Detailed Program

Bachelor of Computer Applications

(BCA)

Semester-VIII

(2023-2027)

DOC202306080072

RNB GLOBAL UNIVERSITY

Educating stars for tomorrow

RNB GLOBAL UNIVERSITY

RNB Global City, Ganganagar Road,
Bikaner, Rajasthan 334601

OVERVIEW

RNB Global University follows Semester System along with Choice Based Credit System as per latest guidelines of University Grants Commission (UGC). Accordingly, each academic year is divided into two semesters, **Odd (July-December) and Even (January-June).** Also, the university follows a system of continuous evaluation along with regular updating in course curricula and teaching pedagogy.

The curriculum for BCA Program for (July-December) Odd Semester, 2027 along with examination pattern is as follows:

Course Scheme

Semester –VIII

S. No.	Course Code	Course Category	Course Name	L	T	P	Credits
1.	13033200	DSC 21	Block Chain technologies	3	1	0	4
2.		DSE 8 / GE 7	One from the Pool of DSE Courses / One from the pool of General electives	3	1	0	4
3.		DSE 9 / GE 8	One from the Pool of DSE Courses / One from the pool of General electives	3	1	0	4
4.		DSE 10	One from the Pool of DSE Courses	3	1	0	4
5.	99004000	Research Project-2	Research / Dissertation	0	0	12	6
6.	99003300		Workshops & Seminars/ Human Values & Social Service/NCC/NSS	-	-	-	1
		Total		**12**	**4**	**12**	**23**

DSC – Discipline specific Course
DSE – Discipline Specific Elective
SEC – Skill Enhancement Course
VAC – Value addition course
GE – General Elective

Discipline Specific Electives (DSE)

S.No	Course Code	Course Name	L	T	P	Credits
1.	13037100	Digital image processing	3	1	0	4
2.	13014200	Advanced internet programming	3	1	0	4
3.	13014400	TCP / IP	3	1	0	4

General Elective Courses (GE)

S.No	Course Code	Course Name	L	T	P	Credits
1.	11009700	Entrepreneurship	4	0	0	4
2.	77000100	Research Methodology	4	0	0	4

EVALUATION SCHEME- THEORY

The evaluation of the theory paper of BCA would be based on Internal and External Assessments. Internal Assessment would consist of 50% of the marks (50 marks) and external assessment (in form of End Term Exam) would consist of remaining 50% marks (50 marks). Detailed scheme of Internal and External Assessments as follows:

Internal Assessment

The distribution of Internal Assessment Marks is as follows:

Type	Details	Marks
Mid Term	Two Mid-term Sessional of 15 marks each (15+15)	30
Marks obtained in various Tests, Assignments, Presentations, Quiz, Tutorials, etc.	Average of marks obtained	15
Attendance	75%+ : 5 marks	5
TOTAL	**50**	

External Assessment

Type	Marks
Theory	50

EVALUATION SCHEME -PRACTICAL

The evaluation of the practical paper of BCA would be based on Internal and External Assessments. Internal Assessment would consist of 50% of the marks (50 marks) and external assessment (in form of End Term Exam) would consist of remaining 50% marks (50 marks). Detailed scheme of Internal and External Assessment is as follows:

Internal Assessment

Type	Details	Marks
Marks obtained in various manuals, practical file, participation, any model prepared, output of practical	Average of marks obtained	45
Attendance	75%+ : 5 marks	5
TOTAL	**50**	

External Assessment

Type	Marks
Practical	50

EVALUATION SCHEME- WORKSHOPS & SEMINARS AND HUMAN VALUES & SOCIAL SERVICE/NCC/NSS

1. The evaluation of Workshops & Seminar and Human Values & Social Service/NCC/NSS will be completed from Semester I – Semester VI. It will be evaluated internally by the various Forums & Schools Concerned. The credit for this will be given at the end of each Semester.

2. The students have to join club/clubs/Forums with the active participation in different activities of club. The students would be continuously assessed from Semester-I to Semester-IV and credits and marks would be given after the end of each Semester

1. Vision

To create an environment where a holistic education is given in order to ignite an inquisitive mind, inculcate the qualities of excellence, perceive the intricacies of research, seek out obstacles, overcome them, and carve out a niche for oneself.

2. Mission

- Enabling students to maximize their potential and use their professional standards through ethics and education to raise their level of competence and become change agents.
- Fostering a scholarly culture that fosters the phenomenon of giving back to society via research and creative endeavours.
- To integrate partnerships that enhance knowledge in order to create a dynamic intellectual capital.
- To employ emerging technology to create an inclusive learning environment that is integrated with an improved educational process.
- To create a teaching-learning atmosphere that fosters resilience, sensitivity, and critical thinking, ultimately leading to the development of a strong personality.

3. Programme Educational Objectives (PEOs)

PEO1: To facilitate in development of basic fundamentals of Computer Applications that fit as a perfect foundation towards a beginning a professional career in industry.

PEO2: To develop programming skills of students by using fundamental knowledge of computer science

PEO3: To apply new designs and solutions to complex real-life problems using technologies.

PEO4: To play a creative role during professional life through turning problems to opportunities.

4. Program Outcome (POs)

PO1: Technical understanding: Solve complicated problems using mathematics, physics, technical foundations, and a specialization in technology.

PO2: **Problem analysis:** Identify, formulate, analyze research materials, and analyse complex engineering problems using foundational principles of mathematics, natural sciences, and sciences to reach justifiable conclusions.

PO3: **Application of modern technologies:** Create, select, and apply appropriate approaches, tools, and advanced engineering and IT tools, such as predictions and modelling, to technically challenging processes while taking into account the constraints.

PO4: **Expert Principles and Cyber Systems:** The ability to use and provide expert principles and cyber systems in a global monetary environment.

PO5: **Ultimate Education:** Determine the demand for and expand the capacity to work as a Computing certified in permanent education.

PO6: **The expert and society:** Apply reasoning informed by contextual information to evaluate societal, health, safety, legal, and cultural issues, as well as the obligations that come with them, in the context of professional engineering activity.

PO7: **Environmental and sustainable development:** Display knowledge of the need for sustainable development by identifying the implications of professional technological solutions in society and the environment contexts.

PO8: **Personality and Cooperative Learning:** Ability to work as a member or manager in a variety of diverse teams.

PO9: **Ethics:** Adhere to professional ethics, duties, and automotive technology norms by adopting ethical ideas.

PO10: **Communication:** Interact well with the technical community and society at large on associated technical activities, such as being able to understand and write effective reports and design documentation, give and receive clear directions.

PO11: **Finance and project management:** Demonstrate knowledge and understanding of technical and professional principles and apply those to one's own work, as a member of the team and leader, to manage projects and in multidisciplinary domains.

PO12: **Life-long learning:** With socio-technological advancements, students will be able to engage in independent and life-long learning.

5. Program Specific Outcome (PSOs)

PSO1: Prepare for a potentially lucrative and employable profession of computer applications.

PSO2: Continue your education in Computer Science/Applications.

PSO3: Work for yourself in the Indian and worldwide software markets.

PSO4: Comply with all applicable industrial standards.

6. Course Outcomes		
Course Codes & Course Names	**After completion of these courses' students should be able to**	
13033200-Block-Chain Technologies	**CO1:**	Understand the Fundamentals of Blockchain Technology
	CO2:	Analyze Cryptography and Blockchain Security Mechanisms.
	CO3:	Demonstrate Knowledge of Consensus Mechanisms and Blockchain Platforms
	CO4:	Design and Implement Smart Contracts and Decentralized Applications (DApps)
	CO5:	Analyze and Apply Blockchain in Real-World Use Cases
13037100 - Digital image Processing	**CO1:**	Understand the legal frameworks and regulations governing cyberspace.
	CO2:	Identify and analyze legal issues related to information technology.
	CO3:	Evaluate the ethical implications of information technology practices.
	CO4:	Apply security measures to protect information systems and data.
	CO5:	Apply segmentation and representation techniques for image analysis.
11009700 - Entrepreneurship	**CO1:**	Understand the fundamental concepts and significance of entrepreneurship in economic development**.**
	CO2:	Identify and evaluate opportunities for creating and sustaining successful business ventures.
	CO3:	Develop a comprehensive business plan integrating financial, marketing, and operational strategies
	CO4:	Apply innovative thinking and problem-solving skills to address entrepreneurial challenges.
	CO5:	Demonstrate ethical and sustainable practices in entrepreneurial decision-making and leadership.
13014200 - Advanced internet programming	**CO1:**	Understand the fundamentals of advanced web technologies and internet programming languages.
	CO2:	Develop dynamic web applications using server-side and client-side technologies**.**
	CO3:	Implement web services and RESTful APIs for communication between web systems.
	CO4:	Apply security protocols and techniques to secure web applications and data
	CO5:	Analyze and optimize the performance of web applications for better scalability and efficiency.
77000100-Research Methodology	**CO1:**	Understand the fundamental concepts and importance of research methodology in addressing real-world problems**.**
	CO2:	Develop skills to design and conduct research using appropriate

		methodologies and tools.
	CO3:	Analyze and interpret data to derive meaningful conclusions and insights.
	CO4:	Apply ethical considerations and best practices in research processes.
	CO5:	Developing innovative solutions or approaches to address research challenges.
13014400-TCP / IP	**CO1:**	Understand the fundamentals of computer networking
	CO2:	Learn about IP addressing and subnetting
	CO3:	Implement web services and RESTful APIs for communication between web systems
	CO4:	Understand transport layer protocols (TCP and UDP)
	CO5:	Learn about application layer protocols and network management
99004000-Research Project-2	**CO1:**	Design and conduct independent research, including formulating research questions, developing hypotheses, and selecting appropriate methodologies
	CO2:	Develop expertise in data collection, management, and analysis using advanced statistical or qualitative analysis software.
	CO3:	Develop critical thinking and problem-solving abilities by identifying research gaps, synthesizing information from various sources
	CO4:	Communicate research findings effectively through written reports and oral presentations
	CO5:	Contribute to the chosen field of study by producing research that advances knowledge, addresses significant questions, or solves practical problems

7.CO PO Mapping

13033200	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	2	-	1	3	-	3	3	2	3
CO2	3	-	3	3	3	2	2	3	-	-	3	3
CO3	2	2	3	2	2	3	3	2	3	3	3	3
CO4	1	3	3	-	2	-	2	3	2	3	-	3
CO5	3	3		3		3		3		3	3	

13037100	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	2	-	1	3	-	3	3	2	3
CO2	3	-	3	3	3	2	2	3	-	-	3	3
CO3	2	2	3	2	2	3	3	2	3	3	3	3
CO4	1	3	3	-	2	-	2	3	2	3	-	3
CO5		3	3		3		3		3	3	3	

11009700	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	2	-	1	3	-	3	3	2	3
CO2	3	-	3	3	3	2	2	3	-	-	3	3
CO3	2	2	3	2	2	3	3	2	3	3	3	3
CO4	1	3	3	-	2	-	2	3	2	3	-	3
CO5		2	2	3	3		3	3		3		2

13014200	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	2	-	1	3	-	3	3	2	3
CO2	3	-	3	3	3	2	2	3	-	-	3	3
CO3	2	2	3	2	2	3	3	2	3	3	3	3
CO4	1	3	3	-	2	-	2	3	2	3	-	3
CO5	1		3	3		3	2		2	3	3	

13014400	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	2	-	1	3	-	3	3	2	3
CO2	3	-	3	3	3	2	2	3	-	-	3	3
CO3	2	2	3	2	2	3	3	2	3	3	3	3
CO4	1	3	3	-	2	-	2	3	2	3	-	3
CO5		3		3		3		3		3		3

77000100	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	2	-	1	3	-	3	3	2	3
CO2	3	-	3	3	3	2	2	3	-	-	3	3
CO3	2	2	3	2	2	3	3	2	3	3	3	3
CO4	1	3	3	-	2	-	2	3	2	3	-	3
CO5		3	3		3		3		3		3	3

99004000	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		3	2	3		3		3	2	2
CO2	2	2	3					2	3	3		2
CO3		2			3	2		3		3	3	2
CO4	2	2	3	3	2	2			3	3	3	3
CO5	3	3		3	3		3	3	2		2	2

8.Curriculum

Course Name: Block Chain Technology

Course Code: 13033200

Course Outline

Unit I:
Basics of Blockchain Technology, Introduction to Blockchain: Definition, history, and importance. Key Features: Decentralization, transparency, immutability, and security.
Components of Blockchain: Blocks, transactions, nodes, and ledgers. Types of Blockchains: Public, private, consortium, and hybrid. Basics of Cryptography: Hashing, digital signatures, and public-private keys.

Unit II:
Blockchain Architecture and Mechanisms, Blockchain Architecture: Block structure, Merkle trees, and distributed ledger. Consensus Mechanisms: Proof of Work (PoW), Proof of Stake (PoS), Delegated PoS, and Byzantine Fault Tolerance. Smart Contracts: Definition, characteristics, and applications.

Unit III:

Applications and Use Cases, Cryptocurrency Ecosystem: Bitcoin, Ethereum, altcoins, and stable coins. Enterprise Applications: Supply chain, healthcare, real estate, and voting systems. Decentralized Finance (DeFi): Concepts, benefits, and challenges. NFTs and Tokenization: Definition, use cases, and trends.

Unit IV:

Advanced Topics and Future Trends, Blockchain Scalability: Layer 2 solutions, sharding, and other innovations. Interoperability: Need for cross-chain communication and solutions. Security and Privacy: Blockchain vulnerabilities and counter measures .Regulatory and Ethical Challenges: Global policies and ethical considerations.

Suggested Readings:

1.Blockchain Basics: A Non-Technical Introduction in 25 Steps by Daniel Drescher

2.Mastering Blockchain: Unlocking the Power of Cryptocurrencies, Smart Contracts, and Decentralized Applications by Imran Bashir

3.Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World" by Don Tapscott and Alex Tapscott

4.Bitcoin and Cryptocurrency Technologies by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder

5. The Basics of Bitcoins and Blockchains" by Antony Lewis

Course Name: Digital image processing

Course Code: 13037100

Objectives

Digital Image Processing involves manipulating and enhancing digital images through algorithms to improve their quality or extract meaningful information. The main objectives include tasks like image enhancement, restoration, compression, and segmentation. Techniques such as filtering, edge detection, and morphological operations are applied to enhance image features or reduce noise. Image processing is widely used in fields like medical imaging, satellite imaging, and computer vision.

Course Outline

Unit I:
Fundamentals of Digital Image Processing, introducing students to the basic concepts of image formation, including sampling and quantization. It covers the components of image processing systems, such as input devices, storage, and display mechanisms. Students learn about various types of images, including binary, grayscale, and color, along with popular image formats like JPEG, PNG, and BMP.

Unit II:
Image Enhancement and Restoration delves into techniques to improve the quality of digital images. In the spatial domain, students study methods such as histogram equalization, smoothing, and sharpening filters. In the frequency domain, techniques like Fourier Transform and filtering are introduced. This unit also addresses image restoration, focusing on degradation models and noise removal strategies.

Unit III:
Image Compression and Segmentation, students explore methods to reduce image storage and transmission requirements. Both lossless compression techniques, such as Huffman coding and Run-length encoding, and lossy methods like transform coding (e.g., JPEG) are covered. The unit also introduces image segmentation, teaching students to divide images into meaningful regions using techniques like thresholding and edge detection.

Unit IV:
Feature Extraction and Advanced Applications focuses on extracting meaningful information from images. Students learn about texture, shape, and color features, as well as dimensionality reduction techniques like Principal Component Analysis (PCA). This unit explores object recognition and classification, integrating basic pattern recognition and machine learning concepts. Advanced applications of digital image processing, such as facial recognition, medical imaging, and remote sensing, are highlighted. The course concludes with an introduction to computer vision and emerging trends in the field.

Suggested Readings:

1.Digital Image Processing" by Rafael C. Gonzalez and Richard E. Woods
2.Fundamentals of Digital Image Processing" by Anil K. Jain
3.Digital Image Processing" by S. Jayaraman, S. Esakkirajan, and T. Veerakumar
4.Digital Image Processing and Analysis" by B. Chanda and D. Dutta Majumder
5. Image Processing, Analysis, and Machine Vision" by Milan Sonka, Vaclav Hlavac, and Roger Boyle

Course Name: Entrepreneurship

Course Code: 11009700

Objectives

- To know about the importance of startups and government subsidies available for entrepreneur.
- The purpose of the paper is to orient the learner toward entrepreneurship as a career option and creative thinking and behavior.

Course Outline

Unit I: Introduction
Meaning, elements, determinants and importance of entrepreneurship and creative behavior; Entrepreneurship and creative response to the society' problems and at work; Dimensions of entrepreneurship: intrapreneurship, technopreneurship, cultural entrepreneurship, international entrepreneurship, netpreneurship, ecopreneurship, and social entrepreneurship.

Unit II: Entrepreneurship and Micro, Small and Medium Enterprises
Concept of business groups and role of business houses and family business in India; The contemporary role models in Indian business: their values, business philosophy and behavioral orientations; Conflict in family business and its resolution.

Unit III
Public and private system of stimulation, support and sustainability of entrepreneurship. Requirement, availability and access to finance, marketing assistance, technology, and industrial accommodation, Role of industries/entrepreneur's associations and self-help groups, The concept, role and functions of business incubators, angel investors, venture capital and private equity fund.

Unit IV: Sources of business ideas and tests of feasibility
Significance of writing the business plan/ project proposal; Contents of business plan/ project proposal; Designing business processes, location, layout, operation, planning & control; preparation of project report (various aspects of the project report such as size of investment, nature of product, market potential may be covered); Project submission/ presentation and

appraisal thereof by external agencies, such as financial/non-financial institutions.

Unit V: Mobilizing Resource

Mobilizing resources for start-up. Accommodation and utilities; Preliminary contracts with the vendors, suppliers, bankers, principal customers; Contract management: Basic start-up problems.

Suggested Readings:

1. Kuratko and Rao, *Entrepreneurship: A South Asian Perspective,* Cengage Learning.
2. Robert Hisrich, Michael Peters, Dean Shepherd, *Entrepreneurship,* McGraw-Hill Education.
3. Desai, Vasant*. Dynamics of Entrepreneurial Development and Management*.
4. Mumbai, Himalaya Publishing House.
5. Dollinger, Mare J. *Entrepreneurship: Strategies and Resources*. Illinois, Irwin.
6. Holt, David H. *Entrepreneurship: New Venture Creation*. Prentice-Hall of India, New Delhi. Plsek, Paul E. *Creativity, Innovation and Quality*. (Eastern Economic Edition), New Delhi: Prentice-Hall of India. ISBN-81-203-1690-8.
7. Singh, Nagendra P. *Emerging Trends in Entrepreneurship Development*. New Delhi: ASEED.
8. SS Khanka, *Entrepreneurial Development,* S. Chand & Co, Delhi.
9. K Ramachandran, *Entrepreneurship Development,* McGraw-Hill Education
10. SIDBI Reports on Small Scale Industries Sector.

Course Name: Advanced internet programming

Course Code: 13014200

Objectives

Advanced Internet Programming focuses on developing robust, scalable, and dynamic web applications by leveraging modern technologies and frameworks. The objective is to gain in-depth knowledge of both client-side and server-side programming, including the use of JavaScript, HTML5, CSS3, and advanced server technologies such as Node.js and PHP.

Course Outline

Unit I:

Introduction to Web Technologies Overview of Web Technologies: Introduction to web architecture, client-server model, and the role of browsers and web servers.HTML5: Advanced HTML5 features, including multimedia elements, forms, and APIs (Geolocation, Canvas, Web Storage).CSS3: Advanced CSS3 features, such as animations, transitions, and responsive web design using media queries. JavaScript and Frameworks: Introduction to JavaScript, ES6 features, and client-side scripting.

Unit II:

Server-Side and Client-Side Scripting **Server-Side Scripting**: Introduction to server-side programming using languages such as PHP, Node.js, and ASP.NET. Server-side scripting techniques for dynamic content generation. Client-Side Scripting: Detailed exploration of JavaScript.

Unit III:

Web Services and APIs, Introduction to Web Services: Understanding web services and their role in distributed systems. Restful APIs: Principles of REST (Representational State Transfer), designing RESTful APIs, using HTTP methods (GET, POST, PUT, DELETE) SOAP vs. REST: Comparing SOAP (Simple Object Access Protocol) and REST, and understanding their uses in different contexts. SON and XML: Data exchange formats, parsing JSON and XML in web applications.

Unit IV:

Web Security and Protocols, Web Application Security: Overview of common web vulnerabilities like SQL injection, XSS (Cross-Site Scripting), and CSRF (Cross-Site Request Forgery). Secure Communication: SSL/TLS encryption for secure data transmission, using HTTPS.Authentication and Authorization: User authentication techniques (sessions, cookies, JWT) and authorization protocols (OAuth, OpenID).

Unit V:

Performance Optimization and Scalability , Performance Optimization Techniques: Caching strategies (server-side, browser-side), image optimization, lazy loading, and content compression.CDNs (Content Delivery Networks): Understanding CDNs and how they can reduce latency and improve website performance.Load Balancing: Introduction to load balancing techniques for distributing traffic across multiple servers.

Reference Books:

1.Web Development with Node and Express" by Ethan Brown
2. RESTful Web Services" by Leonard Richardson and Sam Ruby
3. Web Security for Developers" by Malcolm McDonald
4. PHP and MySQL Web Development" by Luke Welling and Laura Thomson
5. Programming with JavaScript" by Ramesh Bangia

Course Name: TCP / IP

Course Code: 13014400

Objective:

The TCP/IP model is a fundamental framework for understanding network communication, consisting of four layers: Application, Transport, Internet, and Network Access. Each layer has specific roles, with the Transport layer primarily handling end-to-end communication, using protocols like TCP for reliable data transmission and UDP for faster, less reliable transmission.

Course Outline

Unit I:

Networking Overview: Definition of computer networks, types of networks (LAN, WAN, MAN), and networking devices (routers, switches, hubs, etc.).
OSI and TCP/IP Models: Comparison between the OSI model and TCP/IP model. Understanding the layers of TCP/IP (Application, Transport, Internet, and Network Access layers).IP Addressing: Structure and classes of IP addresses, private and public IP addresses, subnetting, and subnet masks.IPv4 and IPv6: Differences between IPv4 and IPv6, addressing schemes, and the need for IPv6.

Unit II:

Routing and Routing Protocols: Introduction to static and dynamic routing. Study of routing protocols like RIP (Routing Information Protocol), OSPF (Open Shortest Path First), and BGP (Border Gateway Protocol). Subnetting and Super netting: Understanding how IP networks are divided and aggregated for efficient routing. Address Resolution Protocol (ARP): How ARP maps IP addresses to MAC addresses. Understanding ARP requests and replies.

Unit III:

Transport Layer Protocols, this unit focuses on the protocols used at the transport layer of the TCP/IP model. Topics include Transmission Control Protocol (TCP): Introduction to TCP, its role in reliable data transmission, flow control, error detection, and connection management (three-way handshake).User Datagram Protocol (UDP): Differences between TCP and UDP, characteristics of UDP, and its use in applications where speed is more important than reliability (e.g., streaming, gaming).

Unit IV:

Application Layer Protocols and Network Management, Application Layer Protocols: Study of key protocols such as HTTP, FTP, SMTP, POP3, IMAP, DNS, DHCP, and Telnet. Understanding their purpose, operation, and how they enable communication between applications over a network. Network Address Translation (NAT): Introduction to NAT, its use in mapping private IP addresses to public IP addresses, and its importance in IPv4 address conservation. DNS (Domain Name System): How DNS resolves domain names to IP addresses. The role of DNS servers and records.

Reference Books:

1. TCP/IP Illustrated, Volume 1: The Protocols" by W. Richard Stevens
2. Computer Networking: A Top-Down Approach" by James Kurose and Keith Ross
3. Data and Computer Communications" by William Stallings
4. Networking All-in-One For Dummies" by Doug Lowe
5. Network+ Guide to Managing and Troubleshooting Networks" by Mike Meyers

Course Name: Research Methodology

Course Code: 77000100

Objective:
The objective of Research Methodology is to equip students with a systematic understanding of research principles and techniques. It aims to foster the ability to identify, define, and address research problems effectively. Students learn to design appropriate research strategies, collect and analyze data using suitable tools and methodologies. The course emphasizes ethical considerations, critical thinking, and rigor in the research process.

Course Outline

Unit I -Research Methodology: An Introduction
Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research Topic

Unit II- Research Design
Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs

Unit III- Methods of Data Collection
Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of Secondary Data

Unit IV- Processing and Analysis of Data
Processing Operations, Elements/Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion, Measures of Asymmetry, Measures of Relationship, Simple Regression Analysis, Multiple Correlation and Regression, Partial Correlation, Association in Case of Attribute

Unit V- Practical Training for Research, Observations, Questionnaires, Interviews

Unit VI- Research ethics

Unit VII- Review of published research in the relevant field

Unit VIII- Availability of books at various Libraries

9.Lesson Plans

13033200– Blockchain Technology

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction to Blockchain: Definition, history, and importance.	C-1	Lecture
Unit-I	Key Features of Blockchain: Decentralization, transparency, immutability, and security.	C-2	Lecture
Unit-I	Components of Blockchain: Blocks, transactions, nodes, and ledgers.	C-3	Lecture
Unit-I	Types of Blockchains: Public, private, consortium, and hybrid.	C-4	Lecture
Unit-I	Basics of Cryptography: Hashing, digital signatures, and public-private keys.	C-5	Lecture
Unit-I	Activity	C-6	Activity
Unit-I	Classroom Assignment	C-7	Class Room Assignment
Unit-I	Review and Discussion of Activity-1 Results	C-8	Lecture
Unit-I	Recap and Open Q&A Session on Blockchain Basics	C-9	Lecture
Unit-I	Clarification Class	C-10	Clarification class
Unit-II	Blockchain Architecture: Block structure, Merkle trees, and distributed ledger.	C-11	Lecture
Unit-II	Consensus Mechanisms: Proof of Work (PoW)	C-12	Lecture
Unit-II	Consensus Mechanisms: Proof of Stake (PoS)	C-13	Lecture
Unit-II	Consensus Mechanisms: Delegated PoS and Byzantine Fault Tolerance	C-14	Lecture
Unit-II	Smart Contracts: Definition, characteristics, and applications.	C-15	Lecture
Unit-II	Activity	C-16	Activity
Unit-II	Classroom Assignment	C-17	Class Room Assignment
Unit-II	Presentation	C-18	Presentation
Unit-II	Guest Lecture	C-19	Guest Lecture
Unit-II	Clarification Class	C-20	Clarification Class
Unit-III	Cryptocurrency Ecosystem: Bitcoin, Ethereum, altcoins, and stable coins.	C-21	Lecture
Unit-III	Enterprise Applications: Supply chain, healthcare, real estate, and voting systems.	C-22	Lecture
Unit-III	Decentralized Finance (DeFi): Concepts, benefits, and challenges.	C-23	Lecture
Unit-III	NFTs and Tokenization: Definition, use cases, and trends.	C-24	Lecture
Unit-III	Activity-3	C-25	Activity

Unit-III	Classroom Assignment-	C-26	Class Room Assignment
Unit-III	Seminar	C-27	Seminar
Unit-III	Take Home Assignment	C-28	Take Home Assignment
Unit-III	Blockchain for Supply Chain Management and Logistics	C-29	Lecture
Unit-III	Clarification Class	C-30	Clarification Class
Unit-IV	Blockchain Scalability: Layer 2 solutions, sharding, and other innovations.	C-31	Lecture
Unit-IV	Interoperability: Need for cross-chain communication and solutions.	C-32	Lecture
Unit-IV	Security and Privacy: Blockchain vulnerabilities and countermeasures.	C-33	Lecture
Unit-IV	Regulatory and Ethical Challenges: Global policies and ethical considerations.	C-34	Lecture
Unit-IV	Clarification Class	C-35	Clarification Class
Unit-IV	Presentation	C-36	Presentation
Unit-IV	Classroom Assignment	C-37	Class Room Assignment
Unit-IV	Webinar	C-38	Webinar
Unit-IV	Activity	C-39	Activity
Unit-IV	Take Home Assignment	C-40	Take Home Assignment
Unit-IV	Quality Standards in Blockchain: ISO 9000 Series Standards	C-41	Lecture
Unit-IV	Quality Process Implementation Issues in Blockchain	C-42	Lecture
Unit-IV	Clarification Class-	C-43	Clarification Class
Unit-IV	Presentation-	C-44	Presentation
Unit-IV	Classroom Assignment	C-45	Class Room Assignment
Unit-IV	Seminar	C-46	Seminar
Unit-IV	Activity	C-47	Activity
Unit-IV	Take Home Assignment-3: Blockchain's Impact on Various Industries	C-48	Take Home Assignment
Unit-IV	Clarification Class-3: Industry-specific Blockchain Use Cases	C-49	Clarification Class
Unit-IV	Future of Blockchain in Digital Transformation and Industry 4.0	C-50	Lecture
Unit-IV	Blockchain's Role in Privacy and Data Protection	C-51	Lecture
Unit-IV	Guest Lecture	C-52	Guest Lecture
Unit-IV	Review and Discussion: Blockchain in the Real-World	C-53	Review Class
Unit-IV	Take Home Assignment	C-54	Take Home Assignment
Unit-IV	Blockchain and Its Regulatory Landscape:	C-55	Lecture

	Global Overview		
Unit-IV	Blockchain for Environmental Sustainability	C-56	Lecture
Unit-IV	Blockchain in Education and Credentialing Systems	C-57	Lecture
Unit-IV	Future Prospects for Blockchain: Adoption, Innovation, and Research	C-58	Lecture
Unit-IV	Blockchain Beyond Cryptocurrency: Future Directions	C-59	Lecture
Unit-IV	Clarification Class	C-60	Clarification Class

13037100 – Digital image processing

Unit	Particulars	Class No.	Pedagogy of Class
Unit -I	Fundamentals of Digital Image Processing: Image formation, sampling, and quantization.	C-1	Lecture
Unit -I	Components of Image Processing Systems: Input devices, storage, and display mechanisms.	C-2	Lecture
Unit -I	Types of Images: Binary, grayscale, and color images, and their formats (JPEG, PNG, BMP).	C-3	Lecture
Unit -I	Image Formats: Detailed discussion on image formats and compression techniques.	C-4	Lecture
Unit -I	Digital Image Processing System: Overview and flow of operations.	C-5	Lecture
Unit -I	Activity-1: Hands-on on image sampling and quantization techniques.	C-6	Activity
Unit -I	Classroom Assignment	C-7	Class Room Assignment
Unit -I	Review and Discussion of Activity-1 Results	C-8	Lecture
Unit -I	Recap and Open Q&A on Image Formation and Basic Concepts	C-9	Lecture
Unit -I	Clarification Class	C-10	Clarification Class
Unit-II	Image Enhancement: Histogram equalization and contrast adjustment techniques.	C-11	Lecture
Unit-II	Spatial Domain Enhancement: Smoothing and sharpening filters.	C-12	Lecture
Unit-II	Frequency Domain Enhancement: Fourier Transform and frequency filters.	C-13	Lecture
Unit-II	Image Restoration: Degradation models and noise removal techniques.	C-14	Lecture
Unit-II	Advanced Enhancement Techniques: Homomorphic filtering and more.	C-15	Lecture
Unit-II	Activity-2: Image enhancement using spatial and frequency domain techniques.	C-16	Activity
Unit-II	Classroom Assignment-2: Image Restoration Methods	C--17	Class Room Assignment
Unit-II	Presentation-1: Presentation on Image Enhancement Techniques	C-18	Presentation
Unit-II	Guest Lecture-1: Real-world applications of Image Enhancement	C-19	Guest Lecture
Unit-II	Clarification Class	C-20	Clarification Class
Unit-III	Image Compression: Lossless compression techniques (Huffman, Run-Length Encoding).	C-21	Lecture
Unit-III	Image Compression: Lossy compression techniques (JPEG, Transform Coding).	C-22	Lecture
Unit-III	Segmentation Basics: Thresholding techniques	C-23	Lecture

	and methods.-		
Unit-III	Edge Detection: Sobel, Canny, and Laplacian edge detectors.	C-24	Lecture
Unit-III	Segmentation in the Frequency Domain: Using Fourier transform for segmentation.	C-25	Lecture
Unit-III	Activity-3	C-26	Activity
Unit-III	Classroom Assignment-3: Application of image compression techniques	C-27	Class Room Assignment
Unit-III	Seminar-1: Image Compression and Segmentation in Industry	C-28	Seminar
Unit-III	Take Home Assignment-1: Comparative analysis of lossless vs lossy compression techniques.	C-29	Take Home Assignment
Unit-III	Clarification Class	C-30	Clarification Class
Unit-IV	Feature Extraction: Texture, shape, and color features.	C-31	Lecture
Unit-IV	Feature Extraction: Statistical and structural techniques.	C-32	Lecture
Unit-IV	Principal Component Analysis (PCA): Dimensionality reduction techniques.	C-33	Lecture
Unit-IV	Object Recognition and Classification: Basics of pattern recognition.	C--34	Lecture
Unit-IV	Advanced Object Recognition: Machine learning approaches.	C-35	Lecture
Unit-IV	Activity-4: Hands-on on PCA and Object Recognition Techniques.	C-36	Activity
Unit-IV	Classroom Assignment-4: Object recognition and classification application.	C-37	Class Room Assignment
Unit-IV	Guest Lecture-2: Applications of Feature Extraction in Medical Imaging	C-38	Guest Lecture
Unit-IV	Clarification Class on Feature Extraction and Pattern Recognition	C-39	Clarification Class
Unit-IV	Advanced Applications: Facial recognition and medical imaging.	C-40	Lecture
Unit-IV	Advanced Applications: Remote sensing and geospatial applications.	C-41	Lecture
Unit-IV	Emerging Trends in Digital Image Processing: Deep learning and neural networks.	C-42	Lecture
Unit-IV	Presentation	C-43	Presentation
Unit-IV	Classroom Assignment	C-44	Class Room Assignment
Unit-IV	Seminar	C-45	Seminar
Unit-IV	Activity	C-46	Activity
Unit-IV	Take Home Assignment-2: Exploration of emerging applications in Image Processing.	C-47	Take Home Assignment

Unit-IV	Clarification Class on Advanced Applications and Emerging Trends	C-48	Clarification Class
Unit-IV	Final Project Discussion: Real-world Image Processing Applications	C-49	Discussion Class
Unit-IV	Guest Lecture	C-50	Guest Lecture
Unit-IV	Final Review and Q&A Session on Image Processing	C-51	Review Class
Unit-IV	Take Home Assignment-3: Final Project on Digital Image Processing Applications	C-52	Take Home Assignment
Unit-IV	Blockchain and Image Processing: Use of Blockchain in Image Data Security	C-53	Lecture
Unit-IV	Review Class: Image Processing Applications in Different Fields	C-54	Review Class
Unit-IV	Quality Standards in Digital Image Processing: ISO and other standards	C-55	Lecture
Unit-IV	Final Evaluation and Wrap-Up of Course	C-56	Final Evaluation
Unit-IV	Guest Lecture-4: Innovations and Challenges in Digital Image Processing	C-57	Guest Lecture
Unit-IV	Future Directions in Digital Image Processing	C-58	Lecture
Unit-IV	Blockchain and Image Processing: Applications in Data Protection and Authentication	C-59	Lecture
Unit-IV	Clarification Class	C-60	Clarification Class

13014200 -Advanced internet programming

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Introduction to Web Technologies: Overview of Web Architecture and Client-Server Model	C-1	Lecture
Unit-I	Role of Browsers and Web Servers in Web Technologies	C-2	Lecture
Unit-I	HTML5: Multimedia Elements, Forms, and APIs (Geolocation, Canvas, Web Storage).	C-3	Lecture
Unit-I	Advanced HTML5 Features: LocalStorage, SessionStorage, and WebSockets.	C-4	Lecture
Unit-I	CSS3: Advanced Features: Animations, Transitions, and Responsive Web Design.	C-5	Lecture
Unit-I	CSS3: Media Queries and Mobile-Friendly Design	C-6	Lecture
Unit-I	JavaScript and Frameworks: Introduction to JavaScript and ES6 Features	C-7	Lecture
Unit-I	Client-Side Scripting: JavaScript DOM Manipulation and Event Handling	C-8	Lecture
Unit-I	Activity-1: Hands-on JavaScript Coding: DOM Manipulation and Event Handling	C-9	Activity
Unit-I	Classroom Assignment	C-10	Class Room Assignment
Unit-II	Server-Side Scripting: Introduction to PHP, Node.js, and ASP.NET	C-11	Lecture
Unit-II	Dynamic Content Generation Using Server-Side Scripting	C-12	Lecture
Unit-II	Server-Side Scripting with PHP: Variables, Loops, and Conditional Statements	C-13	Lecture
Unit-II	Node.js Basics: Setting up a Simple Server Using Node.js	C-14	Lecture
Unit-II	Client-Side Scripting with JavaScript: Detailed Exploration of JavaScript	C-15	Lecture
Unit-II	JavaScript Functions and Objects: Understanding Functions, Scope, and Closures	C-16	Lecture
Unit-II	Activity-2: Implementing Client-Side Scripts and Interactivity with JavaScript	C-17	Activity
Unit-II	Classroom Assignment	C-18	Class Room Assignment
Unit-II	Presentation	C-19	Presentation
Unit-II	Guest Lecture	C-20	Guest Lecture
Unit-III	Introduction to Web Services: What Are Web Services and Their Role?	C-21	Lecture
Unit-III	Restful APIs: Understanding REST and Designing RESTful APIs	C-22	Lecture
Unit-III	HTTP Methods: GET, POST, PUT, DELETE and Their Use in RESTful APIs	C-23	Lecture
Unit-III	SOAP vs. REST: Comparison and Use Cases of Each	C-24	Lecture

Unit-III	SON and XML: Data Formats and Their Role in Web Services	C-25	Lecture
Unit-III	Parsing JSON and XML in Web Applications	C-26	Lecture
Unit-III	Activity	C-27	Activity
Unit-III	Classroom Assignment	C-28	Class Room Assignment
Unit-III	Seminar	C-29	Seminar
Unit-III	Take Home Assignment	C-30	Take Home Assignment
Unit-III	Clarification Class	C-31	Clarification Class
Unit-IV	Web Security: Common Vulnerabilities in Web Applications (SQL Injection, XSS, CSRF)	C-32	Lecture
Unit-IV	Secure Communication: SSL/TLS Encryption and HTTPS	C-33	Lecture
Unit-IV	Authentication: Session-Based, Cookie-Based, and Token-Based Authentication	C-34	Lecture
Unit-IV	Authorization: OAuth, OpenID, and User Permissions	C-35	Lecture
Unit-IV	Securing Web Applications: Best Practices for Secure Web Development	C-36	Lecture
Unit-IV	Activity-4: Hands-on Implementing Authentication and Authorization in Web Apps	C-37	Activity
Unit-IV	Classroom Assignment	C-38	Class Room Assignment
Unit-IV	Presentation-2: Securing Web Applications: Authentication and Encryption	C-39	Presentation
Unit-IV	Webinar	C-40	Webinar
Unit-IV	Clarification Class	C-41	Clarification Class
Unit-V	Performance Optimization: Techniques for Web Optimization	C-42	Lecture
Unit-V	Caching Strategies: Browser-Side, Server-Side, and Content Caching	C-43	Lecture
Unit-V	Image Optimization and Lazy Loading Techniques	C-44	Lecture
Unit-V	Content Compression: Techniques for Compressing Web Content	C-45	Lecture
Unit-V	CDN (Content Delivery Networks): Improving Website Performance with CDNs	C-46	Lecture
Unit-V	Load Balancing: Techniques for Efficient Traffic Distribution	C-47	Lecture
Unit-V	Activity-5: Hands-on with Performance Optimization Techniques	C-48	Activity
Unit-V	Classroom Assignment	C-49	Class Room Assignment
Unit-V	Take Home Assignment	C-50	Take Home Assignment
Unit-V	Guest Lecture-2: Future Trends in Web	C-51	Guest Lecture

	Technologies and Performance-		
Unit-V	Final Project Discussion: Optimizing and Securing Web Applications	C-52	Discussion Class
Unit-V	Review Class: Key Concepts in Web Technologies	C-53	Review Class
Unit-V	Final Evaluation: Web Technologies and Web Application Development	C-54	Final Evaluation
Unit-V	Final Take Home Assignment	C-55	Take Home Assignment
Unit-V	Scaling Web Applications for the Future	C-56	Lecture
Unit-V	Guest Lecture	C-57	Guest Lecture
Unit-V	Future Directions in Web Technologies: Emerging Trends and Innovations	C-58	Lecture
Unit-V	Real-World Applications of Web Technologies	C-59	Lecture
Unit-V	Clarification Class	C-60	Clarification Class

13014400-TCP / IP

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Networking Overview: Definition of computer networks, types of networks (LAN, WAN, MAN), and	C-1	Lecture
Unit-I	networking devices (routers, switches, hubs, etc.).	C-2	Lecture
Unit-I	OSI and TCP/IP Models: Comparison between OSI and TCP/IP models.	C-3	Lecture
Unit-I	Understanding the layers of TCP/IP (Application, Transport, Internet, and Network Access layers).	C-4	Lecture
Unit-I	IP Addressing: Structure and classes of IP addresses, private	C-5	Lecture
Unit-I	and public IP addresses, subnetting, and subnet masks.	C-6	Lecture
Unit-I	IPv4 and IPv6: Differences between IPv4 and IPv6,.	C-7	Lecture
Unit-I	Activity	C-8	Activity
Unit-I	Classroom Assignment-	C-9	Class Room Assignment
Unit-I	addressing schemes, and the need for IPv6	C-10	Lecture
Unit-I	Recap and Open Q&A on	C-11	Lecture
Unit-I	IP Addressing and IPv4/IPv6 Differences	C-12	Lecture
	Home Assignment		Home Assignment
	Clarification Class	C-13	Clarification Class
Unit-II	Routing and Routing Protocols: Introduction to static and dynamic routing.	C-14	Lecture
Unit-II	Study of Routing Protocols: RIP (Routing Information Protocol), OSPF (Open Shortest Path First), and BGP (Border Gateway Protocol).	C-15	Lecture
Unit-II	Subnetting and Supernetting: Understanding how IP networks are divided and aggregated.	C-16	Lecture
Unit-II	Address Resolution Protocol (ARP): How ARP maps IP addresses to MAC addresses.	C-17	Lecture
Unit-II	Understanding ARP Requests and Replies	C-18	Lecture
Unit-II	Activity-2: Hands-on exercises on configuring routing protocols (RIP, OSPF, BGP) and ARP.	C-19	Activity
Unit-II	Classroom Assignment	C-20	Class Room Assignment
Unit-II	Seminar	C-21	Seminar
Unit-II	Home Assignment		Home Assignment
Unit-II	Routing and ARP Configuration Tasks	C-22	Lecture
Unit-II	Take Home Assignment	C-23	Take Home - Assignment
Unit-II	Routing Protocols in Industry and their Real-	C-24	Lecture

	World Applications		
Unit-II	Study and Compare Routing Protocols (RIP vs OSPF vs BGP).	C-25	Lecture
	Clarification Class	C-26	Clarification Class
Unit-III	Transport Layer Protocols: TCP (Transmission Control Protocol)	C-27	Lecture
Unit-III	Role of TCP in Reliable Data Transmission, Flow Control, Error Detection, and Connection Management	C-28	Lecture
Unit-III	Introduction to UDP (User Datagram Protocol): Differences with TCP, and	C-29	Lecture
Unit-III	use cases where speed is more important than reliability.	C-30	Lecture
Unit-III	Characteristics of UDP, and applications (e.g., streaming, gaming).	C-31	Lecture
Unit-III	Activity	C-32	Activity
Unit-III	Comparison of TCP and UDP: Performance Analysis through simulations	C-33	Lecture
Unit-III	Classroom Assignment	C-34	Class Room Assignment
Unit-III	Implementing TCP and UDP Protocols in Web Applications	C-35	Lecture
Unit-III	Take Home Assignment	C-36	Take Home Assignment
Unit-III	Research on TCP/UDP Use Cases in Real-World Scenarios	C-37	Lecture
	Clarification Class	C-38	Clarification Class
Unit-IV	Application Layer Protocols: Study of protocols like HTTP, FTP, SMTP, POP3, IMAP, DNS, DHCP, and Telnet.	C-39	Lecture
Unit-IV	Understanding the Operation of Application Layer Protocols and Their Role in Enabling Communication.	C-40	Lecture
Unit-IV	Network Address Translation (NAT): Introduction to NAT and its use in IPv4 address conservation.	C-41	Lecture
Unit-IV	DNS (Domain Name System): How DNS Resolves Domain Names to IP Addresses.	C-42	Lecture
Unit-IV	Role of DNS Servers and DNS Records.	C-43	Lecture
Unit-IV	Activity-4: Hands-on exercises on configuring DNS and NAT in a local network environment.	C-44	Activity
Unit-IV	Classroom Assignment-4: Configuring DNS and NAT on a Web Server	C-45	Class Room Assignment
Unit-IV	Guest Lecture-1: Real-world Applications of DNS and NAT in Network Management	C-46	Guest Lecture
Unit-IV	Clarification Class on Application Layer Protocols and Network Addressing	C-47	Clarification Class
Unit-IV	Web Security and Protocols: Overview of Web	C-48	Lecture

	Security Standards (SSL/TLS, HTTPS)		
Unit-IV	Introduction to Secure Web Communications: Role of SSL/TLS Encryption.	C-49	Lecture
Unit-IV	Best Practices for Secure Web Development (Authentication, Authorization, etc.).	C-50	Lecture
Unit-IV	Performance Optimization in Networking: Caching Strategies and Content Delivery Networks (CDNs).	C-51	Lecture
Unit-IV	Load Balancing Techniques in Networking to Improve Performance.	C-52	Lecture
Unit-IV	Activity	C-53	Activity
Unit-IV	Class room Assignment	C-54	Class room Assignment
Unit-IV	Final Review and Q&A on Networking Topics: Routing, Transport, and Application Layers	C-56	Lecture
Unit-IV	Introduction to Wireless Networking: Overview of Wi-Fi, Bluetooth, and Cellular Networks.	C-57	Lecture
Unit-IV	Wireless LAN Technologies: Wi-Fi Standards (802.11a/b/g/n/ac), and Channel Selection.	C-58	Lecture
Unit-IV	Cellular Networks: 3G, 4G, 5G technologies and their protocols.	C-59	Lecture
	Clarification Class	C-60	Clarification Class

77000100 -Research Methodology

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Meaning of Research, Objectives of Research	C-1	Lecture
Unit-I	Motivation in Research, Types of Research	C-2	Lecture
Unit-I	Research Approaches, Significance of Research	C-3	Lecture
Unit-I	Research Methods versus Methodology	C-4	Lecture
Unit-I	Selecting a Research Topic	C-5	Lecture
Unit-I	Activity-1: Brainstorming Research Topics	C-6	Activity
Unit-I	Classroom Assignment	C-7	Classroom Assignment
Unit-I	Recap and Open Q&A on	C-8	Lecture
Unit-I	Research Methodology Basics	C-9	Lecture
Unit-I	Clarification Class	C-10	Clarification Class
Unit-II	Meaning of Research Design, Need for Research Design	C-10	Lecture
Unit-II	Features of a Good Design,	C-11	Lecture
Unit-II	Concepts Related to Research Design	C-12	Lecture
Unit-II	Different Research Designs	C-13	Lecture
Unit-II	Basic Principles of Experimental Designs	C-14	Lecture
Unit-II	Activity-2: Developing a Sample Research Design	C-15	Activity
Unit-II	Classroom Assignment		Classroom Assignment
Unit-II	Evaluating Research Designs	C-16	Lecture
Unit-II	Presentation	C-17	Presentation
Unit-II	Presenting a Research Design	C-18	Lecture
Unit-II	Guest Lecture	C-19	Guest Lecture
	Clarification Class	C-20	Clarification Class
Unit-III	Collection of Primary Data: Observation and Interview Methods	C-21	Lecture
Unit-III	Data Collection through Questionnaires and Schedules	C-22	Lecture
Unit-III	Difference between Questionnaires and Schedules	C-23	Lecture
Unit-III	Some Other Methods of Data Collection	C-24	Lecture
Unit-III	Collection of Secondary Data	C-25	Lecture
Unit-III	Activity-3: Designing a Questionnaire	C-26	Activity
Unit-III	Classroom Assignment-3: Data Collection Approaches	C-27	Classroom Assignment
Unit-III	Seminar	C-28	Seminar
Unit-III	Innovative Methods for Data Collection	C-29	Lecture
Unit-III	Innovative Methods for Data Collection	C-30	Lecture
Unit-III	Take-Home Assignment:	C-31	Take-Home Assignment
Unit-III	Activity	C-32	Activity

Unit-III	Identifying Data Sources	C-33	Lecture
Unit-III	Clarification Class	C-34	Clarification Class
Unit-IV	Processing Operations	C-35	Lecture
Unit IV	Elements/Types of Analysis	C-36	Lecture
Unit-IV	Measures of Central Tendency and Dispersion	C-37	Lecture
Unit-IV	Measures of Asymmetry and Relationship	C-38	Lecture
Unit-IV	Simple and Multiple Regression Analysis	C-39	Lecture
Unit-IV	Simple and Multiple Regression Analysis	C-40	Lecture
Unit-IV	Activity-4:	C-41	Activity
Unit-IV	Practical Data Analysis Using Statistical Tools	C-42	Lecture
Unit-IV	Classroom Assignment:	C-43	Classroom Assignment
Unit-IV	Calculating Statistical Measures	C-44	Lecture
Unit-IV	Clarification Class	C-45	Clarification Class
Unit-V	Practical: Observations	C-46	Practical Session
Unit-V	Practical: Conducting Interviews	C-47	Practical Session
Unit-V	Practical: Conducting Interviews	C-48	Practical Session
Unit-V	Practical: Designing and Using Questionnaires	C-49	Practical Session
Unit-V	Practical: Observations	C-50	Practical Session
Unit-V	Practical: Observations	C-51	Practical Session
Unit-V	Practical: Conducting Interviews	C-52	Practical Session
Unit-V	Practical: Conducting Interviews	C-53	Practical Session
	Clarification Class	C-54	Clarification Class
Unit-VI	Ethical Considerations in Research	C-55	Lecture
Unit-VI	Case Studies: Addressing Ethical Dilemmas in Research	C-56	Case Study Discussion
Unit-VI	Addressing Ethical Dilemmas in Research	C-57	Lecture
Unit-VI	Ethical Considerations in Research	C-58	Lecture
Unit-VI	Case Studies: Addressing Ethical Dilemmas in Research	C-59	Case Study Discussion
Unit-VI	Clarification Class	C-60	Clarification Class

13013700-Intelligent System

Unit	Particulars	Class No.	Pedagogy of Class
Unit-I	Computational Phonology: Issues	C-1	Lecture
Unit-I	Phonological Rules	C-2	Lecture
Unit-I	Mapping Text to Phones	C-3	Lecture
Unit-I	Prosody in TTS (Text-to-Speech)	C-4	Lecture
Unit-I	Probabilistic Models of Pronunciation and Spelling	C-5	Lecture
Unit-I	N-Grams in Phonological Modelling	C-6	Lecture
Unit-I	Analysis of Pronunciation Rules in TTS	C-7	Lecture
Unit-I	Class Room Assignment-1 (Write a Report on N-Grams and their Applications)	C-8	Lecture
Unit-I	Computational Phonology: Issues	C-9	Lecture
Unit-II	Word Classes and POS Tagging	C-10	Lecture
Unit-II	Context-Free Grammar (CFG) for English	C-11	
Unit-II	Lexicalized and Probabilistic Parsing	C-12	Lecture
Unit-II	Semantic Representation	C-13	Lecture
Unit-II	Semantic and Lexical Analysis	C-14	Lecture
Unit-II	Word Sense Disambiguation and Information Retrieval (IR)	C-15	Lecture
Unit-II	Tagging Sentences and Parsing in CFG	C-16	Lecture
Unit-II	Class Room Assignment-2 (Develop a Basic Parser for Word Sense Disambiguation)	C-17	Lecture
Unit-II	Clarification Class	C-18	Clarification Class
Unit-II	Word Classes and POS Tagging	C-19	Lecture
Unit-II	Context-Free Grammar (CFG) for English	C-20	Lecture
Unit-III	Discourse and Dialogue Agents	C-21	Lecture
Unit-III	Natural Language Generation (NLG)	C-22	Lecture
Unit-III	Machine Translation	C-23	Lecture
Unit-III	Introduction to Machine Learning in Language Processing	C-24	Lecture
Unit-III	Home Assignment		Home Assignment
Unit-III	Activity	C-25	Activity
Unit-III	Class Room Assignment		Class Room Assignment
Unit-III	Take Home Assignment-1 (Explore an NLP Machine Learning Model)	C-26	Lecture
Unit-III	Discourse and Dialogue Agents	C-27	Lecture
Unit-III	Natural Language Generation (NLG)		Lecture
Unit-III	Machine Translation	C-28	Clarification Class
Unit-III	Quiz	C-29	Quiz
	Class Room Assignment	C-30	Class Room Assignment
Unit-IV	Clustering Algorithms	C-31	Lecture
	Home Assignment		Home Assignment
Unit-IV	Decision Trees in Data Mining	C-32	Lecture
Unit-IV	Text Mining Techniques	C-33	Lecture

Unit-IV	Synergetic Techniques in Machine Learning	C-34	Lecture
Unit-IV	Machine Learning	C-35	Lecture
Unit-IV	Machine Learning	C-36	Lecture
Unit-IV	Machine Learning	C-37	Lecture
Unit-IV	Genetic Algorithms and Artificial Neural	C-38	Lecture
Unit-IV	Genetic Algorithms and Artificial Neural	C-39	Lecture
Unit-IV	Networks (ANN) for Machine Learning	C-40	Lecture
Unit-IV	Networks (ANN) for Machine Learning		Lecture
Unit-IV	Applications of Machine Learning in Bioinformatics	C-41	Lecture
Unit-IV	Applications of Machine Learning in Bioinformatics	C-42	Lecture
Unit-IV	Clarification Class	C-43	Clarification Class
Unit-IV	Presentation	C-44	Presentation
	Incorporating Intelligence into Systems	C-45	Lecture
Unit-V	Incorporating Intelligence into Systems	C-46	Lecture
Unit-V	Class Room Assignment	C-47	Class Room Assignment
Unit-V	Webinar	C-48	Webinar
Unit-V	Take Home Assignment	C-49	Take Home Assignment
Unit-V	Applications in Physical Machines, including Robots	C-50	Lecture
Unit-V	Web-based Applications of Intelligent Interfaces	C-51	Lecture
Unit-V	Applications in Tutoring Systems, Web Mining, and E-shopping	C-52	Lecture
Unit-V	Activity		Activity
Unit-V	Class Room Assignment	C-53	Class Room Assignment
Unit-V	Webinar	C-54	Webinar
Unit-V	Take Home Assignment	C-55	Take Home Assignment
Unit-V	Incorporating Intelligence into Systems	C-56	Clarification Class
Unit-V	Requirements and Design Issues of Intelligent Interfaces	C-57	Presentation
Unit-V	Applications of Intelligent Interfaces in Stand-alone Systems, Developing Intelligent Interfaces for Operating Systems and Databases	C-58	Class Room Assignment
Unit-V	Classification Class	C-59	Classification Class
Unit-V	Quiz	C-60	Quiz

Note: The review of Syllabus happens on a periodic basis for the benefit of the students. In case there are changes in curriculum due to review, students would be intimated in writing.

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