooks:


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20CSA383  BIG DATA ANALYTICS AND VISUALIZATION LAB  0-0-3-1

Course Outcomes

CO1: Get familiar with standard tools and frameworks used in the analysis and visualization of Big Data

CO2: Acquire a clear understanding of the architectural concepts of Hadoop and Map Reduce paradigm

CO3: Learn the Java concepts required for developing Map Reduce programs

CO4: Get familiar with the usage and applications of programming tools PIG&HIVE in Hadoop echo system

CO5: Learn how to effectively use the data visualization tools Tableau/Google Chart

SYLLABUS

Installation and Configuration of Hadoop in two operating modes (Pseudo distributed & Fully distributed), Use web based tools to monitor the Hadoop setup, Perform the different file management tasks in HDFS, Run a basic Word Count program to understand Map Reduce paradigm, Stop word elimination using Map Reduce, Mining of large dataset to find the average, max and min values using Map Reduce, Tera Sort benchmark comparison for YARN, Setting up Hadoop cluster in AWS, Install PIG on Hadoop and write Pig Latin scripts to sort, group, join,
project and filter your data, Install Hive on Hadoop and use it to create, alter and drop databases, tables, views, functions and indexes, Use Tableau/Google chart to visualize a dataset of your choice.

REFERENCES:

5. https://www.tableau.com/

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20CSA399 Major Project (Optionally leading to Paper Publication) 10 credits

Preamble:

Data Scientists, employ techniques and theories drawn from many fields within the broad areas of mathematics, statistics, information science, and computer science, in particular from the subdomains of machine learning, classification, cluster analysis, data mining, databases, and visualization to derive actionable insights and help meet specific business needs and goals. The goal of this Major Project course is to help the student experienced in industrial/research projects by applying the skills they acquired by the different courses in this program, to solve real world problems.

Course Objectives:

CO-01: Apply the skills a student acquired through the different courses in this program to design software solutions for real world problems.
**CO-02:** To expose the student to the industry-standard project practices, under time and deliverable constraints.

**CO-03:** Provide opportunity to work as a team and evaluate the developed product/algorithm both from individual’s and team’s perspective.

**CO-04:** Train the student to write and publish research papers.

**CO-05:** Demonstrate independence and originality in thought and application and communicate among software professionals to demonstrate the knowledge and principles.

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**Electives**

**20CSA331**

**TIME SERIES ANALYSIS**

|     | 3 | 0 | 0 | 3 |

**Course Outcomes**

**CO1**  To get introduced to the overview of time series analysis and importance of its properties.

**CO2**  Describe the regression, type and importance of regression and role of model selection in time serious analysis.

**CO3**  Explain about the covariance and prediction about time serious data and its models.

**CO4**  Classify different types of spectral representation and estimation of time serious analysis.

**CO5**  Overview about multivariate and spatial time serious and its higher applications.

Unit: 1
Overview - signal vs noise, graphics; Stationary processes-ensemble, random walk vs trend, periodicity, linear process; Estimators-mean, ACF, PACF, variogram; Properties-covariance of covariance, normality.

Unit:2

Regression-models for trend, differencing, backshift operator B; Harmonic regression-periodogram, signal processing, novel asymp; Nonparametric regression-smoothing, periodic functions; Model selection-AIC, BIC, SIC, bias-variance trade-off; ARMA models-polynomial approximation, causality, notation.

Unit:3

Covariances-identification; Prediction-recursion ;Estimation-MLE, LS, forward-backward; State-space models-Kalmanfilter; Properties-equivalence with ARMA, nonlinear models; Switching models-hidden Markov models (HMM).

Unit:4

Hilbert spaces-infinite dimension, L2, martingale; Spectral representation-integral representation, Wolddecomposition; Periodogram-discrete Fourier transform (DFT); Spectral estimation-linear filters.

Unit:5

Multivariate time series-VAR, cross-correlation, trans function, spectral regr; Cointegration-principal components; Seasonality-X-11, regression models, seasonal differencing; Wavelets-multi resolutionanalysis; Spatial time series-kriging, spatial AR models.

TEXTBOOK:

REFERENCES:
5. “Forecasting: Principles and Practice” by Rob J. Hyndman and George Athanasopoulos.

CO – PO Affinity Map
## Course Outcome:

- Able to understand the application areas of IoT
- Able to understand data analytics in IoT
- Able to understand building blocks of IoT and their protocols

## Unit 1: Introduction  
10 Hours


## Unit 2: Fundamental devices in IoT  
7 Hours


## Unit 3: Protocols for IoT  
8 Hours


## Unit 4: Data and Network Analytics in IoT  
10 Hours


## Unit 5: Implementing IoT  
10 Hours

Text Books:


Reference Books:


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20CSA333  EMBEDDED SYSTEMS  3 0 0 3

Course Outcomes

CO1: Comprehend the specifications of embedded systems for hardware and software architecture.

CO2: Analyze and develop software programs for the embedded systems.

CO3: Assess the design specifications Embedded Systems, related frameworks and Embedded Systems resource chains.

CO4: Design the breadboard test circuit including microcontroller design and device control.

CO5: Construct embedded devices utilizing RTOS concepts in real-time.

Unit 1
Unit 2

Unit 3

Unit 4

Unit 5

TEXTBOOKS:

2. David E. Simon – An Embedded Software Primer- Pearson Education Asia – 1999

REFERENCES:

1. Caroline Yao & Quing Li – Real Time Concepts for Embedded Systems
2. Kirk Zureli - C Programming for Embedded Systems
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Objective: To study basic concepts of database systems, relational and non-relational databases and graph databases.

Course Outcomes

CO1: To understand the concept of how NoSQL databases differ from relational databases from a practical perspective.

CO2: Master the basic concepts of designing NoSQL database management system.

CO3: Be familiar with selecting a particular NoSQL database for specific use cases.

CO4: Must be able to Identify what type of NoSQL database to implement based on business requirements

Unit 1:
Database Management System – introduction, history of database, management systems-characteristics of dbms, definition, objectives, merits and demerits, entity relationship model, concurrency control.

Environment systems – definition, designing databases, hierarchical data model, network data model

Unit 2:
RDBMS – relational data model, techniques & components of relational data model, definition of relational terms, features, 12 rules for a fully RDBMS.

Unit 3:
NOSQL Systems-Introduction to NoSQL, Disadvantages of NoSQL technology, NOSQL Systems, weakness of RDBMS, Key-value database-Key values database, More elements of key values database, Properties of Key-value store

Unit 4:
Columnar Databases - Characteristics of a columnar database, Concepts of columnar databases

Document databases with MongoDB - Implement a document database with MongoDB.

Unit 5:
Graph Databases - Graph databases, graph traversal and graph problems, graph data structures edge list, adjacency matrix, properties of graph model.

Implementation and systems - Reliable, maintainable and scalable, Different information systems
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**20CSA335**  **PATTERN RECOGNITION**  **3-0-0-3**

Course Outcomes

CO1: Understand the concept of a pattern and the basic approach to the development of pattern recognition and machine intelligence algorithms and applications of PR system.

CO2: Understand the basic methods of feature extraction, feature evaluation, analyse and relate research in the pattern recognition area.

CO3: Understand and apply both supervised and unsupervised classification methods to develop PR system in real-world data.

CO4: Apply pattern recognition techniques to real-world problems such as object detection and recognition.

CO5: Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.

CO6: Summarize, analyze, and relate research in the pattern recognition area verbally and in writing.

Introduction to Pattern Recognition- Tree Classifiers Getting our feet wet with real classifiers- Decision Trees: CART, C4.5, ID3- Random Forests-Bayesian Decision Theory Grounding our inquiry- Linear Discriminants Discriminative Classifiers: the Decision Boundary, Separability,
Perceptrons, support Vector Machines, Parametric Techniques

Generative Methods grounded in Bayesian Decision Theory, Maximum Likelihood Estimation - Bayesian Parameter Estimation.


Text Books


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Course Outcomes

CO1: To enable students to learn the fundamental concepts of a digital image processing and its working protocols.

CO2: To understand image enhancement techniques in spatial and frequency domain so as to devise algorithms or mathematical models for real time image enhancement problems.

CO3: To enable students implement algorithms for handling intensive image restoration problems.

CO4: Development of segmentation algorithms used to detect and extract the region of interest from images.

CO5: Interpretation and use of feature extraction and image representation techniques to carry out image labeling and automatic image understanding.

UNIT-1


UNIT-2


UNIT-3


UNIT-4


UNIT-5


TEXTBOOKS:

REFERENCES


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20CSA337 WIRELESS NETWORKS AND COMMUNICATIONS 3 0 0 3

Course Outcomes

CO1: Understand the working of a wireless system, basics of wireless communication, including the features and operation of protocols, antennas, and various propagation modes in wireless communication.

CO2: Explain the basic physical and technical settings of modulation techniques and features of analog and digital data including transmission methods.

CO3: To lay a basic foundation on IEEE wireless communication standards such as WLAN-802.11, Bluetooth, WiMax and satellite communication.

CO4: Understand the concept of Adhoc network and types of routing protocols supporting wireless communications and simulate protocols such as AODV, TORA, DSDV in NS2 or NS3.

CO5: Must be able to simulate or implement a real word wireless communication system.


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20CSA338 MULTIMEDIA AND GRAPHICS 3003

Course Outcomes

CO1: Understand the concept of multimedia terms such as multimedia, integration, interactive, HTML, and authoring and qualify the characteristics of multimedia: nonlinear versus linear content.

CO2: Describe several different environments in which multimedia might be used, and several different aspects of multimedia building blocks that provide a benefit over other forms of information presentation.
CO3: Utilization of different multimedia building blocks with all the features such as creation of text, image, digital audio and video with different types of format of each.

CO4: Describe the primary multimedia delivery methods—the Internet, wireless, CD-ROM, and DVD—as well as cite the history of multimedia and note important projected changes in the future of multimedia.

Unit 1

Unit 2
Making instant Multimedia – Multimedia Authoring tools.

Unit 3

Unit 4
MultiMedia Building Blocks: Animation – Video.

Unit 5

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Course Outcomes

CO1 To get introduced to the basic concepts of Bioinformatics and its importance in Biological data analysis.

CO2 Describe the history, scope and importance of nucleic acids and role of molecular biology in Bioinformatics.

CO3 Explain about the methods to characterize and manage the different types of Biological data and its applications.

CO4 Classify different types of Bioinformatics software’s.

CO5 Overview about biological macromolecular structures and structure prediction methods in Biocomputing, introduction to sequence alignments.

UNIT-1

UNIT-2

UNIT-3

UNIT-4

UNIT-5

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20CSA340 SOFT COMPUTING 3 0 0 3

Course Outcome

CO1: Describe and identify the strategies and functions of the soft computing in smart machines

CO2: Acknowledge the usefulness of a soft computing mechanism for a significant problem.

CO3: Address the advantages of various neural network architectures and their limitations.

CO4: Use fuzzy logic and thinking in order to address insecurity and to resolve problems of engineering and genetic algorithms to substitute issues of optimization.

CO5: Find out numerous methods for solving technical and real-world problems with these models.

Unit 1


Unit 2

FUZZY sets, properties, Membership functions Fuzzy operations, Applications.

Unit 3

Classification and Regression Trees - Data Clustering Algorithms - Rule based Structure identification.
Unit 4

Neuro-Fuzzy Systems.

Unit 5


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20CSA341 Advanced Operating System and Distributed Computing 3 0 0 3

Course Outcomes

CO1: Understanding the broad problem areas in Advanced Operating Systems.

CO2: Exposure to Virtualizing techniques.

CO3: Demonstrate understanding of different architectures used in Distributed OS and analyze their design issues.

CO4: To introduce fundamental principles of distributed systems, technical challenges and key design issues.
CO5: To impart knowledge of the distributed computing models and algorithms.

Unit 1

Overview of operating System, OS Structures - SPIN, Exokernel, L3 microkernel approach, Process and Threads, File and memory management, Disks, Microkernels.

Unit 2

Virtualization - Requirements For Virtualization, Type 1 and Type 2 Hypervisors, Techniques For Efficient Virtualization, Memory Virtualization, I/O Virtualization, Virtual Appliances, Virtual Machines on Multicore Cpus, Licensing Issues. Load Balancing.

Unit 3

Distributed Operating System – fundamentals, Distributed Objects and Middleware, Naming, Java RMI, Remote Procedure calls. Parallel Systems - Shared memory machines, Synchronization, Communication, Lightweight RPC, Scheduling, Shared memory multiprocessor OS, Mobile OS.

Unit 4


Unit 5

Distributed mutual exchange algorithms, Deadlock detection in distributed systems, checkpoint and rollback recovery, Distributed file servers; Distributed programming environments: Communication primitives.

Text books/Reference Books


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Course Outcomes

CO1: Understand approaches to syntax and semantics, fundamental mathematical models and algorithms in the field of NLP including hidden Markov models, Ngram Models and probabilistic models.

CO2: Devise solutions for a range of natural language components using existing algorithms, techniques and frameworks, including part-of-speech tagging, language modelling, parsing, context modelling and semantic role labelling.

CO3: To give an overview of the major technologies in speech recognition and synthesis including tools for acoustic analysis.

CO4: To evaluate the outcomes of various language processing and representation models.

CO5: To get exposed to hands-on experience of using NLP tools and apply existing statistical and deep learning techniques to language applications such as machine translation.

Unit 1

Unit 2

Unit 3

TEXTBOOK:


REFERENCES:

20CSA343 TEXT MINING AND ANALYTICS 3 0 0 3

Course Outcomes

CO1: Be familiar with the basic methods for information extraction and retrieval of textual data

CO2: Understand the concept of apply text processing techniques to prepare documents for statistical modelling

CO3: Must be able to evaluate the performance of machine learning models for textual data

CO4: Master the concept of machine learning models for analyzing textual data and correctly interpreting the results

Unit-1


Unit-2


Unit-3

Extracting Relations from Text: From Word Sequences to Dependency Paths:
Introduction, Subsequence Kernels for Relation Extraction, A Dependency-Path Kernel for Relation Extraction and Experimental Evaluation

Mining Diagnostic Text Reports by Learning to Annotate Knowledge Roles:
Introduction, Domain Knowledge and Knowledge Roles, Frame Semantics and Semantic Role Labeling, Learning to Annotate Cases with Knowledge Roles and Evaluations.

Unit -4
A Case Study in Natural Language Based Web Search:

Introduction, iSTART: Feedback Systems, iSTART: Evaluation of Feedback Systems

Unit-5
Textual Signatures: Identifying Text-Types Using Latent Semantic Analysis to Measure the Cohesion of Text Structures:
Introduction, Cohesion, Coh Metrix, Approaches to Analyzing Texts, Latent Semantic Analysis, Predictions, Results of Experiments.

Automatic Document Separation: A Combination of Probabilistic Classification and Finite-State Sequence Modeling:
Introduction, Related Work, Data Preparation, Document Separation as a Sequence Mapping Problem, Results.

Evolving Explanatory Novel Patterns for Semantically-Based Text Mining:
Related Work, A Semantically Guided Model for Effective Text Mining.

Text Books:

Reference Books:

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Course Outcomes

CO1: Understand the concepts of Business Intelligence & Data Warehouses and apply the principles of data warehouse modelling.

CO2: Must be able to construct frameworks of computerized decision support by using the concepts of data analytics and business intelligence (BI).

CO3: Understand the technologies and use tools that make up BI concepts like Data warehousing, Data reporting and use of Online analytical processing (OLAP)

CO4: Must be able to Identify the major ethical and legal issues of analytics.


TEXT BOOKS/ REFERENCES:


2. Jiawei Han, Micheline Kamber and Jian Pei, “Data mining concepts and Techniques”, Third Edition, Elsevier Publisher, 2006.


20CSA346 QUANTUM COMPUTING 3-0-0-3

Course Outcomes

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Introduction to Quantum Computation: Quantum bits, Bloch sphere representation of a qubit, multiple qubits.

Background Mathematics and Physics: Hilbert space, Probabilities and measurements, entanglement, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis.

Quantum Circuits: single qubit gates, multiple qubit gates, design of quantum circuits.


Noise and error correction: Graph states and codes, Quantum error correction, fault-tolerant computation

References


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20CSA347 VISUAL PROGRAMMING USING C# 3003


CO2: Must be able to program in C# and work on basic console applications.

CO3: Must be able to build Window applications with event handling and MDI features.

CO4: Understand the working ADO.Net model and design and implement a database application

CO5: Understand the working of file systems, file types, directories and building an interactive windows application.


String class: methods and properties of string class, enumerations, boxing and unboxing, OOPS concepts: Encapsulation, data hiding, inheritance, interfaces, polymorphism, operator overloading, overriding Methods, Static Class members, Delegates and events. Exception Handling, garbage collector, generics and collection

Basics of Windows Programming- Event Driven Programming, Windows Forms, Using common controls-Labels, textboxes, buttons, check boxes, radio button, progress bar, combo box, list box. Components-timer, image list, Menus, Modal and Modeless Dialog Boxes, MDI, Mouse and keyboard event handling.

Files: System.IO, directory and file types, Stream readers and stream writers, working with binary data.

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**20CSA348**

**DESIGN PATTERNS**

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**Course Outcomes**

CO1 Understand the appropriate roles of subtyping and inheritance, and use them effectively.

CO2 Identify the appropriate design patterns to solve object oriented design problems.

CO3 Develop design solutions using creational patterns.

CO4 Apply structural patterns to solve design problems.

CO5 Construct design solutions by using behavioral patterns.

**Unit 1**

Introduction to Design Patterns: Significance – Software Design and patterns – Model – View - Controller.

**Unit 2**

Observer Pattern - Decorator Pattern - Factory Pattern - Singleton Pattern - Command Pattern - Adapter and Facade Patterns - Template

Method Pattern - Iterator and Composite Patterns –

The State Pattern – The Proxy Pattern – Compound Patterns.

**Unit 3**


**TEXTBOOK:**

_Erich Freeman, Elisabeth Robson, Bert Bates and Kathy Sierra “Head First Design Patterns”, O’Reilly Media Inc., October 2004._

**REFERENCES:**
3. Mark Grand, “Patterns in Java – A Catalog of Reusable Patterns Illustrated with UML”, Wiley – Dream tech India, 2002

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