SRI VENKATESWARA UNIVERSITY
BACHELOR OF COMPUTER APPLICATIONS
SEMESTER IV
UNDER CBCS W.E.F. 2021-2022

Cyber Laws

Semester	Course Code	Course Title	Hours/Week	Hours	Credits
IV	C10	Cyber Laws	4	60	4

Course Objectives:

- Enable learners to understand, explore, and acquire a critical understanding of CyberLaw.
- Develop competencies for dealing with frauds and deceptions (confidence tricks, scams) and other cyber-crimes for example, child pornography etc. that are taking place via the Internet.
- Make learners conversant with the social and intellectual property issues emerging from 'Cyberspace'.
- Explore the legal and policy developments in various countries to regulate Cyberspace.
- Develop the understanding of relationship between commerce and cyberspace; and give learners in depth knowledge of Information Technology Act and legal frame work of Right to Privacy, Data Security and Data Protection.

Course Outcomes:

At the end of the course, students should be able to:
- Critically evaluate ongoing developments in law relating to information technologies.
- Display an understanding of how these developments relate to one another.
- Examine areas of doctrinal and political debate surrounding rules and theories;
- Evaluate those rules and theories in terms of internal coherence and practical outcomes.
- Draw on the analysis and evaluation contained in primary and secondary sources.

Syllabus

Unit I

Introduction: Computers and its Impact in Society, Overview of Computer and Web Technology, Need for Cyber Law, *Cyber Jurisprudence* at International and Indian Level.

Unit II

Cyber Law- International Perspectives: UN &International Telecommunication Union (ITU)Initiatives, Council of Europe -Budapest Convention on Cybercrime, Asia-Pacific Economic Cooperation(APEC), Organization for Economic Co-operation and Development(OECD), World Bank, Commonwealth of Nations.

Unit III

Constitutional& Human Rights Issues in Cyberspace: Freedom of Speech and Expression in Cyberspace, Right to Access Cyberspace – Access to Internet, Right to Privacy, Right to Data Protection.

Unit IV

Cyber Crimes& Legal Framework: Cyber Crimes against Individuals, Institution and State, Hacking,DigitalForgery,CyberStalking/Harassment,CyberPornography,IdentityTheft&Fraud , Cyber terrorism, Cyber Defamation, Different offences under IT Act,2000.

Unit V

Cyber Torts: Cyber Defamation, Different Types of Civil Wrong sunder the IT Act, 2000, Intellectual Property Issues in Cyber Space, Interface with Copyright Law, Interface with Patent Law, Trade marks &Domain Names Related issues

Reference Books

1. Chris Reed& John Angel, *Computer Law*, OUP, NewYork,(2007).
2. Justice Yatindra Singh, *Cyber Laws*, Universal Law Publishing Co, New Delhi, (2012).
3. VermaK,MittalRaman, *LegalDimensionsofCyberSpace*,IndianLawInstitute,NewD elhi,(2004)
4. JonthanRosenoer, *Cyber Law*, Springer, New York,(1997).
5. SudhirNaib,TheInformationTechnologyAct,2005:AHandbook,OUP,NewYork,(20 11)
6. S.R.Bhansali, *Information TechnologyAct,2000*, UniversityBookHousePvt.Ltd.,Jaipur (2003).

7. Vasu Deva, *Cyber Crimes and Law Enforcement*, Commonwealth Publishers, New Delhi,(2003).

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Cyber Laws Lab

Semester	Course Code	Course Title	Hours/Week	Hours	Credits
IV	C10-P	Cyber Laws Lab	2	30	1

Lab Experiments

1. Write a program for recovering deleted files from a hard disk.
2. Write a program for gathering evidence.
3. Write a program for viewing files of various formats.
4. Write a program for locating files needed for a forensics investigation.
5. Write a program for performing image and file conversions.
6. Write a program for handling evidence data.
7. Write a program for creating a disk image file of a hard disk partition.
8. Give at least ten cyber crime scenarios to students and make them analyse the scenario and submit report citing cyber laws which are violated.

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DATA MINING and WARE HOUSING

Semester	Course Code	Course Title	Hours/Week	Hours	Credits
IV	C11	DATA MINING and WARE HOUSING	4	60	4

Course Objectives:

- Be familiar with mathematical foundations of data mining tools.
- Understand and implement classical models and algorithms in data warehouses and data mining
- Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- Master data mining techniques in various applications like social, scientific and environmental context. Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Course Outcomes:

At the end of the course, the student will demonstrate the following. The students will be able to:
- Examine the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system.
- Apply preprocessing statistical methods for any given raw data
- Discover interesting patterns from large amounts of data to analyze and extract patterns to solve problems, make predictions of outcomes
- Comprehend the roles that data mining plays in various fields and manipulate different data mining techniques
- Select and apply proper data mining algorithms to build analytical applications.
- Evaluate and implement a wide range of emerging and newly-adopted methodologies and technologies to facilitate the knowledge discovery.

<u>Syllabus</u>

Unit I

Introduction: Data Mining and Importance, Relational Databases, Data Warehouses, Transactional Databases. Data Mining Functionalities, Kinds of Patterns.

Data Preprocessing: Why Preprocess the Data?, *Descriptive Data Summarization*: Measuring the Central Tendency, Measuring the Dispersion of Data, Data Cleaning, Data Integration and Transformation, Data Reduction.

Unit II

Data Warehouse and OLAP Technology: An Overview, What Is a Data Warehouse? , A Multidimensional Data Model, From Tables and Spreadsheets to Data Cubes, Stars, Snowflakes, and Fact Constellations: Schemas for Multidimensional databases, Examples, Measures: Their Categorization and Computation, Concept Hierarchies, OLAP Operations in the Multidimensional Data Model.

Data Warehouse Architecture: Steps for the Design and Construction of Data Warehouses, A Three- Tier Data Warehouse Architecture, Data Warehouse Back-End Tools and Utilities. Data Warehouse Implementation.

Unit III

Mining Frequent Patterns, Associations, and Correlations: Basic Concepts, Mining Methods: The Apriori Algorithm: Finding Frequent Itemsets Using Candidate Generation, Generating Association Rules from Frequent Itemsets,

Improving the Efficiency of Apriori, Mining Frequent Itemsets without Candidate Generation. Mining various kinds of Association Rules: Mining Multilevel Association Rules, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses.

Unit IV

Classification and Prediction: Classification, Prediction, Regarding Classification and Prediction, Decision Tree Induction, Attribute Selection Measures. *Bayesian Classification***:** Naïve Bayesian Classification

Rule-Based Classification: Using IF-THEN Rules for Classification, Rule Extraction from a Decision Tree, Rule Induction Using a Sequential Covering Algorithm.

Unit V

Cluster Analysis: Cluster Analysis, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods.
Hierarchical Methods: Agglomerative and Divisive Hierarchical Clustering, Density-Based Methods, Outlier Analysis.

Prescribed Text Book:

1. Data Mining: Concepts and Techniques Second Edition Jiawei Han University of Illinois at Urbana-Champaign Micheline Kamber

References:

1. Data Mining by VikramPudi, P. Radha Krishna, Oxford UniversalPress
2. Data Warehousing by ReemaThareja, Oxford UniversityPress
3. J. Han, M. Kamber and J. Pei, Data Mining: Concepts and Techniques, 3rd.Edition Morgan Kaufmann,2011
4. Introduction to data mining –G. K. Gupta,PHI
5. Data mining, Data warehouse &Olap-Berson, Tata McGrawHill

Student Activity:

1. Predict the course taken by a student based on his activities and way of learning
2. Learn visual patterns of any real time data

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DATA MINING and WARE HOUSING Lab

Semester	Course Code	Course Title	Hours/Week	Hours	Credits
IV	C11-P	DATA MINING and WARE HOUSING Lab	2	30	1

List of Experiments

1. Demonstration of preprocessing on datasetstudent.arff.
2. Demonstration of preprocessing on datasetlabor.arff.
3. Demonstration of Association rule process on dataset contactlenses.arff using Apriori algorithm.
4. Demonstration of Association rule process on dataset test.arff using Apriori algorithm.
5. Demonstration of classification rule process on dataset student.arff using j48algorithm.
6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm.
7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm.
8. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm.
9. Demonstration of clustering rule process on dataset iris.arff using simple k-means.
10. Demonstration of clustering rule process on dataset student.arff using simple k-means.

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Web Programming

Semester	Course Code	Course Title	Hours/Week	Hours	Credits
IV	C12	Web Programming	4	60	4

Course Objectives:

- To learn about the Building Blocks of PHP, Arrays.
- To learn about PHP functions and file handling.
- To learn about working with Forms, Sessions, Cookies.
- To learn about Java Script basics.

Course Outcomes:

- Able to use Building Blocks of PHP, Access array elements.
- Able to use various functions and handle data using files..
- Able to use working with Forms, Sessions, Cookies.
- Able to implement JavaScript.

Syllabus

Unit-I: Basics of HTML & Java Script
Basic structure of an HTML document, HTML Tags, Lists, Tables and Frames, Forms and controls
Java Script: Introduction – Basic commands – Variables – Operators – Control structures – Arrays - Window and document object – Forms and form elements – String, math and dates – multiple windows.

Unit-II: Basics of PHP
Introduction to PHP, Identifiers, Variables, Constants, Data Types, Operators, Conditional Statements, PHP Loops.
Working with Arrays: Arrays, Creating Arrays, some Array-Related Functions. Working with Objects: Creating Objects, Object Instance. Working with Strings, Dates and Time: Formatting Strings with PHP), Investigating Strings with PHP , Manipulating Strings with PHP, Using Date and Time Functions in PHP.

Unit-III: Advanced PHP

Functions, Advantages of Using functions, Types of functions, creating and invoking functions, returning values, recursive functions

Object Oriented Concepts, File handling and Data Storage: creating, open/close a file, file operations: read, write, append. File truncate, file uploading, EOF in PHP.

Unit-IV: Working with Forms in PHP

Creating Forms, Accessing Form - Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user.

PHP with MySQL: Creating Database in MySQL, Connecting to MYSQL, Reading and Writing form data from MYSQL

Unit-V: Working with Cookies and User Sessions:

Introducing Cookies, Setting a Cookie with PHP, Session Function Overview, Starting a Session, Working with session variables, passing session IDs in the Query String, Destroying Sessions and Unsettling Variables, Using Sessions in an Environment with Registered Users.

References:
1. FUNDAMENTALS OF OPEN SOURCE SOFTWARE, MN RAO, PHI,2015.
2. Julie C. Meloni, PHP MySQL and Apache, SAMS Teach Yourself, Pearson Education (2007).
3. Web Technologies, A. a. Puntambekar, 2013, Technical Publications

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Web Programming Lab

Semester	Course Code	Course Title	Hours/Week	Hours	Credits
IV	C12-P	Web Programming Lab	2	30	1

Lab experiments

1. Create a basic student registration form and add validations using JavaScript
2. Create a PHP program to find odd or even number from given number.
3. Write a PHP program to find maximum of three numbers.
4. Demonstrating while loop in PHP for accessing array elements.
5. Demonstrating for each loop in PHP.
6. Write a PHP program to demonstrate various string functions.
7. Write a PHP program to demonstrate Date and Time functions.
8. Write a PHP program to perform read and write operations on a file.
9. Creating user login form in PHP with MYSQL.
10. Demonstrating File Uploads.
11. Demonstrating Working with Cookies.
12. Demonstrating User Sessions.

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Semester IV

DATA COMMUNICATIONS & NETWORKING

Semester	Course Code	Course Title	Hours/Week	Hours	Credits
IV	C13	Data Communications & Networking	4	60	4

Course Objectives:

This course will enable the students to

1. Appreciate the use of computer networking in various walks of life, describe the types of networks, network configurations and network topologies. Also Write the OSI and TCP/IP reference models for networking.
2. Explain responsibilities of data link layer, its implementation and associated protocols, algorithms/pseudo codes.
3. Explain the various techniques used to access a shared channel in the network and IEEE specifications for LANs.
4. List types of networking devices, backbone networks and Internet Protocol (IP) addressing.
5. Explain the responsibilities of network, transport and application layers.

Course Outcomes:

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

1. Define computer networks, list network configurations, types, topologies, the applications of computer networks in different fields, network models and description of physical layer.

2. Reason the need for flow and error control at the data link layer and explain the associated protocols.
3. Enumerate the shared channel access methods, associated protocols and Wired & Wireless LAN standards and implementations.
4. List the types of networking devices / equipments and also explain the addressing scheme used at the network layer.
5. Explain how network layer, transport layer and application layer facilitates the transfer of message from one node to another in a global network

UNIT - I

Introduction toData communications, Network Criteria, point-to-point and multi point connection, physical topology, Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Wireless Networks, protocols and standards.

Network Models: Layered tasks, Connection-Oriented and Connectionless Services, Service Primitives, The OSI Reference Model, The TCP/IP Reference Model, Comparison of the OSI and TCP/IP Reference Models, addressing.

UNIT – II

Physical Layer: Basis for Data Communication: Transmission of digital signals: Bit rate, bit length, baseband and broadband transmission, transmission impairment, data rate limits, performance, Guided Transmission Media Twisted Pair Coaxial Cable and Fiber Optics

Data Link Layer: Framing, Error Control, Flow Control, Error-Detection and correction: Introduction, Error detection using CRC. Data Link Protocols: Simplest Protocol, Stop-and-Wait Protocol, Stop-and-Wait ARQ, GoBack-N ARQ, Selective Repeat ARQ, HDLC.

UNIT – III

Multiple Accesses. Random Access: ALOHA, Carrier Sense Multiple Access (CSMA) Protocols, CSMA with Collision Detection, CSMA with Collision Avoidance.

Controlled Access: Reservation, Polling and Token Passing. Channelization: FDMA, TDMA, CDMA.

Wired LAN: Ethernet, IEEE standards, Standard Ethernet.Changes in the standards, Fast Ethernet, Gigabit Ethernet, **Wireless LAN (802.11).**

UNIT - IV

Connecting LANs, Backbone and Virtual LANs: Connecting devices, Back bone Networks, Virtual LANs. Network Layer: Need for network layer, Logical addressing, Ipv4 addresses, Ipv6 addresses, Ipv4 and Ipv6 datagrams, Transition from Ipv4 to Ipv6.

Network Layer: Delivery, Forwarding, Types of Routing protocols, Unicast Routing Protocols, The **Transport Layer**: Process to process Delivery, User Datagram Protocol (UDP) and TCP. **Application layer:** Domain name space, Distribution of name space, Resolution.

Text Books:

1. Data communications and Networking-4th edition BeharouzA.Forouzan, TMH

Reference Books:

1. Data Communications and Computer Networks By Prakash C. Gupta, PHI Publishers.
2. Computer Networks By Andrew S.Tanenbaum, Pearson Education.
3. Wireless Technologies Circuits, Systems and Devices by Krzysztof Iniewski CRC Press.
4. Wireless Networking Technology: From Principles to Successful Implementationby Stephen A. Rackley.

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DATA COMMUNICATIONS AND NETWORKING LAB

Semester	Course Code	Course Title	Hours/Week	Hours	Credits
IV	C13-P	Data Communications and Networking Lab	2	30	1

List of Experiments
1) Study of different types of Network cables
2) Study of various Network connecting devices
3) Configure Host IP, Subnet Mask and Default Gateway in a System in LAN (TCP/IP Configuration)
4) Configure Internet connection and use IPCONFIG, PING / Tracer and Net stat utilities to debug the network issues.
5) Study of basic network command and Network configuration commands
6) Implementation of character stuffing and destuffing
7) Implementation of parity checker
8) Implementation of CRC
9) Implementation of checksum.
10) Implementation of shortest path protocol
11) Implementation of string encryption and decryption
12) To find out details of network from IP addressing scheme using 'C' code

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DATA ANALYTICS USING R

Semester	Course Code	Course Title	Hours/Week	Hours	Credits
IV	C14	DATA ANALYTICS USING R	4	60	4

Course Objectives:

This course will cover all the fundamental algorithms and techniques used in Data Analytics and provide exposure to theory as well as practical knowledge through R used in data analytics.

After completing the course, student will learn,

- Fundamental basics of statistics used in analysing the data
- How to find the pattern in the given dataset
- How to interpret the data graphically
- How to apply different types of algorithms for the given dataset

Course Outcomes:

- Data-Visualization tools and techniques offer executives and other knowledge workers new approaches to dramatically improve their ability to grasp information hiding in their data.
- Data visualization is a general term that describes any effort to help people understand the significance of data by placing it in a visual context.
- Patterns, trends and correlations that might go undetected in text-based data can be exposed and recognized easier with data visualization software.
- It isn't just the attraction of the huge range of statistical analyses afforded by R that attracts data people to R. The language has also developed a rich ecosystem of charts, plots and visualizations over the years.
- ggplot2 is a data visualization package for the statistical programming language R.

<u>Syllabus</u>

Unit I Introduction:

Introducing to R Data Structures –Help functions in R –Vectors –Scalars –Declarations – recycling –Common Vector operations –Using all and any –Vectorized operations –NA and NULL values –Filtering – Vectorised if-then else –Vector Equality –Vector Element names
Matrices, Arrays and Lists: Creating matrices –Matrix operations –Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns –Vector/Matrix Distinction –Avoiding Dimension Reduction –Higher Dimensional arrays –lists –Creating lists –General list operations – Accessing list components and values –applying functions to lists –recursive lists

Unit II Data Frames & Packages in R

Creating Data Frames –Matrix-like operations in frames –Merging Data Frames –Applying functions to Data frames –Factors and Tables –factors and levels –Common functions used with factors – Working with tables -Other factors and table related functions -Control statements – Arithmetic and Boolean operators and values –Default values for arguments -Returning Boolean values

Packages : Tidyr, ggplot2, ggraph, dplyr, tidyquant, dygraphs

Unit III: Introduction to Data analytics:

Overview of Bigdata, Need of Data Analytics, Applications of Data Analytics, Datasets, tools for data analytics
Basic Statistics: Mean, Median, Standard Deviation, Variance, Correlation, Covariance

Basic Analysis Techniques: Chi-Square Test, t-Test, Analysis of Variance, Corrleation Analysis

Unit IV: Data Analysis Techniques

Linear Regression, Logistic Regression, Classification Techniques, Clustering Techniques, Ensemble model.

Unit V: Data Visualization Using R

Data Visualization, Libraries used for Data Visualization in R, Bar chart, Histogram, Heatmap, Scatter plot, Box Plot, Correlogram, Area Chart

Text Book:

1. Data Analytics using R, McGrawHill Publications,Seema Acharya
2. R for Data Science: Import, Tidy, Transform, Visualize, and Model DatabyHadley Wickham ,O'Reilly
3. Rumset D. J. (2010): Statistical Essentials for Dummies. Hoboken: Wiley Publishing

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DATA ANALYTICS USING R LAB

Semester	Course Code	Course Title	Hours/Week	Hours	Credits
IV	C14-P	DATA ANALYTICS USING R LAB	2	30	1

List of Experiments

1. R DataFrame: Create, Append, Select, Subset, Merging of dataframes
2. Exporting data to Excel, CSV,SAS, TextFile
3. Handling datasets
4. Mean, Median, Standard Deviation, Variance, Correlation, Covariance in R
5. Correlation in R:Pearson & Spearman with Matrix Example
6. T Test in R
7. Chi-Square Test in R
8. Prediction using linear regression and visualizing the regression graphically
9. Prediction using logistic regression and visualizing the regression graphically
10. Classification algorithms in R
11. Clustering algorithms in R
12. Scatter Plot in R using ggplot2
13. Boxplot in R
14. Barchart& Histogram in R

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Object Oriented Software Engineering

Semester	Course Code	Course Title	Hours/Week	Hours	Credits
IV	C15	Object Oriented Software Engineering	4	60	4

Course Objective

- To develop background knowledge as well as core expertise in object oriented system.
- To provide the importance of the software design process.
- To assess the unified process and Unified Modeling Language

Course Outcomes

- To describe the three pillars of object-orientation methodologies and explain the benefits of each.
- To create use case documents that capture requirements for a software system.
- To create class diagrams that model both the domain model and design model of a software system.
- To create interaction diagrams that models the dynamic aspects of a software system.
- To understand the facets of the Unified Process approach to designing and building a software system.
- To build a model for the user interface (UI) of a software application

Unit –I

Software Engineering: Software engineering process paradigms, Process Models – Waterfall Model, Iterative Model, RAD Model, Prototype Model. Requirement Analysis, Analysis Model.

UNIT II

Introduction to OOAD – What is OOAD? – What is UML? What are the United process(UP) phases - Inception -Use case Modeling - Relating Use cases – include, extend and generalization.

UNIT III

Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.

Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT IV

Basic Behavioral Modeling-I: Interactions, Interaction diagrams, Activity Diagrams. UML state diagrams and modeling, UML deployment and component diagrams

UNIT V

Object Oriented Testing: Overview of Testing, object oriented Testing, Types of Testing, Object oriented Testing strategies, Test case design for OO software.

REFERENCE BOOKS:
1. Object Oriented Analysis and Design By GradyBooch.
2. Craig Larman,"Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development", Third Edition, Pearson Education,2005
3. Mike O'Docherty, "Object-Oriented Analysis & Design: Understanding SystemDevelopment with UML 2.0", John Wiley & Sons,2005.
4. James W- Cooper, Addison-Wesley, "Java Design Patterns – A Tutorial",2000.
5. Micheal Blaha, James Rambaugh, "Object-Oriented Modeling and Design withUML", Second Edition, Prentice Hall of India Private Limited,2007
6. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides,"Design patterns: Elements of Reusable object-oriented software", Addison-Wesley,1995.

Student Activity:
1. Develop a class diagram for the flight services available in your nearby airport
2. Develop a sequence diagram of activities of any automated device

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OBJECT ORIENTED SOFTWARE ENGINEERING LAB

Semester	Course Code	Course Title	Hours/Week	Hours	Credits
IV	C15-P	Object Oriented Software Engineering Lab	2	30	1

List of Experiments

Case Studies:

Design Following Systems in Object Oriented Approach using UML with open source tools (Eclipse UML2 or any other Open source tools):

1. Online Examination System.
2 Online Railway Reservation.
3 Library Maintenance System.
4 Any E-Commerce Portal.
5 Biometric Attendance System.

Note: Student is expected to analyze the system in object oriented manner and design the system in object oriented approach using UML with open source tools