Kurukshetra University, Kurukshetra

(Established by the State Legislature Act XII of 1956)

('A++' Grade, NAAC Accredited)

॥ योगस्थ: कुरु कर्माणि ॥

समबुद्धि व योग युक्त होकर कर्म करो

(Perform Actions while Stead fasting in the State of Yoga)

Scheme of Examination for Under-Graduate Programmes

Bachelor of Computer Applications (Industry-Linked Program)

SCHEME D

according to

Curriculum Framework for Under-Graduate Programmes

As per NEP-2020 (Multiple Entry-Exit, Internships and Choice Based Credit System)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

(For the Batches Admitted From 2025-2026)

Program Learning Outcomes (PLOs)

1. Domain Knowledge & Technical Proficiency

i. Apply core knowledge of computer science and software development to solve real-world problems.
ii. Demonstrate proficiency in programming languages, database systems, web technologies, and software tools.
iii. Develop applications using modern software development frameworks and tools.

2. Work-Based Learning & Industry Exposure

i. Gain hands-on experience through on-the-job training in live industrial environments.
ii. Demonstrate understanding of workplace expectations, professional behavior, and organizational structure.
iii. Translate classroom concepts into practical deliverables in a professional setting.

3. Critical Thinking & Problem Solving

i. Analyze complex computing problems and apply logical reasoning and algorithmic thinking for solutions.
ii. Employ debugging, testing, and optimization strategies to improve software performance.

4. Communication and Teamwork

i. Communicate effectively in both written and oral forms in academic and workplace settings.
ii. Collaborate in teams and interdisciplinary environments, demonstrating interpersonal skills and conflict resolution.

5. Apprenticeship-Based Learning Outcomes

i. Reflect measurable growth in workplace competencies, productivity, and workplace readiness through formal apprenticeship assessments.
ii. Demonstrate the ability to assimilate feedback, maintain logs, and submit detailed training reports for performance evaluation.

Kurukshetra University Kurukshetra
Scheme of Examination for Undergraduate programmes
Subject: BCA (Industry-Linked Program)
According to
Curriculum Framework for Undergraduate Programmes
as per NEP 2020 (Multiple Entry-Exit, Internships and Choice Based Credit System)

Semester	Course Type	Course Code	Nomenclature of paper	Credits	Contact hours	Internal marks	End term Marks	Total Marks	Duration of exam (Hrs)
1	CC-A1	B25-CIL-101	Computer Fundamentals & Problem Solving using Python	2	2	15	35	50	3
			Practical	2	4	15	35	50	3
	CC-B1	B25-CIL-102	Introduction to Web Technologies	2	2	15	35	50	3
			Practical	2	4	15	35	50	3
	CC-C1	B25-CIL-103	Linux and Shell Programming	2	2	15	35	50	3
			Practical	2	4	15	35	50	3
	CC-M1	B25-CIL-104	Introduction to Data Science	1	1	10	20	30	3
			Practical	1	2	5	15	20	3
	MDC1	B25-CIL-105/ To be taken from other Dept.	Introduction to Statistics	2	2	15	35	50	3
			Practical	1	2	5	20	25	3
	SEC1	To be taken from SEC Pool		3					
	VAC1	To be taken from VAC Pool		2					
	AEC1	To be taken from AEC Pool		2					
2	CC-A2	B25-CIL-201	Programming in C	2	2	15	35	50	3
			Practical	2	4	15	35	50	3
	CC-B2	B25-CIL-202	Front End Engineering	2	2	15	35	50	3
			Practical	2	4	15	35	50	3
	CC-C2	B25-CIL-203	Database Management Systems	2	2	15	35	50	3
			Practical	2	4	15	35	50	3
	CC-M2	B25-CIL-204	Data Analytic using Python	1	1	10	20	30	3
			Practical	1	2	5	15	20	3
	MDC-2	B25-CIL-205/ To be taken from other department	Mathematics for Data Science	2	2	15	35	50	3
			Practical	1	2	5	20	25	3
	SEC-2	To be taken from SEC Pool		3					
	VAC-2	To be taken from VAC Pool		2					
	AEC-2	To be taken from AEC Pool		2					

3	CC-A3	B25-CIL-301	Data Structures	2	2	15	35	50	3
			Practical	2	4	15	35	50	3
	CC-B3	B25-CIL-302	Back End Engineering	2	2	15	35	50	3
			Practical	2	4	15	35	50	3
	CC-C3	B25-CIL-303	Cloud Computing	2	2	15	35	50	3
			Practical	2	4	15	35	50	3
	CC-M3	B25-CIL-304	Data Visualization	2	2	15	35	50	3
			Practical	2	4	15	35	50	3
	MDC-3	B25-CIL-305/ To be taken from other department	Design Thinking and Innovation	2	2	15	35	50	3
			Practical	1	2	5	20	25	3
	SEC-3	To be taken from SEC Pool		3					
	AEC-3	To be taken from AEC Pool		2					
4	CC -A4	B25 -CIL-401	Artificial Intelligence and Machine Learning	3	3	20	50	70	3
			Practical	1	2	10	20	30	3
	CC -B4	B25 -CIL-402	Front End Frameworks	2	2	15	35	50	3
			Practical	2	4	15	35	50	3
	CC -C4	B25 -CIL-403	Mobile Application Development	2	2	15	35	50	3
			Practical	2	4	15	35	50	3
	AEC - 4	To be taken from AEC Pool		2					
	VAC - 3	To be taken from VAC Pool		2					
	CC - M4(V)	B25 -CIL-404/ To be taken from VOC Pool	AI for Data Science	2	2	15	35	50	3
			Practical	2	4	15	35	50	3
						A#	B#	C#	D#
5			Apprenticeship	20	600	125	125	250	500
6			Apprenticeship	20	600	125	125	250	500

A# Marks by establishment.
B# Marks by faculty mentor.
C# Marks through Presentation/Viva-Voce.
D# (Total Marks) = A + B + C

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Scheme of Examination for Under-Graduate Programmes

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DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

(For the Batches Admitted From 2025-2026)

With effect from the Session: 2024-25			
Part A - Introduction			
Name of the Programme	BCA (Industry-Linked Program)		
Semester	1st		
Name of the Course	Computer Fundamentals & Problem Solving using Python		
Course Code	B25-CIL-101		
Course Type	CC-A1		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)	-		
Course Objectives	This course is designed to introduce students—regardless of their prior experience with computers—to the foundational concepts of computing and the basics of programming using Python. It aims to build a strong understanding of computer organization, data representation, and problem-solving strategies. The course further introduces Python as a beginner-friendly high-level programming language to implement algorithmic solutions, enabling students to develop logical thinking and structured programming skills essential for application development in various domains.		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	**CLO I:** Students will understand the working and organization of computer systems and represent data in various number systems. **CLO II:** Students will be able to analyze problems and write structured algorithms and pseudocode to solve them using Python. **CLO III:** Students will apply control structures, functions, and string operations effectively in Python programs. **CLO IV:** Students will manipulate data using Python's built-in data structures. **CLO V:** Apply problem-solving skills to design, code, test, and debug simple Python programs using appropriate programming constructs, data structures, and logic to solve real-world computational problems.		
Credits	Theory	Practical	Total
	2	2	4
Teaching Hours per week	2	4	6
Internal Assessment Marks	15	15	30
End Term Exam Marks	35	35	70
Max. Marks	50	50	100
Examination Time	3 hours	3 hours	

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit I to IV and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	Components of a computer system: CPU, memory, input and output devices. Types of software: system software, application software, and utility software. Introduction to operating systems: functions, types of operating system. Data representation: number systems (binary, octal, decimal, hexadecimal), conversions and binary arithmetic (addition, subtraction using 1's and 2's complement). Concept of logic gates and truth tables.	7
II	Problem-solving concepts, algorithms, flowcharts, and pseudocode. Characteristics of a good program. Introduction to programming languages: machine, assembly, and high-level languages. Compiler vs interpreter. Basics of Python: features, Python IDEs. Writing first Python program. Python syntax and indentation, variables and data types, type casting, input/output operations.	8
III	Operators in Python: arithmetic, relational, logical, assignment, membership, identity, and bitwise. Conditional control structures: if, if-else, nested if-else, match-case. Looping	7

	structures: while, for, nested loops, break and continue. Python functions: defining and calling functions, arguments and return values, built-in functions, scope of variables. String handling: string operations, string methods, formatting strings.	
IV	Lists: creation, indexing, slicing, updating, list methods (append(), insert(), remove(), pop(), sort(), reverse()), list iteration, nested lists; Tuples: creation, indexing, slicing, immutability, tuple operations, packing and unpacking. Dictionaries: creating, accessing, updating key-value pairs, dictionary methods (get(), items(), keys(), values(), update(), pop()), nested dictionaries; Sets: creation, adding/removing elements, set operations (union, intersection, difference), removing duplicates.	8
V	Practical exercises based on Units I–IV covering problem-solving, algorithm design, and implementation of Python programs using control structures, functions, and data structures. Students will develop small applications to demonstrate data representation, logic operations, and manipulation of strings, lists, tuples, dictionaries, and sets.	60
	Total Contact Hours	90

Suggested Evaluation Methods

Internal Assessment: 30		**End Term Examination: 70**	
Theory	**15**	**Theory**	**35**
Class Participation/ Seminar/ presentation/ assignment/ quiz/ class test etc.:	5	Written Examination	
Mid-Term Exam:	10		
Practical	**15**	**Practical**	**35**
Class Participation/ Seminar/ presentation/ assignment/ quiz/ class test etc.:	5	Practical Examination	
Mid-Term Exam:	10		

Part C-Learning Resources

Reference Books

1) Reema Thareja, Python Programming: Using Problem Solving Approach, Oxford University Press, 2017.
2) Yashavant Kanetkar, Let Us Python, BPB Publications, Latest Edition.
3) R.S. Salaria, Problem Solving and Programming in Python, Khanna Publishing, 2020.
4) Dr. Anita Goel, Computer Fundamentals, Pearson Education, 2010.
5) Charles Severance, Python for Everybody: Exploring Data Using Python 3, CreateSpace Independent Publishing, 2016. (Also available as a free online resource)

With effect from the Session: 2024-25			
Part A - Introduction			
Name of the Programme	BCA (Industry-Linked Program)		
Semester	1st		
Name of the Course	Introduction to Web Technologies		
Course Code	B25-CIL-102		
Course Type	CC-B1		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)	-		
Course Objectives	This course is designed to introduce students to the fundamentals of web technologies. It serves as the foundation for understanding how the web works, including basic concepts of the internet, websites, domain names, hosting, and web protocols. The course covers essential web markup technologies such as HTML and CSS to help students structure and style web pages. Special emphasis is given to equipping beginners with the skills to build simple static websites, paving the way for more advanced web development topics like front-end engineering, back-end development, and frameworks in subsequent semesters.		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	**CLO I:** Students will understand the foundational concepts of how the web and internet function, including protocols, domains, and hosting. **CLO II:** Students will be able to create structured web pages using HTML elements including text, images, links, tables, and forms. **CLO III:** Students will apply CSS rules to style web pages and enhance the visual presentation using layout techniques. **CLO IV:** Students will organize and deploy a basic static website and demonstrate awareness of future web development technologies and practices. **CLO V:** Students will be able to design and publish responsive static web pages using HTML and CSS, demonstrating effective use of structure, styling, and interactive elements.		
Credits	Theory	Practical	Total
	2	2	4
Teaching Hours per week	2	4	6
Internal Assessment Marks	15	15	30
End Term Exam Marks	35	35	70
Max. Marks	50	50	100
Examination Time	3 hours	3 hours	

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit I to IV and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	History and evolution of the World Wide Web. Basics of Internet technologies: IP address, DNS, URL, HTTP/HTTPS, FTP. Difference between the Internet, Intranet, and Extranet. Web servers and hosting: domain registration, web hosting types, HTTP requests and responses. Introduction to browsers, search engines, and the client-server model.	8
II	Structure of an HTML document: DOCTYPE, html, head, body tags. Text formatting tags: headings, paragraphs, bold, italic, underline, superscript and subscript. Working with hyperlinks, images, lists. Tables in HTML: structure, merging rows and columns, table headers. Forms: input elements, labels, fieldsets, text area, dropdowns, radio buttons, checkboxes, buttons, and submitting forms.	7
III	CSS: Separation of content and design. Types of CSS: inline, internal, external. CSS syntax: selectors, properties, and values. Common CSS properties: colors, fonts, text alignment,	8

	borders, backgrounds, margins and padding. CSS box model and its components. Introduction to layout techniques: flexbox and grid. Applying CSS to HTML elements and building simple styled web pages.	
IV	Planning and organizing a basic website: folder structure, naming conventions, linking multiple HTML files. Introduction to responsive design. Steps to publish a static website. Overview of web accessibility and ethical issues in web development. Introduction to web development workflows: editors, file naming conventions, and previewing in browser.	7
V	Practical exercises based on Units I–IV involving the creation of structured HTML pages with applied CSS styling and layout techniques. Students will design, organize, and publish simple responsive static websites demonstrating the use of hyperlinks, forms, tables, and multimedia elements.	60
	Total Contact Hours	90

Suggested Evaluation Methods

Internal Assessment: 30		**End Term Examination: 70**	
Theory	**15**	**Theory**	**35**
Class Participation/ Seminar/ presentation/ assignment/ quiz/ class test etc.:	5	Written Examination	
Mid-Term Exam:	10		
Practical	**15**	**Practical**	**35**
Class Participation/ Seminar/ presentation/ assignment/ quiz/ class test etc.:	5	Practical Examination	
Mid-Term Exam:	10		

Part C-Learning Resources

Reference Books

1) Thomas A. Powell, HTML and CSS: The Complete Reference, McGraw-Hill Education, 5th Edition.
2) Jon Duckett, HTML and CSS: Design and Build Websites, Wiley, Latest Edition.
3) Robin Nixon, Learning PHP, MySQL & JavaScript with HTML5, CSS3 & jQuery, O'Reilly, 5th Edition (for extended reference).
4) Achyut Godbole & Atul Kahate, Web Technologies: TCP/IP to Internet Application Architectures, McGraw-Hill Education.
5) Ivan Bayross, Web Enabled Commercial Application Development Using HTML, DHTML, JavaScript, Perl and CGI, BPB Publications.

With effect from the Session: 2024-25			
Part A - Introduction			
Name of the Programme	BCA (Industry-Linked Program)		
Semester	1st		
Name of the Course	Linux and Shell Programming		
Course Code	B25-CIL-103		
Course Type	CC-C1		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)	-		
Course Objectives	This course is designed to introduce students to the fundamentals of the Linux operating system and the essentials of shell scripting. It begins with the architecture and basic commands of Linux, empowering students to navigate and manipulate the Linux file system. The course further develops proficiency in using the command-line interface, understanding file permissions, and executing basic administrative tasks. The latter part of the course focuses on shell scripting using the Bash shell to automate routine tasks and enhance system functionality. Students will develop practical skills in handling files, processes, and control structures in scripts—building a strong foundation for advanced system administration and programming.		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	**CLO I:** Students will understand the structure and philosophy of Linux and be able to perform basic operations in a Linux environment. **CLO II:** Students will manage files, directories, and permissions effectively using command-line tools. **CLO III:** Students will monitor and control processes and user accounts using administrative commands. **CLO IV:** Students will write basic Bash scripts to automate system tasks and solve practical problems. **CLO V:** Students will be able to apply Linux commands and shell scripting techniques to automate system tasks and manage files, processes, and users efficiently.		
Credits	Theory	Practical	Total
	2	2	4
Teaching Hours per week	2	4	6
Internal Assessment Marks	15	15	30
End Term Exam Marks	35	35	70
Max. Marks	50	50	100
Examination Time	3 hours	3 hours	

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit I to IV and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	Overview and features of Linux, comparison with other operating systems, Linux architecture and kernel, system startup process. Introduction to Linux distributions, desktop environments, and shells. Linux file system hierarchy, standard directories and file naming conventions. Basic Linux commands: login, logout, date, cal, clear, man, echo, passwd. Using text editors: vi and gedit. Understanding user types: root, regular user, guest.	8
II	Creating and managing files and directories using commands like ls, cd, mkdir, rmdir, touch, cp, mv, rm, and cat. File viewing commands: more, less, head, tail. File permissions and ownership: chmod, chown, chgrp. File compression and archiving: gzip, tar, zip, unzip. Understanding absolute and relative paths. Wildcards, filters and redirection: >, >>, <, |, tee. Working with locate, find and grep commands.	7

III	Understanding processes: foreground and background processes, viewing and managing processes using ps, top, kill, nice, and jobs. Introduction to process IDs and signals. Creating and managing users and groups: useradd, userdel, usermod, groupadd. Switching users and setting passwords. Understanding login shells and environment variables. Introduction to disk usage commands: df, du, mount, umount.	8
IV	Introduction to shell scripting, creating and executing shell scripts. Shell variables, command substitution, quoting, and comments. Input and output in shell. Decision-making using if, if-else, nested if, case. Looping constructs: while, until, for loops. Break and continue statements. Functions in shell scripts. Script examples: backups, batch renaming, automation tasks.	7
V	Practical exercises based on Units I–IV involving the use of basic and advanced Linux commands, file and process management, and user administration. Students will write and execute shell scripts for automation tasks such as backups, file operations, and system monitoring, demonstrating command-line proficiency and scripting logic.	60
	Total Contact Hours	90

Suggested Evaluation Methods

Internal Assessment: 30		**End Term Examination: 70**	
Theory	**15**	**Theory**	**35**
Class Participation/ Seminar/ presentation/ assignment/ quiz/ class test etc.:	5	Written Examination	
Mid-Term Exam:	10		
Practical	**15**	**Practical**	**35**
Class Participation/ Seminar/ presentation/ assignment/ quiz/ class test etc.:	5	Practical Examination	
Mid-Term Exam:	10		

Part C-Learning Resources

Reference Books

1) Richard Blum, Linux Command Line and Shell Scripting Bible, Wiley, 4th Edition.
2) Neil Matthew and Richard Stones, Beginning Linux Programming, Wrox, 4th Edition.
3) Sumitabha Das, Unix Concepts and Applications, McGraw-Hill Education, 4th Edition.
4) Machtelt Garrels, Introduction to Linux: A Hands-on Guide, FOSS Publication, Latest Edition. (Free resource)
5) Christine Bresnahan and Richard Blum, Linux Essentials, Wiley, 2nd Edition.

With effect from the Session: 2024-25			
Part A - Introduction			
Name of the Programme	BCA (Industry-Linked Program)		
Semester	1st		
Name of the Course	Introduction to Data Science		
Course Code	B25-CIL-104		
Course Type	CC-M1		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)	-		
Course Objectives	This course aims to introduce students to the conceptual foundations of data science and its role in modern decision-making. It focuses on familiarizing students with the data science process, types and sources of data, data collection and preparation techniques, and the ethical and professional responsibilities associated with data use. While avoiding statistical depth, the course incorporates introductory-level exposure to R as a tool for data access and manipulation, enabling students to begin thinking computationally about data and laying the groundwork for future studies in analytics and machine learning.		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	**CLO I:** Students will understand the purpose, process, and scope of data science and gain familiarity with basic data types and R environment. **CLO II:** Students will identify different data sources and demonstrate how to import and inspect data using R. **CLO III:** Students will perform basic data cleaning and preparation tasks using R, enabling further analysis in later courses. **CLO IV:** Students will explain ethical considerations in the data science process and identify career and learning opportunities in the field. **CLO V:** Students will be able to apply Python libraries to handle, clean, and analyze real-world datasets, demonstrating practical understanding of the data science life cycle.		
Credits	Theory	Practical	Total
	1	1	2
Teaching Hours per week	1	2	3
Internal Assessment Marks	10	5	15
End Term Exam Marks	20	15	35
Max. Marks	30	20	50
Examination Time	3 hours	3 hours	

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit I to IV and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	Introduction to Data Science; Evolution and applications of Data Science; Data Science life cycle; Roles of a Data Scientist; Types of data: structured, semi-structured, unstructured; Data collection methods and data sources; Overview of real-world data sets and problem-solving using data.	4
II	Introduction to NumPy; Creation of arrays using NumPy; Array indexing and slicing; Array attributes and methods; Mathematical operations on arrays; Array broadcasting; Working with multidimensional arrays; Aggregations and statistical functions; NumPy for linear algebra operations.	3
III	Introduction to pandas; Series and DataFrame objects; Creating and loading data into pandas structures; DataFrame indexing and slicing; Data selection and filtering; Adding and deleting columns; Basic operations on DataFrames; Iterating over data frames.	4

IV	Data cleaning and preprocessing using pandas; Handling missing data; Merging, joining, and concatenating DataFrames; GroupBy operations; Basic descriptive statistics using pandas; Data summarization;	4
V	Practical exercises based on Units I–IV involving data handling, manipulation, and preprocessing using Python libraries such as NumPy and pandas. Students will work with real-world datasets to perform data loading, cleaning, transformation, and basic statistical analysis, demonstrating the complete workflow of the data science life cycle.	30
	Total Contact Hours	45

Suggested Evaluation Methods			
Internal Assessment: 15		**End Term Examination: 35**	
Theory	**10**	**Theory**	**20**
Class Participation/ Seminar/ presentation/ assignment/ quiz/ class test etc.:	5	Written Examination	
Mid-Term Exam:	5		
Practical	**5**	**Practical**	**15**
Mid-Term Exam:	5	Practical Examination	

Part C-Learning Resources

Reference Books

1) Wes McKinney, Python for Data Analysis, O'Reilly Media, 2nd Edition, 2018.
2) Joel Grus, Data Science from Scratch: First Principles with Python, O'Reilly Media, 2nd Edition, 2019.
3) Allen B. Downey, Think Stats: Probability and Statistics for Programmers, O'Reilly Media, 2nd Edition, 2014.
4) Peter Bruce, Andrew Bruce, and Peter Gedeck, Practical Statistics for Data Scientists, O'Reilly Media, 2nd Edition, 2020.
5) Stefanie Molin, Hands-On Data Analysis with Pandas, Packt Publishing, 2nd Edition, 2021.

With effect from the Session: 2024-25			
Part A - Introduction			
Name of the Programme	BCA (Industry-Linked Program)		
Semester	1st		
Name of the Course	Introduction to Statistics		
Course Code	B25-CIL-105		
Course Type	MDC1		
Level of the course (As per Annexure-I	100-199		
Pre-requisite for the course (if any)	-		
Course Objectives	This course introduces students to the foundational concepts of descriptive and inferential statistics. It equips learners with skills to summarize, interpret, and analyze numerical data effectively. Through structured understanding of measures of central tendency, dispersion, correlation, and probability, students develop the statistical literacy needed for data-informed thinking. Without involving any programming or software, the course emphasizes manual calculation, tabular analysis, and logical reasoning. It is designed to provide a strong conceptual base that students can apply in business, computer science, and data-oriented fields.		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	**CLO I:** Students will understand different types of data and sampling methods and organize raw data into tabular and categorical formats. **CLO II:** Students will compute and interpret various measures of central tendency for given datasets and understand their comparative strengths. **CLO III:** Students will analyze data variability using standard measures of dispersion and explain the distribution's shape through skewness. **CLO IV:** Students will estimate relationships between variables using correlation and regression and apply basic probability rules in practical contexts. **CLO V:** Students will be able to apply statistical methods using digital tools to analyze, interpret, and visualize data for informed decision-making.		
Credits	Theory	Practical	Total
	2	1	3
Teaching Hours per week	2	2	4
Internal Assessment Marks	15	5	20
End Term Exam Marks	35	20	55
Max. Marks	50	25	75
Examination Time	3 hours	3 hours	

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit I to IV and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	Definition, scope, and importance of statistics in decision making. Types of statistics: descriptive and inferential. Types of data: qualitative vs. quantitative, discrete vs. continuous. Levels of measurement: nominal, ordinal, interval, ratio. Methods of data collection and sampling techniques: random, stratified, systematic. Frequency distribution and tabulation.	7
II	Introduction and importance of central tendency. Mean (arithmetic, weighted), median, and mode for ungrouped and grouped data. Properties and merits/demerits of each measure. Comparison of mean, median, and mode. Use cases in business, computer applications, and social studies.	8
III	Concept of dispersion and variability. Range, quartile deviation, mean deviation, and standard deviation. Coefficient of variation and its applications. Concept of skewness:	7

	positive and negative skewness, Karl Pearson's and Bowley's methods.	
IV	Meaning and types of correlation: positive, negative, and zero. Karl Pearson's coefficient of correlation and Spearman's rank correlation. Introduction to linear regression: regression lines and their interpretation. Concept of probability: random experiment, event, sample space. Basic rules of probability (addition and multiplication). Concept of conditional probability.	8
V	Practical exercises based on Units I–IV involving data collection, tabulation, and computation of statistical measures using spreadsheet tools or statistical software. Students will perform calculations of central tendency, dispersion, correlation, and regression, and interpret results for data-driven decision-making. Hands-on activities will also include visualization of data through charts and frequency distributions.	30
	Total Contact Hours	60

Suggested Evaluation Methods			
Internal Assessment: 30		**End Term Examination: 70**	
Theory	**15**	**Theory**	**35**
Class Participation/ Seminar/ presentation/ assignment/ quiz/ class test etc.:	5	Written Examination	
Mid-Term Exam:	10		
Practical	**5**	**Practical**	**20**
Class Participation/ Seminar/ presentation/ assignment/ quiz/ class test etc.:	5	Practical Examination	

Part C-Learning Resources

Reference Books

1) S. P. Gupta, *Statistical Methods*, Sultan Chand & Sons, Latest Edition.
2) R.S. Bhardwaj, *Business Statistics*, Excel Books, Latest Edition.
3) R. A. Johnson, *Elementary Statistics*, Cengage Learning, 12th Edition.
4) S. C. Gupta and V. K. Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, Latest Edition.
5) Richard De Veaux, Paul Velleman, and David Bock, *Stats: Data and Models*, Pearson Education, Latest Edition.