Shikshan Education Trust's

Shah & Anchor Kutchhi Engineering College

An Autonomous Institute, Affiliated to University of Mumbai

2024-25 | Scheme & Syllabus

Bachelor of Vocational (B.Voc.)

in

Artificial Intelligence & Data Science

First Year B.Voc. with effect from A.Y. 2024-25 onwards

Second Year B.Voc. Scheme with effect from A.Y. 2025-26 onwards

Third Year B.Voc. Scheme with effect from A.Y. 2026-27 onwards

Honours in B.Voc. Scheme with effect from A.Y. 2027-28 onwards

Shah & Anchor Kutchhi Engineering College

CURRICULUM STRUCTURE FIRST YEAR B.Voc.

Artificial Intelligence and Data Science

Chairman BoS
Department of Artificial Intelligence & Data Science
Shah & Anchor Kutchhi Engineering College

Principal

Chairman
Governing Council
Shah & Anchor Kutchhi Engineering College

B.Voc. UG Program in Artificial Intelligence & Data Science

Vision

To be globally recognized for contributing professional and ethical engineers in the field of Artificial Intelligence and Data Science with competence in solving problems and generate an impact.

Mission

1. To provide problem solving and analytical skill based education to students that will enhance their progress in the field of AI and DS through industry collaborations and standards.
2. To develop skilled and ethical professionals who can capable of performing AI and DS based solutions to societal challenges.
3. To equip students for pursuing research in the area of multi-disciplinary, entrepreneurial and modelling methodologies and contribute towards their value in the field of AI and DS.

Shah & Anchor Kutchhi Engineering College

B.Tech. (H) Program in Artificial Intelligence and Data Science

Program Structure for First Year B.Tech. in Artificial Intelligence & Data Science
(With Effect from 2024-2025)

Semester I

Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination				
		Contact Hours per Week		Total Credits	Duration in Hours	Maximum Marks			Total Marks
		L	P			CIA	ESE		
	Semester Commencement								
	2024 Commencement								

CIA–Continuous Internal Assessment ESE–End Semester Examination

Shah & Anchor Kutchhi Engineering College

An Autonomous Institution Affiliated to University of Mumbai

B.Tech. (S) Program in Artificial Intelligence and Data Science

Program Structure for Final Year B.Tech. in Artificial Intelligence & Data Science
(With Effect from 2021-2022)

Semester II

Course Code	Name of the Course	Scheme of Instruction: Hours per Week L	P	Total Credits	Scheme of Examination: Duration in Hours	Maximum Marks CIA	ESE	Total Marks
	General Component							
	AID Component							

*All ESE & ESE (Term & Practical) will be conducted for 100 marks and converted to the appropriate Grading and Examination scheme.

CIA–Continuous Internal Assessment
ESE–End Semester Examination Practical

CIA–Mid Semester Examination
CIA–Continuous Comprehensive Evaluation

CIA–Continuous Internal Assessment Practical
ESE–End Semester Examination

B.Tech. UG Program in Artificial Intelligence and Data Science

Credit Structure

Component	Course Code	Course Category	Sem I	Sem II	Total
GENERAL COMPONENT	[illegible]	Basic Science Courses	[illegible]	[illegible]	[illegible]
	[illegible]	Engineering Science Courses	[illegible]	[illegible]	[illegible]
	[illegible]	Humanities & Social Sciences Courses	[illegible]	[illegible]	[illegible]
	[illegible]	Mandatory Courses	[illegible]		[illegible]
SKILL COMPONENT	[illegible]	Integrated Core Courses	[illegible]	[illegible]	[illegible]
	[illegible]	Vocational & Skill Enhancement Courses	[illegible]	[illegible]	[illegible]
Total Credits			[illegible]	[illegible]	[illegible]

SEMESTER I

[illegible]			L	T	P
[illegible]	[illegible]	[illegible]	3	0	0

Course Objectives	
1	[illegible]
2	[illegible]
3	[illegible]
4	[illegible]

Course Outcomes	
After successful completion of the course, the students will be able to	
CO 1	[illegible]
CO 2	[illegible]
CO 3	[illegible]
CO 4	[illegible]

Prerequisites: nil/ NA

Course Assessment Methods:

DIRECT
1. [illegible]
2. [illegible]
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INDIRECT
1. [illegible]
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Module-I: [illegible]	**[illegible] Hours**
1.1 [illegible]	
1.2 [illegible]	
1.3 [illegible]	
1.4 [illegible]	
1.5 [illegible]	
Module-II: [illegible]	**[illegible] Hours**
2.1 [illegible]	
2.2 [illegible]	
2.3 [illegible]	
Module-III: [illegible]	**[illegible] Hours**
3.1 [illegible]	
3.2 [illegible]	
Module-IV: [illegible]	**[illegible] Hours**
4.1 [illegible]	
4.2 [illegible]	
4.3 [illegible]	

Lecture Hours **Total Hours [illegible] Hrs**

Textbooks

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References

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Programme Name & Code	Semester: I	L	T	P
Communication and Presentation Skills	Course Code: BTCS[illegible]	3	0	0

Course Objectives	
1	To develop and develop an effective model of making progress-oriented documents
2	To strengthen the knowledge of the student communication in the form of giving instructions, [illegible]
3	To develop correct and objective presentations
4	To make an personal, team, interview, culture and application

Course Outcomes	
After successful completion of this course, the students will be able to:	
CO1:	Plan and prepare effective technical documents which will in some part be a solid foundation for their future professional work
CO2:	Prepare the best research communications in order to the demands of the industry
CO3:	Participate in group communications, discussions, meetings, presentations etc.
CO4:	Obtain a decision with success in written communication behaviour

Pre-requisite courses, if any:

Course coordinator: Mr./Ms./Dr.

SYLLABUS
1. Communication: Introduction, Importance, Process, Barriers, Types of Communication (Verbal, Non-verbal, Written, Graphic, Audio-visual, Electronic), Principles of Effective Communication, Communication Ethics, Communication Technology Update, Communication Networks, Flow of Communication (Formal, Informal, Grapevine), Barriers to Communication, Miscommunication, Noise, Overcoming Measures, Importance of Listening Skills, Effective Listening Skills, Body Language, Interpersonal Skills, Negotiation Skills, Conflict Management, Leadership Skills, Motivation, Time Management, Stress Management, Assertiveness, Etiquette, Soft Skills, Public Speaking Skills, Group Discussion, Interview Skills, Resume Writing, Cover Letter, Job Application, Report Writing, Technical Proposals, Research Papers, Project Writing, Business Letters, Memos, Minutes of Meeting, Notices, Agenda, Circulars, Press Release, Inquiries, Quotations, Tenders, Orders, Complaints, Adjustment Letters, Collection Letters, Sales Letters, Status Reports, Progress Reports, Feasibility Reports, Evaluation Reports, Accident Reports, Survey Reports, Project Reports, Business Reports, Annual Reports, Proposals, Manuals, Instructions, Abstracts, Executive Summaries, Technical Articles, Newsletters, Blogs, Social Media Communication, Digital Communication, Virtual Communication, Cross-Cultural Communication, Global Communication, Ethical Communication, Legal Communication, Environmental Communication, Sustainability Communication, Corporate Social Responsibility Communication, Crisis Communication, Risk Communication, Health Communication, Science Communication, Technical Communication, Scientific Communication, Engineering Communication, Medical Communication, Pharmaceutical Communication, Financial Communication, Marketing Communication, Advertising Communication, Public Relations Communication, Media Relations, Press Conferences, Interviews, Speeches, Presentations, Visual Aids, Graphics, Charts, Graphs, Tables, Diagrams, Illustrations, Photographs, Videos, Animations, Multimedia, Interactive Media, Virtual Reality, Augmented Reality, Artificial Intelligence, Machine Learning, Natural Language Processing, Chatbots, Voice Assistants, Smart Devices, Internet of Things, Cloud Computing, Big Data, Analytics, Cybersecurity, Privacy, Data Protection, Ethics, Legal Issues, Intellectual Property, Copyright, Trademark, Patent, Licensing, Contracts, Agreements, Disputes, Arbitration, Mediation, Litigation, Court Proceedings, Judgments, Appeals, Enforcement, Compliance, Regulations, Standards, Guidelines, Best Practices, Case Studies, Examples, Illustrations, Applications, Implications, Recommendations, Conclusions, Future Trends, Emerging Issues, Challenges, Opportunities, Solutions, Strategies, Tactics, Techniques, Methods, Tools, Resources, Skills, Competencies, Knowledge, Attitudes, Values, Ethics, Professionalism, Integrity, Responsibility, Accountability, Transparency, Trustworthiness, Reliability, Quality, Excellence, Innovation, Creativity, Critical Thinking, Problem Solving, Decision Making, Leadership, Teamwork, Collaboration, Communication, Interpersonal Skills, Emotional Intelligence, Cultural Intelligence, Global Mindset, Diversity, Inclusion, Equity, Social Justice, Human Rights, Environmental Sustainability, Corporate Social Responsibility, Ethical Leadership, Servant Leadership, Transformational Leadership, Transactional Leadership, Situational Leadership, Contingency Theory, Path-Goal Theory, Leader-Member Exchange Theory, Vroom-Yetton-Jago Model, Fiedler's Contingency Model, Hersey-Blanchard Situational Leadership Model, Blake-Mouton Managerial Grid, Ohio State Leadership Studies, University of Michigan Leadership Studies, Lewin's Leadership Styles, Tannenbaum and Schmidt's Leadership Continuum, Likert's Four Systems of Management, McGregor's Theory X and Theory Y, Ouchi's Theory Z, Deming's 14 Points for Management, Juran's Quality Trilogy, Crosby's Quality Management Maturity Grid, Feigenbaum's Total Quality Control, Ishikawa's Fishbone Diagram, Pareto Analysis, Statistical Process Control, Six Sigma, Lean Manufacturing, Kaizen, Just-in-Time, Kanban, Poka-Yoke, Value Stream Mapping, Root Cause Analysis, 5 Whys, Fishbone Diagram, Pareto Chart, Control Chart, Histogram, Scatter Diagram, Run Chart, Flowchart, Process Map, SIPOC Diagram, Cause and Effect Matrix, Failure Mode and Effects Analysis, Design of Experiments, Taguchi Methods, Response Surface Methodology, Evolutionary Operation, Simplex Method, Monte Carlo Simulation, Queuing Theory, Inventory Control, Supply Chain Management, Logistics, Transportation, Warehousing, Distribution, Procurement, Purchasing, Supplier Relationship Management, Vendor Management, Contract Management, Negotiation, Bidding, Tendering, Auctions, Reverse Auctions, Electronic Procurement, E-Commerce, E-Business, E-Government, E-Learning, E-Health, E-Banking, E-Finance, E-Insurance, E-Tourism, E-Agriculture, E-Environment, E-Energy, E-Transportation, E-Logistics, E-Supply Chain, E-Procurement, E-Sourcing, E-Auctions, E-Negotiation, E-Contracts, E-Payments, E-Security, E-Privacy, E-Ethics, E-Law, E-Regulations, E-Standards, E-Guidelines, E-Best Practices, E-Case Studies, E-Examples, E-Applications, E-Implications, E-Recommendations, E-Conclusions, E-Future Trends, E-Emerging Issues, E-Challenges, E-Opportunities, E-Solutions, E-Strategies, E-Tactics, E-Techniques, E-Methods, E-Tools, E-Resources, E-Skills, E-Competencies, E-Knowledge, E-Attitudes, E-Values, E-Ethics, E-Professionalism, E-Integrity, E-Responsibility, E-Accountability, E-Transparency, E-Trustworthiness, E-Reliability, E-Quality, E-Excellence, E-Innovation, E-Creativity, E-Critical Thinking, E-Problem Solving, E-Decision Making, E-Leadership, E-Teamwork, E-Collaboration, E-Communication, E-Interpersonal Skills, E-Emotional Intelligence, E-Cultural Intelligence, E-Global Mindset, E-Diversity, E-Inclusion, E-Equity, E-Social Justice, E-Human Rights, E-Environmental Sustainability, E-Corporate Social Responsibility, E-Ethical Leadership, E-Servant Leadership, E-Transformational Leadership, E-Transactional Leadership, E-Situational Leadership, E-Contingency Theory, E-Path-Goal Theory, E-Leader-Member Exchange Theory, E-Vroom-Yetton-Jago Model, E-Fiedler's Contingency Model, E-Hersey-Blanchard Situational Leadership Model, E-Blake-Mouton Managerial Grid, E-Ohio State Leadership Studies, E-University of Michigan Leadership Studies, E-Lewin's Leadership Styles, E-Tannenbaum and Schmidt's Leadership Continuum, E-Likert's Four Systems of Management, E-McGregor's Theory X and Theory Y, E-Ouchi's Theory Z, E-Deming's 14 Points for Management, E-Juran's Quality Trilogy, E-Crosby's Quality Management Maturity Grid, E-Feigenbaum's Total Quality Control, E-Ishikawa's Fishbone Diagram, E-Pareto Analysis, E-Statistical Process Control, E-Six Sigma, E-Lean Manufacturing, E-Kaizen, E-Just-in-Time, E-Kanban, E-Poka-Yoke, E-Value Stream Mapping, E-Root Cause Analysis, E-5 Whys, E-Fishbone Diagram, E-Pareto Chart, E-Control Chart, E-Histogram, E-Scatter Diagram, E-Run Chart, E-Flowchart, E-Process Map, E-SIPOC Diagram, E-Cause and Effect Matrix, E-Failure Mode and Effects Analysis, E-Design of Experiments, E-Taguchi Methods, E-Response Surface Methodology, E-Evolutionary Operation, E-Simplex Method, E-Monte Carlo Simulation, E-Queuing Theory, E-Inventory Control, E-Supply Chain Management, E-Logistics, E-Transportation, E-Warehousing, E-Distribution, E-Procurement, E-Purchasing, E-Supplier Relationship Management, E-Vendor Management, E-Contract Management, E-Negotiation, E-Bidding, E-Tendering, E-Auctions, E-Reverse Auctions, E-

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A. Suggested Topic List of Ergonomics Dictionary in Ergonomics

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Course Objectives	
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2	[redacted]
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Course Outcomes	
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DETAILED SYLLABUS	
Module-1: Sets Theory	**07 Hours**
1.1 Introduction of Sets, Sets Representation, Cardinality of a Sets 1.2 Types of Sets, Power set of a Sets, Venn Diagrams 1.3 Operations on Sets, Laws of Sets, Introduction of Sets, Difference of Sets, Complement of a Sets, Symmetric Difference of Sets 1.4 Algebra of Sets, Duality, Principle of Inclusion, Exclusion principle of two sets 1.5 Multisets, Operations on Multisets, Indexed Sets, Ordered Pairs	
Module-2: Boolean Algebra	**12 Hours**
2.1 Boolean Algebra, Properties of Boolean Algebra 2.2 Boolean Expressions, Evaluation of Boolean Expressions, Equal Boolean Expressions 2.3 Canonical Forms, Disjunctive Normal Forms or Sum of Products or (SOP), Conjunctive Normal Forms or Products of Sums or (POS), Obtaining a Disjunctive Normal Form, Obtaining a Conjunctive Normal Form, Principle of Duality 2.4 Logic Gates and Circuits, Schematics or Graphical Representations of Boolean Expressions, Applications of Boolean Algebra to Switching Theory, Karnaugh Maps	
Module-3: Relations and Functions	**11 Hours**
3.1 Binary Relations, Domain and Range of Relations, Complements of a Relation, Representations of Relations, Properties of Relations, Composition of Relations and Relations, Types of Relations, Closure Properties of Relations, Equivalence Relations, Partial Ordering 3.2 Functions, Domain, Co-Domain, and Range of a Function, Functions as a Set, Representations of a Function, Types of Functions, Identity Functions, Inverse Functions, Functions Composition of Functions, Mathematical Functions	
Module-4: Graph Theory	**10 Hours**
4.1 Introduction to Graphs, Types of Graphs, Representations of Graphs, Isomorphic Graphs, Homeomorphic Graphs, Subgraphs, Multigraph, Complete Graph, Regular Graph, Bipartite Graph, Complete Bipartite Graph, Planar Graph, Properties of Planar Graphs 4.2 Euler Planar Graph, Properties of Euler Planar Graphs, Graph Coloring, Applications of Graph Coloring	

Lecture Schemes **Total Hours: 40 Hrs**

Textbooks

1. "Discrete Mathematics and its Applications" by Kenneth H. Rosen.
2. "Introduction to Graph Theory" by Douglas B. West
3. "Discrete Mathematics" by Thomas J. Hegge

Reference Books

1. "Trigonometry: An Easy Guide for Study" by Agnesthus Demonstrations (Science) 3E Supplementary Science Organizations and Author 3E Theory

[illegible]	Semester: I	L	P	C
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Course Objectives	
1	[illegible]
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Course Outcomes	
After successful completion of this course, the student will be able to:	
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Course Assessment Methods:

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Course Objectives	
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Course Outcomes	
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CO 3	[illegible]
CO 4	[illegible]

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Course Objectives	
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Course Outcomes	
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CO 1	[illegible]
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Module-1: PC Assembling and Software Installation	**7 Hours**
1.1 Introduction to PC Components: Identify and understand the various hardware components of a computer such as CPU, motherboard, RAM, storage devices, power supply, etc. 1.2 Assembly Process: Step-by-step guide to assembling a PC, including installing the CPU, RAM, motherboard, power supply, GPU, storage devices, and cables. 1.3 Installing Drivers: Installing drivers for hardware components to ensure proper functionality. 1.4 Troubleshooting Basics: Identifying common issues during PC assembly and troubleshooting techniques.	
Module-2: Windows Operating System Installation	**6 Hours**
2.1 Introduction to Operating Systems: Overview of different operating systems (Windows, Linux, macOS), Understanding the role of an operating system in a computer. 2.2 Choosing and Preparing Installation Media: Choosing between installation media (USB, DVD), Creating bootable USB drives, Understanding BIOS/UEFI settings for system configurations. 2.3 Installation Process: Step-by-step guide to installing the chosen operating system, Partitioning drives and formatting during installation. 2.4 Driver Installation: Installing necessary drivers for hardware components, Basic Configuration and Setup: Setting up user accounts, network settings, and basic configurations post-installation.	
Module-3: Networking Basics	**6 Hours**
3.1 Introduction to Computer Networking: Basic Understanding Concepts, Network and wiring requirements, Types of networks (LAN, WAN, MAN), Components and topologies, Choice of components, Ranging, Self duplex, Half duplex, Concept of modulation, Demodulation. 3.2 Types of Networks: LAN, WAN, MAN, Network Topologies: Bus, Star, Ring, Mesh, Tree, Hybrid, Understanding Network Protocols: Overview of common protocols (TCP/IP, HTTP, FTP, DNS, DHCP), Their functions and importance. 3.3 Network Devices: Routers, Switches, Modems, Access Points, Network Cables: Types of cables (Ethernet, fiber optic), Connectors, Network Configuration: Setting up a network, Configuring IP addresses (static and dynamic), Subnetting basics. 3.4 Types of cables and connectors: Cable Types (UTP, STP, Coaxial, Fiber Optic), Connectors (RJ45, BNC), Cable standards (Cat5e, Cat6, Cat6a), Hands-on: Crimping cables and testing connections.	
Module-4: Computer networking tools and troubleshooting	**7 Hours**
4.1 Network Components such as LAN cards, hubs, switches, routers, Basics of IP addressing and subnetting, Basics of Network Protocols, Network Configuration, Wireless Networking. 4.2 Testing and Troubleshooting Tools: Introduction to network testing and troubleshooting tools, Ping, Traceroute, Ipconfig, Ifconfig, Netstat, Nslookup, Packet Analyzers. 4.3 Basic troubleshooting techniques: Common network problems and solutions, Using Ping to verify host reachability, Analyzing network traffic with Wireshark, Interpreting network logs and error messages.	

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Prerequisite Course(s) Core & Elec.	Semester: V			
Time: (Hours/Week)	Course Code: [illegible]	3	0	3

Course Objectives	
1	To introduce fundamental concepts of data science, statistics, and the CRISP-DM process
2	To develop skills for managing, processing, and analyzing data from various sources
3	To provide practical exposure to tools and software used in data analysis
4	To enhance professional skills for effective collaboration, communication, and ethical practices

Course Outcomes	
After successful completion of this course, the student will be able to:	
CO 1	[illegible]
CO 2	[illegible]
CO 3	[illegible]
CO 4	[illegible]

Prerequisite courses: [illegible]
Course assessment Methods:

DIRECT	
1	Continuous/Internal assessment (Theory and Lab components)
2	Assignments/Tutorials/Term papers/presentations/Group discussions/Quiz sessions/Industry interaction/Design Thinking Interaction Sessions
3	Mid Term Examination/Practical Viva-Voce Examination/Mini Project/Lab Performance/Lab Journal/Lab Assignments/Tutorials/Term papers/presentations/Design Sessions/Quiz sessions/Case studies/Design Thinking Interaction Sessions/Industry Visit Components
4	End Semester Examination (Theory and Lab components)
INDIRECT	
1	Course exit survey



Model Curriculum

Table of Contents

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SEMESTER II

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Course Objectives	
1	[illegible]
2	[illegible]
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Course Outcomes	
After successful completion of this course, the students will be able to:	
CO 1	[illegible]
CO 2	[illegible]
CO 3	[illegible]
CO 4	[illegible]

Prerequisites: [illegible]

Course Assessment Methods:

DIRECT
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Textbooks:

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References:

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Course Objectives:	
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Course Outcomes:	
After successful completion of this course, the students will be able to:	
CO-1	[redacted]
CO-2	[redacted]
CO-3	[redacted]
CO-4	[redacted]

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Course Assessment Methods:

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INDIRECT
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Course Objectives	
1	[illegible]
2	[illegible]
3	[illegible]
4	[illegible]

Course Outcomes	
After successful completion of this course, the student will be able to:	
CO1	[illegible]
CO2	[illegible]
CO3	[illegible]
CO4	[illegible]

[illegible]

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[illegible]	
[illegible]	[illegible] Hours
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[illegible]	[illegible] Hours
[illegible]	

[illegible] [illegible]

[illegible]

A. [illegible]

1. [illegible]
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14. [illegible]
15. [illegible]

[illegible]

[illegible]

1. [illegible]
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3. [illegible]

[illegible]

1. [illegible]
2. [illegible]

[redacted]	Semester: II	I	II	III
[redacted]	Course Code: [redacted]	3	3	3

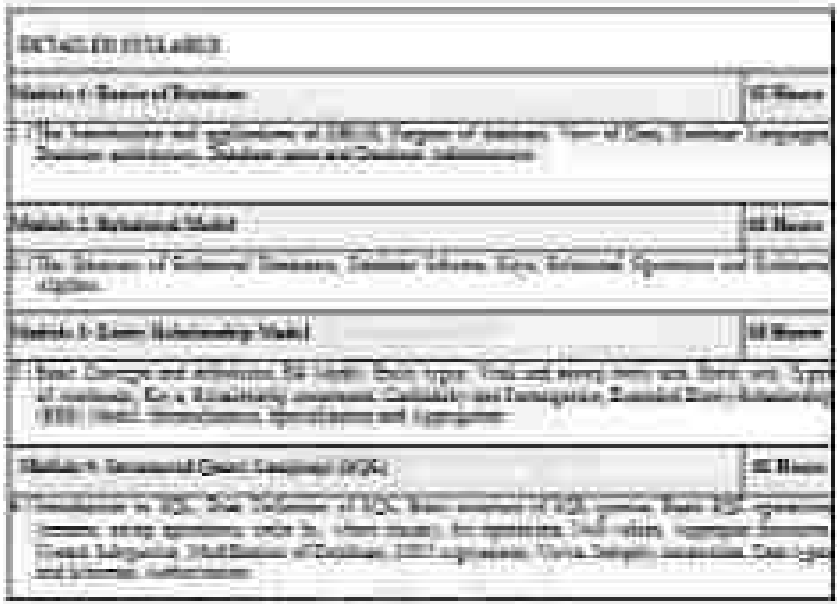
Course Objectives:	
1	[redacted]
2	[redacted]
3	[redacted]
4	[redacted]

Course Outcomes:	
After successful completion of this course, the students will be able to:	
CO 1:	[redacted]
CO 2:	[redacted]
CO 3:	[redacted]
CO 4:	[redacted]

Pre-requisite: [redacted]

Course Assessment Methods:

DIRECT
[redacted]
INDIRECT
[redacted]



Lab Guidelines

a. Suggested Topics List of experiments (minimum 8 experiments)

i. [illegible]
ii. [illegible]
iii. [illegible]
iv. [illegible]
v. [illegible]
vi. [illegible]
vii. [illegible]
viii. [illegible]
ix. [illegible]
x. [illegible]

Practical Approach **Total Hours (In Hrs)**

Textbooks

1. [illegible]
2. [illegible]
3. [illegible]

Reference Books

1. [illegible]
2. [illegible]
3. [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Course Objectives	
1	[illegible]
2	[illegible]
3	[illegible]
4	[illegible]

Course Outcomes	
After successful completion of this course, the students will be able to:	
CO 1	[illegible]
CO 2	[illegible]
CO 3	[illegible]
CO 4	[illegible]

[illegible]

Course Assessment Methods

Direct	
1. [illegible]	
2. [illegible]	
3. [illegible]	
4. [illegible]	
Indirect	
1. [illegible]	
2. [illegible]	

DETAILED SYLLABUS

Module 1: Introduction and Basics of Python Programs	10 Hours
1.1 Introduction: What is Python Programming Language, History, Features, Installing Python, Running Python programs, Debugging, Syntax Errors, Runtime Errors, Logical Errors, Experimental Debugging, Formal and Natural Languages, The Difference Between Programs, Errors, and Exceptions 1.2 Variables and Expressions: Values and Types, Variables, Names and Keywords, Type conversion, Operators and Operands, Expressions, Interactive Mode and Script Mode, Order of Operations	

Module 2: Conditional Statements, Control statements, Classes and Objects	10 Hours
2.1 Conditional Statements: if, if-else, nested if-else, Looping: for, while, nested loops 2.2 Control statements: Terminating loops, skipping specific conditions 2.3 Classes and Objects: Overview of OOP (Object Oriented Programming), Class Definition, Creating Objects, Accessing an Object's Attributes and Methods, Built-in Class Attributes, Destruction, Garbage Collection, Data Encapsulation, Data Hiding	

Module 3: Functions and Strings	10 Hours
3.1 Functions: Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are Local, Stack Diagrams, Fruitful Functions and Void Functions, Why Functions?, Importing with from, Return Values, Incremental Development, Composition, Boolean Functions, More Recursion, Leap of Faith, Checking Types 3.2 Strings: A String Is a Sequence, Traversal with a for Loop, String Slices, Strings are Immutable, Searching, Looping and Counting, String Methods, The in Operator, String Comparison, String Operations	

Module 4: Lists, Tuples and Dictionaries, Classes and Objects	10 Hours
4.1 Lists: List Values, Accessing Elements, Lists are Mutable, Traversing a List, Operations on Lists, List Slices, List Methods, List Operations, Deleting Elements, Objects and Values, Aliasing, Cloning Lists, Parameters and Arguments 4.2 Tuples and Dictionaries: Tuples, Assigning values to Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, Basic list operations, Concatenation, Repetition, Membership, Iteration, Built-in Tuple Functions, Creating a Dictionary, Accessing Values in a Dictionary, Updating Dictionary, Deleting Dictionary Elements, Properties of Dictionary Keys, Operations in Dictionary, Built-in Dictionary Functions, Built-in Dictionary Methods	

Lecture Hours: 40

Total Hours: 40 Hrs

LAB CONTENTS:

A. Suggested Topics for List of experiments (minimum 8 experiments)

1. Install and configure Python IDE
2. Write simple Python program to display message on screen
3. Write simple Python program using operators
   a) Arithmetic Operators b) Logical Operators c) Bitwise Operators
4. Write simple Python program to demonstrate use of conditional statements
   a) if statement b) if...else statements c) Nested if statement
5. Write python program to demonstrate use of looping statements
   a) while loop b) for loop c) Nested loops
6. Write python program to perform following operations on Lists
   a) Create List b) Access List c) Update List d) Delete List
7. Write python program to perform following operations on Tuples
   a) Create Tuple b) Access Tuple c) Update Tuple d) Delete Tuple
8. Write python program to perform following operations on Dictionary
   a) Create Set b) Access Set elements c) Update Set d) Delete Set
9. Write python program to perform following operations on Strings
   a) Create Dictionary b) Access Dictionary elements c) Delete Set d) Update Dictionary
   e) Looping through Dictionary
10. a) Write Python program to demonstrate inner functions
    b) Write Python program to demonstrate Anonymous functions

B. Mini Project (Group Activity)

Practical Outcomes: **Total Hours: 60 Hrs**

Textbooks

1. [Author], "Core Python Programming", Dreamtech Press
2. [Author], "Core Python [illegible]", [illegible]
3. [Author], "Python 3", [illegible]
4. [Author], "Python Programming", [illegible]

Reference Books

1. [illegible]
2. [illegible]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Course Objectives	
1	[redacted]
2	[redacted]
3	[redacted]
4	[redacted]

Course Outcomes:	
After successful completion of this course, the students will be able to:	
CO 1	[redacted]
CO 2	[redacted]
CO 3	[redacted]
CO 4	[redacted]

Course Assessment Methods:

DIRECT
[redacted]

INDIRECT
[redacted]

[illegible]

A. [illegible]

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Course Objectives	
1	To introduce fundamental concepts of data science, statistics, and the IT/ITeS industry
2	To develop skills for managing, processing, and analyzing data from multiple sources
3	To provide practical exposure to tools and software used in data analytics
4	To enhance professional skills for effective visualization, performance communication, and ethical practices

Course Outcomes	
After successful completion of this course, the students will be able to:	
CO 1	Understand data science concepts, statistical methods, and the role of data in the IT/ITeS industry
CO 2	Apply techniques to collect, manage, and analyze data from various sources
CO 3	Use appropriate tools and software to perform data analysis and visualization
CO 4	Communicate insights and data through effective presentations, reports, and ethical practices

Prerequisite courses: Nil
Course assessment Methods:

DIRECT
1. Continuous Internal Assessment (Theory and Lab components)
2. End-semester Theory Examination (Descriptive/Objective) and End-semester Lab Examination (Design, Testing, Interpretation, Documentation)
3. Student Engagement Due to Flipped Classroom Methodology and Engagement Due to Project-based Learning (Assessment Methods for Theory and Lab Components)
4. Mini-project Presentation / Demonstration / Lab Component
INDIRECT
1. Course Exit Survey



Model Curriculum

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[illegible] 2
[illegible] 4
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[illegible] 6
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SHAH & ANCHOR

विद्यार्थिनं सर्वविद्याप्रवीणम्॥