

SGRR UNIVERSITY

**Brochure of Value-Added Courses
School of Computer Application &
Information Technology
2022-2023**

ABOUT THE UNIVERSITY

Shri Guru Ram Rai University was established by a religious and philanthropic leader, Shri Mahant Devendra Dass Ji Maharaj in the year 2017. It is situated in the heart of city, Uttarakhand. We are extremely privileged to extend the values and ethos of the Shri Guru Ram Rai Education mission through SGRR University to impart quality education and in successfully placing more than 80% students in various companies across the globe. SGRR University has humongous campus spread over 80 acres of land. Its state-of-art facilities give opportunities to develop leadership skills and to achieve professional excellence. It has 8500+ students from different countries, 29 states and Union Territories and providing cultural melange and global exposure to our students. One of the biggest boosts from University is its unmatched experience of 67 years of in delivering quality education that helps to develop confidence and will give you more knowledge, industry exposure, building good networking and high self-esteem. This will change your overall personality and develop you into a complete professional to face any challenge.

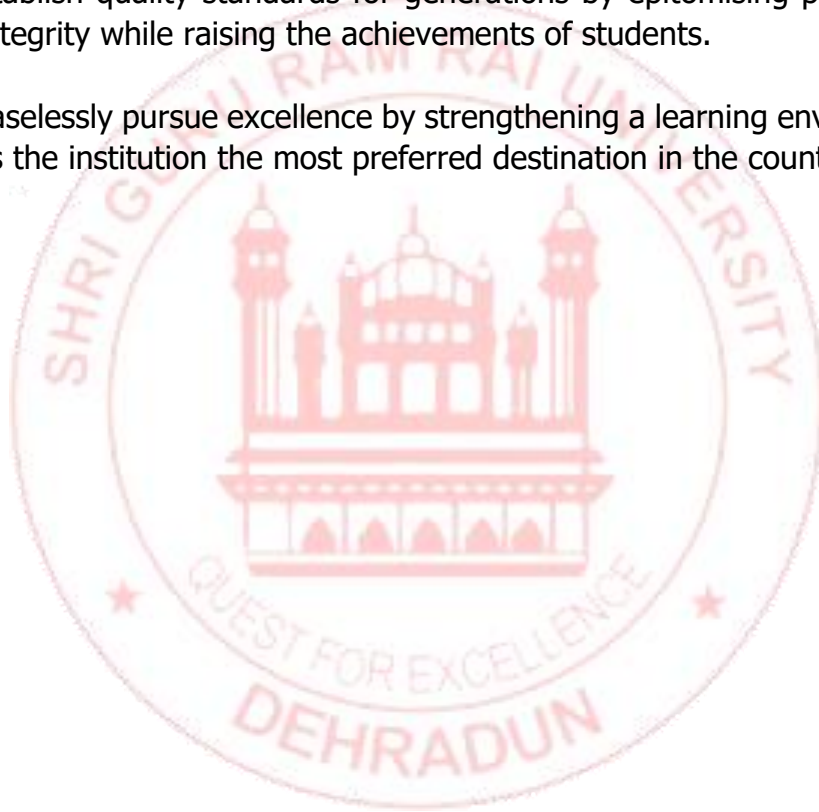
Vision

“To establish Sri Guru Ram Rai University to be a Center of Excellence in higher education, innovation and social transformation by nurturing inquisitive and creative minds and by enabling the stakeholders to become committed professionals and educators of national and global relevance.”

Mission

- ❖ To provide a comprehensive and sustainable educational experience that fosters the spirit of enquiry, scientific thinking and professional competence along with ethical and spiritual values
- ❖ To deliver a classic, well rounded learning experience that is distinctive and impactful on the young generation preparing them for a successful career
- ❖ To engage, inspire and challenge the stakeholders to become leaders with ethics and positive contributors to their chosen field and humane citizens
- ❖ To attract, train and retrain qualified staff to work efficiently to bring forth the maximum resource potential

- ❖ To develop committed and responsible professionals who work for the welfare of the society by providing innovative and efficient solutions and creating long term relationship with the stakeholders
- ❖ To create a sustainable career, by collaborating with stakeholders and participating in community partnership for life and livelihood in the local society in a responsive and dynamic way
- ❖ To make our students globally competent by introducing specialized training leading to professional capabilities and developing diverse skills in them for competitive advantage.
- ❖ To establish quality standards for generations by epitomising professionalism and integrity while raising the achievements of students.
- ❖ To ceaselessly pursue excellence by strengthening a learning environment that makes the institution the most preferred destination in the country.



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INTRODUCTION

The ever-changing global scenario makes the world more modest and needs high levels of lateral thinking and the spirit of entrepreneurship to cope up with the emergent challenges. Many a times, the defined skill sets that are being imparted to students today with Programme Specific Objectives in educational institutions become redundant sooner or later due to rapid technological advancements. No university curriculum can adequately cover all areas of importance or relevance. It is important for higher education institutions to supplement the curriculum to make students better prepared to meet industry demands as well as develop their own interests and aptitudes.

Objectives The main objectives of the Value-Added Course are:

- ✓ To provide students an understanding of the expectations of industry.
- ✓ To improve employability skills of students.
- ✓ To bridge the skill gaps and make students industry ready.
- ✓ To provide an opportunity to students to develop inter-disciplinary skills.
- ✓ To mould students as job providers rather than job seekers.

Course Designing The department interested in designing a Value Added Course should undertake Training Need Analysis, discuss with the generic employers, alumni and industrial experts to identify the gaps and emerging trends before designing the syllabus.

Conduction of value added courses :

Value Added Course is not mandatory to qualify for any programme and the credits earned through the Value-Added Courses shall be over and above the total credit requirement prescribed in the curriculum for the award of the degree. It is a teacher assisted learning course open to all students without any additional fee.

Classes for a VAC are conducted during the RESERVED Time Slot in a week or beyond the regular class hours The value-added courses may be also conducted during weekends / vacation period. A student will be permitted to register only one Value Added Course in a Semester.

student will be encouraged to opt for the VAC offered by his/her parent Department/Faculty. Industry Experts / Eminent Academicians from other Institutes are eligible to offer the value-added course. The course can be offered only if there are at least 5 students opting for it. The students may be allowed to take value added courses offered by other departments after obtaining permission from Dean offering the course. The duration of value added course is 30 hours with a combination 18 hours (60%) of theory and 12 hours (40%) of practical. However, the combination of

theory and practical shall be decided by the course teacher with the approval of the Dean

GUIDELINES FOR CONDUCTING VALUE ADDED COURSES

- ❖ Value Added Course is not mandatory to qualify for any program.
- ❖ It is an instructor supported learning course open to all students without any added fee.
- ❖ Classes for VAC will be conducted during the **RESERVED** Time Slot in a week or beyond the regular class hours.
- ❖ The value-added courses may be also conducted during weekends / vacation period.
- ❖ A student will be permitted to register only one Value Added Course in a Semester.
- ❖ Students may be permitted to enrol in value-added courses offered by other departments/ Schools after obtaining permission from the Department's Head offering the course.

DURATION AND VENUE

- ❖ The duration of value-added course should not be less than 30 hours.
- ❖ The Dean of the respective School shall provide class room/s based on the number of students/batches.
- ❖ VAC shall be conducted in the respective School itself.

REGISTRATION PROCEDURE

The list of Value-Added Courses, along with the syllabus, will be available on the University Website. A student must register for a Value-Added Course offered during the semester by completing and submitting the registration form. The Department Head shall segregate according to the option chosen and send it to the Dean of the school offering the specific Value-Added Courses.

- ❖ Each faculty member in charge of a course is responsible for maintaining Attendance and Assessment Records for candidates who have registered for the course.
- ❖ The Record must include information about the students' attendance and Assignments, seminars, and other activities that were carried out.
- ❖ The record shall be signed by the Course Instructor and the Head of the Department at the end of the semester and kept in safe custody for future verification.
- ❖ Each student must have a minimum of 75% attendance in all courses for the semester in order to be eligible to take certificate.

- ❖ Attendance requirements may be relaxed by up to 10% for valid reasons such as illness, representing the University in extracurricular activities, and participation in NCC.
- ❖ The students who have successfully completed the Value Added Course shall be issued with a Certificate duly signed by the Authorized signatories.



Digital Image Processing

Course Outcomes:

- Understand the principles of digital image processing and its applications.
- Analyze and enhance images using various image processing techniques.
- Apply mathematical and statistical techniques to analyze images.
- Design and implement image processing algorithms using programming languages.
- Evaluate the performance of image processing algorithms and compare their effectiveness.
- Use image processing tools and libraries for various applications.

Course Content:

Module I: Introduction to Digital Image Processing

Overview of Digital Image Processing, Components of an Image Processing System, Applications of Digital Image Processing.

Module II: Digital Image Fundamentals

Elements of Visual Perception, Sampling and Quantization, Pixel Relationships, Color Models

Module III: Image Enhancement in the Spatial Domain

Gray Level Transformations, Histogram Processing, Point Processing, Spatial Filtering

Module IV: Image Enhancement in the Frequency Domain

Fourier Transform, Discrete Fourier Transform, Filtering in the Frequency Domain, Image Smoothing and Sharpening

Module V: Image Restoration

Image Degradation Model, Noise Models, Restoration in the Presence of Noise, Linear Filters for Restoration

Module VI: Colour Image Processing

Color Models and Color Image Processing, Color Transformations, Color Image Enhancement, Color Image Segmentation

Module VII: Image Compression

Fundamentals of Image Compression, Lossless Compression Techniques, Lossy Compression Techniques, Image Compression Standards

Module VIII: Image Segmentation

Thresholding Techniques, Edge-Based Segmentation, Region-Based Segmentation, Clustering-Based Segmentation

Module IX: Object Recognition

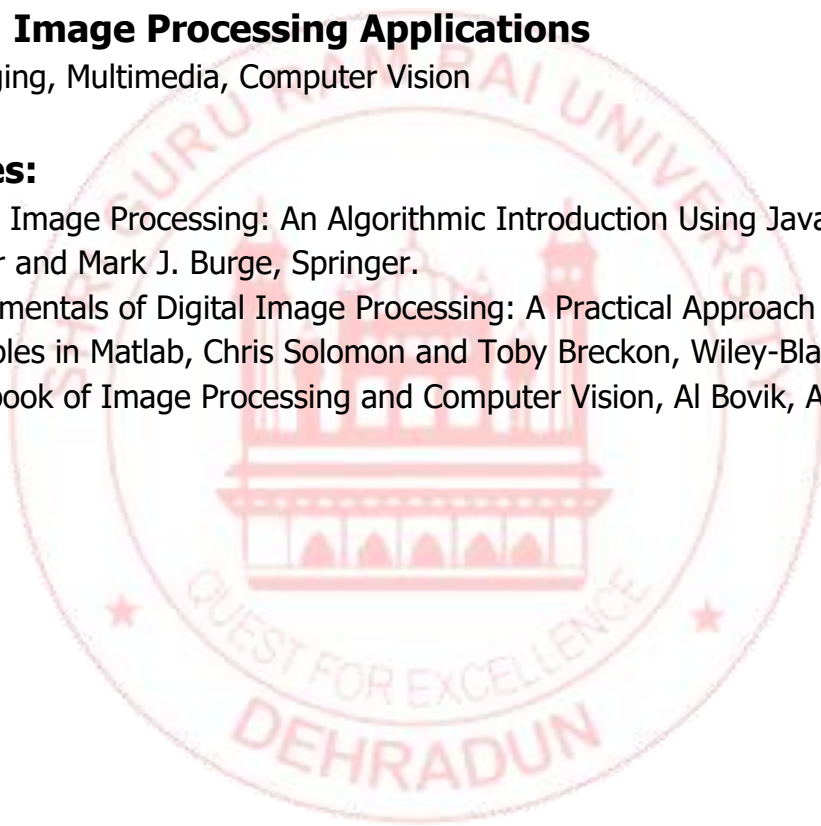
Recognition Based on Decision-Theoretic Methods, Structural Methods, Template Matching, Neural Networks

Module X: Image Processing Applications

Medical Imaging, Multimedia, Computer Vision

References:

- Digital Image Processing: An Algorithmic Introduction Using Java, Wilhelm Burger and Mark J. Burge, Springer.
- Fundamentals of Digital Image Processing: A Practical Approach with Examples in Matlab, Chris Solomon and Toby Breckon, Wiley-Blackwell.
- Handbook of Image Processing and Computer Vision, AI Bovik, Academic Press.



Search Engine Optimization (SEO)

Course Outcomes:

- Understand the principles and importance of SEO
- Conduct keyword research and identify relevant keywords for a website
- Optimize website content for search engines
- Analyze website performance using SEO tools
- Understand the role of link building in SEO
- Measure the effectiveness of SEO campaigns
- Develop a comprehensive SEO strategy for a website

Course Content:

Module I : Introduction to SEO

What is SEO?, Why is SEO important?, Types of SEO

Module II: Keyword Research

Understanding search intent, Keyword research tools, Analyzing keyword competition

Module III: On-page Optimization

Title tags, meta descriptions, and header tags, Content optimization, Image optimization URL optimization, Internal linking

Module IV: Technical SEO

Site structure and navigation, Page speed optimization, Mobile optimization, Schema markup

Module V: Off-page Optimization

Link building, Social media optimization, Local SEO

Module VI: Measuring SEO Performance

Google Analytics, Google Search Console, SEO reporting

Module VII: Developing an SEO Strategy

Setting goals and objectives, Conducting a website audit, Competitive analysis. Creating an SEO roadmap

References:

- "Search Engine Optimization For Dummies" by Peter Kent
- "The Art of SEO" by Eric Enge, Stephan Spencer, and Jessie Stricchiola
- "Search Engine Optimization All-in-One For Dummies" by Bruce Clay
- "Content Marketing Strategies For Dummies" by Stephanie Diamond
- "Social Media Marketing All-in-One For Dummies" by Jan Zimmerman and Deborah Ng



The Art of Clean Code

Course Outcomes:

- Understand the principles of clean code and its significance in software development.
- Apply coding standards and best practices for writing readable and maintainable code.
- Implement design patterns to enhance code structure and flexibility.
- Develop effective unit tests using Test-Driven Development (TDD) principles.
- Evaluate and optimize code performance to identify and resolve bottlenecks.

Course Content:

Module I: Introduction to Clean Code and Coding Standards

Definition and significance of clean code, The impact of clean code on software development

Code readability and maintainability, Naming conventions and meaningful identifiers, Formatting and indentation, Comments and documentation

Module II: Design Principles and Design Patterns

SOLID principles, DRY (Don't Repeat Yourself) principle, KISS (Keep It Simple, Stupid) principle, Introduction to design patterns, Creational, Structural, and Behavioral patterns, Applying design patterns to real-world problems

Module III: Unit Testing and Test-Driven Development (TDD)

Importance of testing in clean code development, Writing effective unit tests, Test-Driven Development (TDD) methodology

Module IV: Debugging, Error Handling, and Performance Optimization

Techniques for effective debugging, Proper error handling and exception management, identifying performance bottlenecks, Techniques for optimizing code performance

References:

- Clean Architecture: A Craftsman's Guide to Software Structure and Design by Robert C. Martin
- Code Complete: A Practical Handbook of Software Construction by Steve McConnell

DIGITAL EMPOWERMENT

Course Outcomes:

- Understand the principles and importance of Digital Empowerment
- Create awareness about Digital India.
- Use ICT and digital services in daily life.
- Develop skills to communicate and collaborate in cyberspace using social platforms, teaching/learning tools.
- Understand the significance of security and privacy in the digital world.
- Evaluate ethical issues in the cyber world module

Course Content:

Module I: Digital inclusion and Digital Empowerment

- Needs and challenges
- Vision of Digital India: DigiLocker, E-Hospitals, e-Pathshala, BHIM, e-Kranti (Electronic Delivery of Services}, e-Health Campaigns
- Public utility portals of Govt. of India such as RTI, Health, Finance, Income Tax filing, Education

Module II: Communication and Collaboration in the Cyberspace

- Electronic Communication: electronic mail, blogs, social media
- Collaborative Digital platforms
- Tools/platforms for online learning
- Collaboration using file sharing, messaging, video conferencing

Module III: Towards Safe and Secure Cyberspace

- Online security and privacy
- Threats in the digital world: Data breach and Cyber Attacks
- Blockchain Technology
- Security Initiatives by the Govt of India

Module IV: Ethical Issues in Digital World

- Netiquettes
- Ethics in digital communication
- Ethics in Cyberspac

References:

- Rodney Jones and Christoph Hafner. "Understanding digital literacies: A practical

- Introduction". Routledge Books, 2nd edition, 2021
- <https://www.digitalindia.gov.in>
- <https://www.digilocker.gov.in>
- <https://www.cybercrime.gov.in>
- <https://www.cybersafeindia.in>
- <https://www.meity.gov.in/cyber-sura-ksh-it-bharat-program>



Database Administration

Course Outcomes:

- Understand Database and Database Administration
- Understand Tablespace and storage management
- Create and Manage databases
- Manage backup and recovery

Course Content:

Module I:

DBA Roles and Responsibilities; Database Architecture; ORACLE logical and physical database structure; Memory and Process Structure, SQLPLUS Overview, creating a database.

Module II:

Working with Tablespaces and Data Files, Creating and adding tablespace and datafiles, Managing Control Files, Online Redo Logs and Archive logs; Multiplexing

Module III:

Working with Tables and Constraints; Working with Indexes, Views, Synonyms, and Sequences; Partitioning and Materialized Views, Introduction of PLSQL, Stored Procedure, Functions, Trigger, package

Module III:

Backup and Recovery Overview, Database backup, restoration and recovery, defining a backup and recovery strategy, Backup and Recovery options; Data Dump; User-Managed Backup and Recovery; Configuring RMAN; RMAN Backups, Restore and Recovery; High Availability Features; Oracle Data Guard; Flashback operations, Database Security

References:

- "Database Administration: The Complete Guide to DBA Practices and Procedures 2nd Edition by Craig S Mullins
- "Database Management Systems" by Raghu Ramakrishnan and Johannes Gehrke
- "Database System Concepts" by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan
- "A Guide to the SQL Standard" by C.J. Date and Hugh Darwen

GREEN COMPUTING

Course Code: VACCAIT008

Course Outcomes:

- To understand what Green Computing is and how it can help improve environmental Sustainability.
- To understand the principles and practices of Green Computing.
- To understand how Green Computing is adopted or deployed in enterprises. Understand the significance of security and privacy in the digital world.
- Analyze a given problem and develop an algorithm to solve the problem
- Improve upon a solution to a problem

Course Content:

Module I: FUNDAMENTALS

Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

Module II: GREEN ASSETS AND MODELING

Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

Module III: GRID FRAMEWORK

Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

Module IV: GREEN COMPLIANCE

Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.

Module V: CASE STUDIES

The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

References:

- Green Computing With Emerging Memory by Takayuki Kawahara (Editor), Hiroyuki Mizuno (Editor)
- Introduction To Green Computing by Salahudin S. Sajan
- Green Computing And Predictive Analytics For Healthcare by taylorfrancis



Chat GPT for Beginners

Course Code: VACCAIT009

Course Outcomes:

- Understand the fundamentals of natural language processing (NLP).
- Explore the architecture and working principles of Chat GPT.
- Learn how to integrate Chat GPT into applications.
- Develop basic conversational agents using Chat GPT.
- Gain insights into ethical considerations and best practices in chatbot development.

Course Content:

Module I: Foundations of Natural Language Processing (NLP) and Introduction to Chatbot Technology

Overview of NLP and its significance, Key components: Tokenization, Part-of-Speech tagging, Named Entity Recognition, Applications of NLP in various industries; Introduction to Chatbot Technology: Evolution of chatbots, Types of chatbots: rule-based vs. machine learning-based, Use cases and applications of chatbots

Module II: Understanding Chat GPT

Overview of GPT Architecture: Understanding the fundamentals of Generative Pre-trained Transformer (GPT), Introduction to OpenAI's Chat GPT, Limitations and capabilities of Chat GPT, Working with Chat GPT API, Setting up API keys and accessing Chat GPT, Making API calls for text generation, Handling and interpreting responses from Chat GPT

Module III: Building Simple Conversational Agents

Building Basic Chatbots, Setting up a basic chatbot project, Integrating Chat GPT into a Python application, Customizing conversations and responses

Module IV: Ethical Considerations, Integration, and Future Trends

Addressing bias and fairness in chatbots, Privacy concerns and responsible data handling, Ensuring ethical AI practices in chatbot development, Integrating Chatbots into Applications: Embedding chatbots in websites and mobile apps, Interaction with databases and external APIs; Real-world Applications and Case Studies: Examining

successful chatbot implementations, Industry-specific use cases, Challenges and lessons learned

References:

- "Natural Language Processing in Action" by Lane, Howard, and Hapke.
- "Speech and Language Processing" by Daniel Jurafsky and James H. Martin
- "Natural Language Processing: Python and NLTK" by Niraj Kumar
- "Chatbot Development with TensorFlow 2.0 and Rasa" by Sumit Raj



Cyber Law

Course Code: VACCAIT010

Course Outcomes

- Acquire a comprehensive understanding of cyber law principles, focusing on cybercrimes, identity theft, and privacy laws.
- Develop the ability to analyze and apply legal frameworks to cases involving cyber terrorism and the dissemination of obscene materials online.
- Gain expertise in identifying and addressing legal issues related to online identity impersonation and personal data misuse.
- Understand and apply laws pertaining to sexual exploitation in digital media, especially concerning minors.
- Cultivate the skills to evaluate and respond to breaches of confidentiality and privacy in the digital space.

Course Content:

Module I: Cybercrimes and Legal Framework

Understanding the legal implications of unauthorized changes in computer source documents,

Exploring legal consequences for transmitting offensive or menacing content, Discussing the legal penalties for the possession or receipt of stolen computer resources or devices.

Module II: Identity and Privacy Violations

Analyzing the legal ramifications of stealing someone's identity through digital means, Understanding the consequences of impersonation and fraud in the digital domain, examining laws related to unauthorized access and misuse of personal data.

Module III: Cyber Terrorism and Obscenity

Delving into the legal aspects of cyber terrorism and its penalties, Understanding the legal boundaries and consequences regarding the distribution of obscene materials online.

Module IV: Sexual Exploitation and Confidentiality Breaches

Exploring laws concerning the transmission of sexually explicit content, focusing on the legal aspects of child exploitation in the digital realm, Discussing the legal implications of violating confidentiality agreements and privacy breaches in the digital space.

References:

- Cyber Law - An exhaustive section wise Commentary on The Information Technology Act by Pavan Duggal
- Cyber Laws by Justice Yatindra Singh, Universal Law Publishing



Computer Device & Its Security

Course Code: VACCAIT011

Course Outcome:

- Introduction to computer security.
- Understand cryptography technique
- Understand network attacks
- Analyze different network attacks.

Course Content:

Module I:

- Computer Security overview Computer security Key security concept
- Security terminology Vulnerability-attack-threat-countermeasures
- Importance of computer security Recent cyber attack.

Module II:

- Cryptography Definition Terminology History and goals
- Different types of cryptography Encryption algorithms
- Key management Digital signature.

Module III:

- Access Control and Authentication Access control principles
- Access control policies Access control models Authentication basics
- Password biometric Multi-factor authentication.

Module IV:

- Attacks on Software Attacks on privileged programs Attacks through environment variables Buffer overflow attack Attack which does not require the stack (Return-to-libc attack) Exploiting the format string vulnerability. Exploiting race condition vulnerability including the Dirty COW race condition. Packet sniffing and spoofing
- Attacks on the TCP protocol Firewall protection.

References:

- Cryptography and Network Security, William Stalling 7th Edition
- Network Device Security, Terry Woloszyn, Kindle Edition.

Introduction to R Programming

Course Code: VACCAIT012

Course Outcomes:

- Develop an R script and execute it.
- Install, load and deploy the required packages, and build new packages for sharing and reusability.
- Extract data from different sources using API and use it for data analysis.
- Visualize and summarize the data.
- Design application with database connectivity for data analysis.

Course Content:

Module I: Introduction

R interpreter, Introduction to major R data structures like vectors, matrices, arrays, list and data frames, Control Structures, vectorized if and multiple selection, functions.

Module II: Installing, loading and using packages

Read/write data from/in files, extracting data from web-sites, clean data, transform data by sorting, adding/removing new/existing columns, centring, scaling and normalizing the data values, converting types of values, using string in-built functions, Statistical analysis of data for summarizing and understanding data, visualizing data using scatter plot, line plot, bar chart, histogram and box plot.

Module III: Designing GUI and Building Packages

Building interactive application and connecting it with database and building packages.

References:

- Cotton, R., Learning R: a step-by-step function guide to data analysis. 1st edition. O'reilly Media Inc.
- Gardener, M.(2017). Beginning R: The statistical programming language, WILEY.
- Lawrence, M., & Verzani, J. (2016). Programming Graphical User Interfaces in R. CRC press. (ebook)

Introduction To Mobile App Development

Course Code: VACCAIT013

Course Objectives:

This course introduces students to mobile application programming technology, design, and development. Accessing device capabilities, industry standards, architecture, and programming for mobile applications utilising Software Development Kit (SDK) are among the topics covered. When finished, Students should be able to design simple mobile applications.

Course Outcomes:

By the end of this course, students should be able to:

- Test a mobile application written in the android programming language
- Identify various concepts of mobile programming that make it unique from programming for other platforms
- Create a mobile application using the Java programming language
- Critique mobile applications on their design pros and cons
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces
- Program mobile applications for the Android operating system that use basic and advanced phone features
- Deploy applications to the Android marketplace for distribution

Course Content:

Module I: Introduction

Introduction to mobile computing, introduction to android development environment

Module II: Factors in developing mobile applications

Mobile software engineering, Frameworks and tools, User interface development, Understanding basics of application development software

Module III: User interfaces

Understanding basics of Java, Architecture of Android-based devices, Understanding smartphone, tablet and laptop application development,

Module IV: Intents and services

Android intents and services, lifecycle, Characteristics of mobile applications

Module V: Platforms and Additional Issues

Development Process, Architecture, Design, Technology Selection, Mobile App Development Hurdles, Testing

Module VI: Security and Hacking

Active Transactions, More on Security, Hacking Android

Reverences:

- "Mobile DevOps Playbook" by Moataz Nabil
- "Android Studio Giraffe Essentials" by Neil Smyth
- "How to Build Android Apps with Kotlin" by Alex Forrester
- "Learning mobile App Development" by Jakob Iversen

