

# SDGI GLOBAL UNIVERSITY



## PROGRAMMESTRUCTURE

### SCHOOL OF COMPUTER APPLICATIONS

#### BCA(HONS) WITH SPECIALIZATION AI/ML/Data science /Cyber Security

PROGRAMME CODE: CA08/11/09

BATCH W.E.F: 2024-2028

### **VisionoftheUniversity**

To be recognized as an Institution of excellence, facilitating learning, fostering creativity, knowledge creation, innovations, consultancy and leadership in multiple areas to build a conscious community that will positively impact living beings for a sustainable future.

### **MissionoftheUniversity**

1. To create conducive environment for an interactive and application oriented experiential learning making the Institute a preferred destination for work and study.
2. To Foster creativity, research and innovation orientation in students and faculty in basic and applied areas in all of its disciplines, provide cost effective solutions and nurture entrepreneurial capabilities to accelerate growth.
3. To act as a catalyst in social change by developing academic, social, political, technological, scientific, industrial and business leadership in the spirit “Think Globally and Act Locally”; by providing ample opportunities to develop team spirit, sportsmanship and love for culture and national heritage.

#### **Core Values**

1. Integrity
2. Honesty
3. Transparency
4. Empathy

# School of Computer Applications

## Vision of School

To be a premier institution in computing sciences, recognized for pioneering research, transformative education, and impactful contributions to society, shaping the future of technology and driving positive.

## Mission of School

To empower students with cutting-edge knowledge and skills in computing sciences, foster a culture of innovation, and prepare them to address the challenges of a rapidly evolving digital world through rigorous academics, experiential learning, and interdisciplinary collaboration.

## Core Values

1. Excellence
2. Innovation
3. Sustainability
4. Global Perspective

## **Programme Educational Objectives(PEO's)**

### **BCA(Hons) with specialization Data Science/Cloud Computing**

- PEO-1** The graduates will establish themselves as professionals by solving real-life problems using exploratory and analytical skills acquired in the field of Computer Applications
- PEO-2** The graduates will provide sustainable solutions to ever changing interdisciplinary global problems through their Research & Innovation capabilities.
- PEO-3** The graduates will become employable, successful entrepreneur as an outcome of Industry-Academia collaboration.
- PEO-4** The graduates will embrace professional code of ethics while providing solution to multidisciplinary social problems in industrial, entrepreneurial and research environment to demonstrate leadership qualities.

### **Programme Outcomes(PO's):**

- PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2: Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3: Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4: Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6: The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### **ProgrammeSpecificOutcomes(PSO):**

**PSO1:** Experiment and prepare programming concepts and provide new ideas and innovations towards research and societal issues.

**PSO2:** Analyse and develop computer programs in the areas related to algorithms, system software, cloud computing, artificial intelligence & machine learning, bioinformatics, big data analytics, block chain, cyber security and networking for efficient design of computer-based systems of varying complexity.

**PSO3:** Apply standard Software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality product for business success.

**BCA (HONS)**  
**WITHSPECIALIZATION**  
**AI/ML /Cyber Security/**  
**Data science**

**TITLE:FourYearProgrammeStructurefor BCA (Hons)**

**DURATIONOFTHECOURSE:4Years**

**TotalCredits-164**

Totalcreditofthe04- yearUGProgrammeforyear wise	01stYear	44
	02ndYear	40
	03rdYear	40
	04thYear	40

Multiple Entry and Exit Structure for BCA(Hons):

1. Certificate (After 1 Year)

Duration: 1 year (2 semesters)

Credits: 40–44 credits

Award: Certificate in Computer Applications

Exit Option: Students can exit with a certificate and re-enter the program later.

2. Diploma (After 2 Years)

Duration: 2 years (4 semesters)

Credits: 80–88 credits

Award: Diploma in Computer Applications

Exit Option: Students can exit after 2 years with a diploma.

3. Bachelor's Degree (After 3 Years)

Duration: 3 years (6 semesters)

Credits: 120–132 credits

Award: Bachelor of Computer Applications (BCA)

Exit Option: Students can exit with a standard bachelor's degree after 3 years.

4. Bachelor's (Honors) Degree (After 4 Years)

Duration:4 years (8 semesters)

Credits: 160–176 credits

Award: Bachelor of Computer Applications (Honors) – BCA(Hons)

Exit Option: Final exit with a BCA(Hons) degree.

Learning Focus: Specialized electives in AI, data science, machine learning, cloud computing, and a research project or dissertation.

Re-entry Options:Students who exit the program can re-enter at the same or a higher level after a gap, as long as they meet the institution’s requirements, without needing to start over.



# SDGI GLOBAL UNIVERSITY, GHAZIABAD (SGU)

## Semester-Wise Teaching Scheme UG Program

**Programme: BCA (Hons)**

**Semester: I**

**Batch – 2024 – 28**

**Academic year: 2024 - 25**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	CC-1	B021223101	Computer Concepts & Programming in C	4	0	0	4	4	50	50	100	40
2	CC-2	B021223102	Foundation of Mathematics	4	0	0	4	4	50	50	100	40
3	CC Lab	B021223151	Programming in 'C' lab	0	0	2	2	1	60	40	100	40
4	DSC-1 (Minor)	B021223103	Web designing using DHTML (Minor)	3	0	0	3	3	50	50	100	40
5	DSC Lab	B021223153	Web designing using DHTML Lab (Minor)	0	0	2	2	1	60	40	100	40
6	OE-1	BSGUOE2422	Principles and Practices of Management	3	0	0	3	3	50	50	100	40
7	AEC-1	BSGUAE2404	Professional Communication	2	0	0	2	2	50	50	100	40
8	SEC-1	BSGUSE2411	Advanced Excel	2	0	0	2	2	25	25	50	20
9		BSGUSE2461	Advanced excel Lab	0	0	2	2	1	30	20	50	20
9	VAC-1	BSGUVA2401	Environmental Education	3	0	0	3	3	50	50	100	40
<b>Total</b>				<b>21</b>	<b>0</b>	<b>6</b>	<b>27</b>	<b>24</b>	<b>475</b>	<b>425</b>	<b>900</b>	<b>360</b>

CC - Core Course

OE - Open Elective/ Multidisciplinary

AE - Ability Enhancement Compulsory Course

VAC - Value Added Course

SE - Skill Enhancement

DSC-Discipline specific course

Bridge Course			
I	BSGUBR2401	Mathematics	Hrs-30
			Bridge

**NOTE:** Non – Creditable Subject



# SDGI GLOBAL UNIVERSITY, GHAZIABAD (SGU)

## Semester-Wise Teaching Scheme UG Program

**Programme: BCA (Hons) with Specialization AI – ML/ Data Science/ Cyber Security**

**Semester:II**

**Batch – 2024 – 28**

**Academic year: 2024 - 25**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	CC-3	B021223201	Data Structures Using C	3	0	0	3	3	50	50	100	40
2	CC-4	B021223202	Object-Oriented Programming Using Python	3	0	0	3	3	50	50	100	40
3	CC Lab	B021223251	Data Structure Using C Lab	0	0	2	2	1	60	40	100	40
4	CC Lab	B021223252	OOPS Lab using Python	0	0	2	2	1	60	40	100	40
5	DSC-2 (Minor)	B020824204/ B021123204/ B020924204	Computer fundamentals for (AI/ML)/Computer fundamentals for Data Science/ Computer fundamentals for Cyber Security (Minor)	3	0	0	3	3	50	50	100	40
6	DSC Lab	B020824254/ B021123254/ B020924254	Computer fundamentals for (AI/ML)/Computer fundamentals for Data Science/ Computer fundamentals for Cyber Security (Minor)	0	0	2	2	1	60	40	100	40
7	AEC-2	BSGUAE2406	Team Building and Leadership	2	0	0	2	2	50	50	100	40
8	SEC-2	BSGUSE2407	Digital Marketing	2	0	0	2	2	25	25	50	20
		BSGUSE2457	Digital Marketing Lab	0	0	2	2	1	30	20	50	20
9	VAC-2	BSGUVA2407	Indian knowledge Systems	3	0	0	3	3	50	50	100	40
<b>Total</b>				<b>16</b>	<b>0</b>	<b>8</b>	<b>24</b>	<b>20</b>	<b>485</b>	<b>415</b>	<b>900</b>	<b>360</b>

CC - Core Course

OE - Open Elective/ Multidisciplinary

AE - Ability Enhancement Compulsory Course

VAC - Value Added Course

SE - Skill Enhancement

DSC-Discipline specific course



# SDGI GLOBAL UNIVERSITY, GHAZIABAD (SGU)

## Semester-Wise Teaching Scheme UG Program

**Programme: BCA (Hons) with AI – ML/ Data Science/ Cyber Security**

**Semester:III**

**Batch – 2024 – 28**

**Academic year: 2025 - 26**

S. No	Status	Paper Code	Subjects	Study Scheme Lec / Week			Hours	Credits	CIE	ESE	Total	Pass Marks
				L	T	P						
1	CC-5	B021223301	Operating System	4	0	0	4	4	50	50	100	40
2	CC-6	B021223302	Artificial Intelligence	4	0	0	4	4	50	50	100	40
3	CC Lab	B021223351	Operating System Lab using Linux	0	0	2	2	1	60	40	100	40
4	CC-7	B021223304	Linear Algebra	4	0	0	4	4	50	50	100	40
5	DSC-3 (Minor)	B021123304/ B020824304/ B020924304	Analyzing and Applying data Science with python / Mathematical Foundation For artificial Intelligence/Introduction to Cyber Crime and Information Security	3	0	0	3	3	50	50	100	40
6	DSC Lab	B021123354/ B020824354/ B020924354	Analyzing and Applying data Science with python Lab/ Mathematical Foundation For artificial Intelligence Lab/Introduction to Cyber Crime and Information Security Lab	0	0	2	2	1	60	40	100	40
7	AEC-3	BSGUAE2407	Creative Writing Skill	2	0	0	2	2	50	50	100	40
8	SEC-3	BSGUSE2416	Cyber Security	2	0	0	2	2	25	25	50	20
		BSGUSE2466	Cyber Security Lab	0	0	2	2	1	30	20	50	20
<b>Total</b>				19	0	6	25	22	425	375	800	320

**CC - Core Course**

**OE - Open Elective/ Multidisciplinary**

**AE - Ability Enhancement Compulsory Course**

**VAC - Value Added Course**

**SE - Skill Enhancement**

**DSC-Discipline specific course**

## DETAILED SYLLABUS

Programme: BCA (Hons)

### Computer Concepts & Programming in C

(CourseCode:B021223101)

Semester:Ist

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4 0 0 4

COURSEOBJECTIVES
Toacquirethefundamentalprinciples,conceptsandconstructsofcomputerprogramming
Todevelopcompetencyforthedesign,codinganddebugging
Tobuildtheprogrammingskillsusing'C'tosolvearealworldproblems

CourseOutcome(CO)	Bloom'sKnowledge Level(KL)
<b>Attheendof course,thestudentwill be ableto understand</b>	
CO1	ToFocusFundamentalsofComputersandPeripherals . K <sub>3</sub>
CO2	To Introduce programming language and aware the students about programming paradigm K <sub>3</sub> , K <sub>4</sub>
CO3	ToFocusConceptandMethodologyofProgramming. K <sub>2</sub> , K <sub>3</sub>
CO4	To give clear idea of different strategy of basic programming with C like Looping, Decision Making, Array, Structure K <sub>2</sub> ,K <sub>4</sub>
CO5	Function, Pointer, etc. to solve real life problems. K <sub>3</sub> , K <sub>6</sub>

#### Unit-1

Introduction to Programming: Introduction, Basic block diagram and functions of various components of computer, Concept of Hardware and Software, Types of software, Compiler and Interpreter. Introduction to Programming: Basic Overview of Procedure Oriented Language, Concepts of Machine level, Assembly level and High level programming, Flowcharts and Algorithms.

#### Unit-2

Fundamentals of 'C': Features of C language, structure of C program, comments, header files, data types, constants and variables, operators, expressions, evaluation of expressions, type conversion, precedence and associativity, I/O functions. Control Structures in 'C': Simple statements, Decision making statements, Looping statements, Nesting of control structures, break and continue statement, goto statement.

#### Unit-3

Array, Functions & Recursion: Array & String: Concept of array, One and Two dimensional arrays, declaration and initialization of arrays, String, String storage, Built-in string functions. Functions: Concept of user defined functions, prototype, definition of function, parameters, parameter passing, calling a function, Macros, Preprocessing. Recursion: Definitions, recursive function, Examples, Applications.

#### **Unit-4**

Pointers: Basics of pointers, pointer to pointer, pointer and array, pointer to array, array of pointers, function returning a pointer.

Structure and Union : Basics of structure, structure members, accessing structure members, nested structures, array of structures, structure and functions, structures and pointers, unions, bit-fields.

#### **Unit-5**

##### **File Management**

Introduction to file management, Simple file management functions for text files, Reading from and writing to files.

The Preprocessor: Introduction, Macro substitution, File Inclusion, Compiler Control Directives

##### **TEXTBOOKS:**

1. Programming in ANSI C, Forth Edition, E Balagurusamy, TMH

2. Reference Books: Letus C, Yashwant Kanitkar

3. C The Complete Reference, Herbert Schildt, McGraw Hill

##### **Reference Book:**

1, Computer fundamentals and Programming in C, Pradipdey and Manas Ghosh, Oxford

# Foundation of Mathematics

(Course Code: B021223102)

Year: 1<sup>st</sup>  
Semester: 1<sup>st</sup>

L    T    P    C  
4    0    0    4

COURSE OBJECTIVES		
To acquire the fundamentals of Matrix theory and its use to find the nature of solution of system of equations		
To built the skills in Limit, continuity and Differentiability and its applications		
To develop the idea of vector calculus and multiple integration.		
	Course Outcome (CO)	Bloom's Knowledge Level (KL)
At the end of course, the student will be able to understand		
CO1	Students will know the solution of system of equations, rank, eigen value, eigenvector and aracteristic polynomial.	K <sub>3</sub>
CO2	Student will able to understand the concept of limit, continuity also its applications.	K <sub>3</sub> , K <sub>4</sub>
CO3	After the completion of unit students knows the concept of differentiability and its application.	K <sub>2</sub> , K <sub>3</sub>
CO4	After the completion of vector, students know what is vector and what are its uses such as gradient, divergence, and curl.	K <sub>2</sub> , K <sub>4</sub>
CO5	Apply integration to compute multiple integrals, area volume, integral in polar coordinate in addition to change of order.	K <sub>3</sub> , K <sub>6</sub>

### Unit 1

Linear Algebra : Linear Algebra-  
Matrices: Rank of a matrix, Consistency of a system of linear equations, Linear dependence and independence of vectors, Eigen-values and Eigenvectors of a matrix, Cayley-Hamilton theorem, Determinants

### Unit 2

Limits and Continuity : Definition of Limits, Left hand and right hand limit, useful formulae in finding the limits of certain Functions, Definition of continuity, Properties of continuous functions, Types of Discontinuity, Removable discontinuity, Discontinuity of first kind and second kind

### Unit 3

Differentiation :  
Differentiability of a function, Rolle's theorem, Lagrange's mean Value theorem, Taylor's theorem, Maclaurin's theorem, Indeterminate Forms, L'Hospital's Rule, Maxima and Minima, curve tracing

### Unit 4

Vector Algebra : Introduction, Representation of vector Addition and subtraction of vectors, Double and Triple Scalar and Vector Product and its Properties, System of reciprocal of Vectors, Gradient, Divergence and curl of a vector

### Unit 5

Integration Integration as inverse process of differentiation, Integration of a function by substitution, by partial fractions and by parts. Evaluation of simple integrals of the following types and problems based on them

**Text Books:** 1. Grewal B.S., Higher Engineering Mathematics, Delhi Khanna Publishers.  
2. Differential Calculus by Shanti Narayan, Publishers S. Chand & Co.

**Reference book:** 3. HKDAS "Advanced Engineering Mathematics" s.chand and company

**Web designing using DHTML**  
**(CourseCode: B021223103)**

**Year:1<sup>st</sup>**  
**Semester: 1<sup>st</sup>**

**L T P C**  
**3 0 0 3**

<b>COURSEOBJECTIVES</b>		
<b>To acquire the fundamentals of Web page design and about types of websites</b>		
<b>To build the skills in HTML, CSS and JavaScript.</b>		
<b>To Understand the basic concept of SEO</b>		
<b>CourseOutcome(CO)</b>		<b>Bloom'sKnowledge Level(KL)</b>
<b>Attheendof course,thestudentwill be abletounderstand</b>		
CO1	Understand principle of Web page design and about types of websites	K3, K4
CO2	Visualize and recognize the basic concept of HTML and application in web designing.	K <sub>1</sub> , K <sub>2</sub>
CO3	Recognize and apply the elements of Creating Style Sheet (CSS).	K <sub>2</sub> , K <sub>4</sub>
CO4	Understand the basic concept of Java Script and its application.	K <sub>2</sub> ,K <sub>3</sub>
CO5	Introduce basics concept of Web Hosting and apply the concept of SEO.	K <sub>3</sub> , K <sub>2</sub>

**Unit1 Introduction**

Introduction: Internet and World Wide Web (WWW); Evolution and History of World Wide Web, Web Pages and Contents, Web Clients, Web Servers, Web Browsers; Protocols Governing Web, URLs; Introduction to client-server computing; Introduction to Markup Languages (HTML and DHTML).

**Unit2 Web Development**

HTML Document Features, Fundamentals HTML Elements, Creating Links; Headers; Text styles; Text Structuring; Text colour and Background; Formatting text; Page layouts, Images; Ordered and Unordered lists; Inserting Graphics; Table Creation and Layouts; Frame Creation and Layouts; Working with Forms and Menus; Working with Radio Buttons; Check Boxes; Text Boxes. Document type definition, XML: DTD, XML schemes, Object Models, presenting and using XML.

**Unit 3 Introduction to CSS**

Features, Core Syntax, Types, Style Sheets, StyleRule Cascading and Inheritance, Text Properties, CSS Box Model, Normal Flow Box Layout, Positioning and other useful Style Properties.

**Unit4 Introduction to Java Script**

Objects, Methods, Events and Functions, Tags, Operators, Data Types, Literals and Type Casting in JavaScript, Programming Construct, Array and Dialog Boxes, Relating JavaScript to DHTML, Dynamically Changing Text, Style, Content.

**Unit5 Core Java**

Core Java: Introduction, Operator, Data type, Variable, Arrays, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming. Java Server Pages (JSP): Introduction, Java Server Pages Overview, A First Java Server Page Example, Implicit Objects, Scripting, Standard Actions, Directives,

**Text Books:**1.Burdman,Jessica,“CollaborativeWebDevelopment”AddisonWesley

1. Xavier,C,“WebTechnologyandDesign”,NewAgeInternational
2. IvanBayross,“HTML,DHTML,JavaScript,Perl&CGI”,BPBPublication
3. Bhave,“ProgrammingwithJava”,PearsonEducation

**Reference Book:**1.HerbertSchieldt,“TheCompleteReference:Java”,TMH.

2.MargaretLevineYoung,“TheCompleteReferenceInternet”,TMH

# Professional Communication

(CourseCode:BSGUAE2404)

Year:1<sup>st</sup>  
Semester:1<sup>st</sup>

L T P C  
20 0 2

COURSEOBJECTIVES		
To acquire the fundamentals of effectiveCommunication.		
To build the skills in Business Correspondence.		
To Understand the basic concept of Oral Presentation and report writing.		
CourseOutcome(CO)	Bloom'sKnowledge Level(KL)	
Attheendof course,thestudentwill be ableto understand		
CO1	Understand principle of Communication.	K <sub>1</sub>
CO2	Recognize the basic concept of Letter Writing, presentation, inviting quotations, sending quotations, placing orders.	K <sub>2</sub> , K <sub>3</sub>
CO3	Apply the concepts for report writing.	K <sub>2</sub> , K <sub>4</sub>
CO4	Understand the need to enhance the vocabulary.	K <sub>2</sub> ,K <sub>3</sub>
CO5	Introduce basics concept of oral representation.	K <sub>3</sub> , K <sub>2</sub>

## Unit1

### Communication

Introduction: Nature of Communication, Process of Communication, Types of Communication (verbal & Non-Verbal), Importance of Communication, Different forms of Communication, Effective principles of Communication, 7 C's. Barriers to Communication Causes, Linguistic Barriers, Psychological Barriers, Interpersonal Barriers, Cultural Barriers, Physical Barriers, Organizational Barriers.

## Unit2

### Business Correspondence

Letter Writing, presentation, inviting quotations, sending quotations, placing orders, inviting tenders, Sales letters, claim & adjustment letters and social correspondence, Memorandum, Inter - office Memo, Notices, Agenda, Minutes of meeting, Job application letter, preparing the Resume.

## Unit 3

### Report Writing

Business reports, Types, Characteristics, Importance, Elements of structure, Process of writing, Order of writing, the final draft, and check lists for reports.

## Unit4

### Vocabulary

The process of formal written Communication (deciding purpose, analyzing audience, designing a message, organizing, selecting, arranging ideas and preparing outlines, developing message) The qualities of good writing- clarity-consciousness-concisness-correctness-coherence-courteousness.

## Unit5

### Oral Presentation

Oral Presentation: Importance, Characteristics, Presentation Plan, Power point presentation, Visual aids. Corporate Communication Formal and Informal Communication Networks; Grapevine; Miscommunication (Barriers); Improving Communication. Business Etiquettes

- TextBooks :**
1. Bovee, and Thill, Business Communication Essentials, Pearson Education
  2. Shirley Taylor, Communication for Business, Pearson Education
  3. Locker and Kaczmarek, Business Communication: Building Critical Skills, McGraw Hill Education

- ReferenceBooks:**
1. Herta A Murphy, Herbert W Hildebrandt, Jane P. Thomas, Effective Business Communication (SIE), McGraw Hill Education
  2. Dona Young, Foundations of Business Communication: An Integrative Approach, McGraw Hill Education

**Principles and Practices of Management**  
(CourseCode:BSGUOE2422)

<b>Year:1<sup>st</sup></b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Semester:1<sup>st</sup></b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

<b>COURSEOBJECTIVES</b>	
To acquire the fundamentals of professionalmanagement	
To understand the Business Ethics & Social Responsibility .	
To Understand the models for change &Strategic Management	
<b>CourseOutcome(CO)</b>	<b>Bloom’sKnowledge Level(KL)</b>
<b>Attheendof course,thestudentwill be ableto understand</b>	
CO1	Understand the concepts of management such as administration, organization and management etc skills. K <sub>2</sub>
CO2	Recognize the basic concept of evolution of management thought. K <sub>2</sub> , K <sub>3</sub>
CO3	Apply the concepts of planning, identify barriers to effective planning, levels, advantages & limitations. K <sub>2</sub> , K <sub>4</sub>
CO4	Understand the basics of motivation, controlling and coordination among team. K <sub>2</sub> ,K <sub>3</sub>
CO5	The basics concepts of Strategic management. K <sub>3</sub> , K <sub>2</sub>

**Unit 1**

**Introduction**

:NatureofManagement:Meaning,Definition,nature&purpose,importance&Functions,ManagementasArt, Science&Profession-ManagementassocialSystemConceptsofmanagement-Administration- Organization,ManagementSkills,LevelsofManagement.

**Unit-2**

**Evolution**

of

Management

:EvolutionofManagementThought:ContributionofF.W.Taylor,HenriFayol,EltonMayo,ChesterBarhard& PeterDruckerto themanagementthought.BusinessEthics&SocialResponsibility:Concept,ShifttoEthics,Too lsofEthics.

**Unit-3**

**Functions**

of

**Management:**

**Part-I**

:PlanningMeaning-

Need&Importance,types,ProcessofPlanning,BarrierstoEffective Planning,levels, advantages&limitations.Forecasting-Need&Techniques,Decisionmaking Types - Processofrationaldecisionmaking&techniquesofdecisionmaking,organizing- Elementsoforganizing&processes:Typesoforganizations,Delegationofauthority-Need, difficulties,Delegation-Decentralization.Staffing-Meaning&ImportanceDirection-Nature, PrinciplesCommunication-Types&Importance

**Unit-4**

**Functions**

of **Management:**

**Part-II**

:Motivation-Importance-theories,Leadership-Meaning-

styles,qualities&functionofleader,Controlling- Need,Nature,importance,Process&Techniques,TotalQualityManagement,Coordination-Need - Importance

**Unit-5**

**Management**

of

**Change**

:ModelsforChange,ForceforChange,NeedforChange,AlternativeChange,Techniques,NewTrendsInOrga nizationChange.StrategicManagement:Definition,ClassesofDecisions,LevelsofDecision,Strategy,Roleo fdifferentStrategist,RelevanceofStrategicManagementanditsBenefits,StrategicManagementinIndia

**TextBooks:** 1. Drucker, F. Peter - Management-Tasks, Responsibilities & Practices.  
 2. Koontz “O” DonnelWeihrich - Elements of Management.  
 3. Koontz H, “O” Donnel C - Management-A Book of Reading.

**ReferenceBooks**1. Drucker, F. Peter - The Practice of Management.

<b>COURSEOBJECTIVES</b>
Provide foundational knowledge of ecological principles and human-environment interactions.
Develop understanding and critical analysis of key environmental challenges and their solutions.
Encourage the adoption of sustainable practices and an understanding of sustainable development principles.

**Environmental Education**  
 (CourseCode:BSGUVA2401)

**Year:1st**

**Semester:1st**

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**3 0 0 3**

<b>CourseOutcome(CO)</b>	<b>Bloom’sKnowledge Level(KL)</b>
<b>Attheendof course,thestudentwill be ableto understand</b>	
CO1	to critically examine all sides of environmental issues and apply understanding from different disciplines to create informed opinions about how to interact with the environment on both a personal and a social level. K <sub>2</sub>
CO2	Recognize the basic concept of renewable and non-renewable resources. K <sub>2</sub> , K <sub>3</sub>
CO3	Understand the concepts of Structure and function of an ecosystem. K <sub>2</sub> , K <sub>4</sub>
CO4	Understand the biodiversity at global, national and local levels. K <sub>2</sub> ,K <sub>3</sub>
CO5	Recognize the impact of human population on the Environment. K <sub>3</sub> , K <sub>2</sub>

**Unit 1:**

**Introduction to Environmental Studies:** Overview of Environmental Studies, Definition and scope, Importance and relevance in contemporary society, Key Environmental Concepts, Ecosystems, biodiversity, and ecological balance, Natural resources: types, distribution, and importance, Human-Environment Interaction, Historical perspective on human impact on the environment, Cultural and societal influences on environmental attitudes.

**Unit 2:**

**Ecological Principles and Processes:**

Ecosystem Dynamics, Structure and function of ecosystems, Energy flow and nutrient, cycles (carbon, nitrogen, water), Biodiversity and Conservation, Types of biodiversity and their importance, Threats to biodiversity and conservation strategies, Population Ecology, Population dynamics and carrying capacity, Human population growth and its impact on the environment.

**Unit 3:**

**Environmental Pollution and Management**

Air and Water Pollution, Sources and types of pollutants, Effects on health and the, environment, Control and management strategies, Soil and Land Pollution, Causes and consequences of soil degradation, Waste management: types, disposal methods, and reduction, Global Environmental Issues, Climate change: causes, effects, and mitigation, Ozone depletion and acid rain.

**Unit 4:**

**Natural Resources and Sustainable Development**

Renewable and Non-renewable Resources, Definition, examples, and management, Sustainable use and conservation of resources, Energy Resources, Conventional and alternative energy sources, Environmental impact of energy production and consumption

Principles of Sustainable Development, Concepts and goals of sustainability, Integrating economic, social, and environmental considerations.

**Unit 5:**

**Environmental Policy, Ethics, and Advocacy:** Environmental Laws and Policies, Key national and international environmental laws, Role of government and NGOs in environmental protection, Environmental Ethics, Ethical perspectives on, environmental issues, Responsibility and stewardship towards nature, Environmental Advocacy and Communication, Public awareness and education strategies, Role of media, activism, and community involvement in environmental issues.

**Text Book:**1."Environmental Studies: From Crisis to Cure" by R. Rajagopalan

2."Ecology: Concepts and Applications" by Manuel C. Molles

**Reference book:** 1."Environmental Science: A Global Concern" by William P. Cunningham and Mary Ann Cunningham.

**Programming in 'C' lab**  
(CourseCode: B021223151)

Year: 1<sup>st</sup>

L T P C

<b>COURSE OBJECTIVES</b>
To introduce students to the basic concepts of C programming, including syntax, data types, and fundamental operations, and to develop proficiency in writing and compiling simple C programs.
To enable students to apply programming constructs such as control flow, operators, arrays, strings, structures, pointers, and file handling to solve problems and create functional programs.

0 0 4 2

Semester: 1<sup>st</sup>

**List of Experiments (Indicative & not limited to)**

Course Outcome (CO)	Bloom's Knowledge Level (KL)
<b>At the end of course, the student will be able to understand</b>	
CO1	Set up the Turbo C environment, write, compile, and execute basic C programs, and use scanf and printf for input and output operations. K <sub>1</sub>
CO2	Implement decision-making using if/else statements and switch cases, and control program flow with loops such as while and do...while. K <sub>1</sub> , K <sub>2</sub>
CO3	Use a variety of operators (increment/decrement, modulus, bitwise) effectively in programs to perform different operations. K <sub>2</sub> , K <sub>3</sub>
CO4	Develop programs utilizing one-dimensional and two-dimensional arrays, and perform string manipulations using standard string functions. K <sub>3</sub>
CO5	Understand and implement advanced concepts such as unions, structures, pointers, and file handling for data management and storage in C programs. K <sub>6</sub>

1. Basic Introduction to C program and Turbo C setup (Compile/Run program).
2. Simple program using scanf/printf.
3. Program using if/else.
4. Program using operators (++ , -- , % , & , | , etc).
5. Switch case programs.
6. Programs of loops (while loop) Programs of loops (do... while loop).
7. Simple program of one-dimensional/2-dimensional array.
8. String Programs (using all string functions).
9. Program to implement union and structures.

10. Program to demonstrate working of pointers.

11. Program to read data from file and write into a file.

**Web designing using DHTML Lab**  
(Course Code: B021223153)

**Year: Ist**

**L T P C**

<b>COURSE OBJECTIVES</b>				
To introduce students to the basic concepts and technologies used in web designing, including HTML, CSS, and JavaScript, and to understand the structure and functionality of web pages				
To enable students to apply Dynamic HTML (DHTML) techniques, including Document Object Model (DOM) manipulation, CSS styling, and JavaScript programming, to create interactive and responsive web pages.				

**Semester: Ist**

**0 0 2 1**

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course, the student will be able to understand		
CO1	Develop and structure basic web pages using HTML.	K <sub>1</sub>
CO2	Apply CSS for styling and layout of web pages.	K <sub>1</sub> , K <sub>2</sub>
CO3	Use JavaScript to add interactivity to web pages.	K <sub>2</sub>
CO4	Manipulate the DOM to dynamically update content and style.	K <sub>3</sub>
CO5	Integrate DHTML techniques to create interactive and responsive web designs.	K <sub>4</sub>

**List of Experiments (Indicative & not limited to)**

1. Write HTML/JavaScript to display your CV in a navigator, your Institute website, Department Website and Tutorial website for a specific subject.
2. Write an HTML program to design an entry form of student details.
3. Write a program in CSS to display a hover effect.
4. Write a program in XML for creation of DTD, which specifies set of rules. Create stylesheets in CSS/XSL & display the document.
5. Write programs using JavaScript for Web Page to display all popbox.
6. Write a program using JavaScript to display application Program calculator.
7. Write a program to show the use of exception handling using Java.
8. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a JSP for doing the following. Create a Cookie and add these four user id's and passwords to this Cookie. 2. Read the user id and passwords entered in the Login form and authenticate with the values available in the cookies.
9. Write a JSP which inserts the details of the 3 or 4 users who register with the website by using a registration form. Authenticate the user when he submits the login form using the user name and password without using cookies.
10. Design a simple website for e-commerce using session tracking.

**ADVANCED EXCEL**  
**(Course Type: Skill Enhancement)**  
**(Course Code: BSGUSE2411)**  
 Credit<sup>L T P</sup>

3 1 0 4

**Course Objectives:** After completion of the Advanced Excel course Student will be able to Use Excel functions and productivity tools to assist in developing worksheets.

Course Outcome (CO)		Bloom's Level
<b>At the end of course, the student will be able</b>		
<b>CO 1</b>	To understand the concept of look-up functions in Excel	<b>BL2</b>
<b>CO 2</b>	To gain the practical knowledge of worksheet	<b>BL3</b>
<b>CO 3</b>	To gain the practical knowledge of Excel Function & Formulas	<b>BL3,4</b>
<b>CO 4</b>	To gain the practical knowledge of Financial modelling in Excel	<b>BL3,4</b>

Unit	Topic
<b>1</b>	Conditional Formatting - Inbuilt Conditional Formatting, Custom Conditional Formatting, Dynamic Search & Highlight, Partial Match Vlookup/ Hlookup/ Xlookup – 18 Scenario
<b>2</b>	Offset Function–Basic, Offset with Sum – Horizontal, Offset with Sum – Vertical, Offset with Match, Offset with Average, Offset with Countif Cloud Features – Edit Report, Export to PowerPoint & PDF, Embed Code Generation Setting, Manage Permissions & Content Pack, Mail Subscription, Quick Insights
<b>3</b>	Index & Match Function - Index Function Basic, Index Function with Area Number, Match Function Basic, Index & Match Functions as replacement to Vlookup Function, Index & Match Functions with Drop Down , SUMIF, AVERAGEIF and COUNTIF Application of Excel Functions in Creating HR Dashboards
<b>4</b>	Financial Modelling in Excel: PMT, PPMT, IPMT, IRR, MIRR, XIRR, FV, FVSCEDULE, PV, CUMPRINC Forecasting, Financial Statements Forecasting, Statistical tools-Standard Deviation , Correlation, Regression , histogram, testing-z-test,t-test, chi square
<b>5</b>	Business Analytics, Use of Spread Sheet to analyze data-Descriptive analytics and Predictive analytics. Macro, Designing Dashboard Power Query Protection New Functions of Excel 2019, VBA

**Suggested Readings:**

1. William Fischer ,Excel: Quick Start Guide from Beginner to Expert

## **2.Grey Harvey, Excel 2019 All – in- One For Dummies**

**Advanced ExcelLab**  
(Course Code: BSGUSE2461)  
Year: 1st

**List of Experiments (Indicative & not limited to)**

**1. Data Entry and Formatting**

- Enter a list of names, addresses, and phone numbers.
- Format cells with different font styles, sizes, and colors.
- Adjust column widths and row heights.

**2. Basic Formulas**

- Calculate the total and average of a list of numbers.
- Use SUM, AVERAGE, MIN, and MAX functions.

**3. Sorting and Filtering**

- Sort data by multiple criteria (e.g., by name, then by age).
- Apply filters to display specific records (e.g., only sales over a certain amount).

**4. Conditional Formatting**

- Highlight cells based on specific conditions (e.g., values greater than a certain number).
- Use color scales to visualize data trends.

**5. Using Functions**

- Implement logical functions like IF, AND, OR.
- Use text functions like CONCATENATE, LEFT, RIGHT, and MID.

**6. Charts and Graphs**

- Create various chart types (bar, line, pie) to represent data visually.
- Customize charts with titles, labels, and legends.

**7. Pivot Tables**

- Create a Pivot Table to summarize sales data by product and region.
- Use slicers to filter data in the Pivot Table.

**8. Data Validation**

- Set up drop-down lists for data entry.
- Implement rules to restrict the type of data entered (e.g., dates only).

**9. VLOOKUP and HLOOKUP**

- Use VLOOKUP to find information in a large dataset.
- Implement HLOOKUP for horizontal data retrieval.

**10. Descriptive Statistics**

- Calculate standard deviation, variance, and correlation using Excel functions.
- Create a summary table with descriptive statistics for a dataset.

**12. Macros**

- Record a simple macro to automate repetitive tasks (e.g., formatting).
- Edit a recorded macro in the VBA editor.

# DATA STRUCTURES USING C

(Course Code: B021223201)

Year: 1<sup>st</sup>

Semester: II

L T P C

3 0 0 3

## COURSE OBJECTIVES

To provide foundational knowledge of data structures and the basics of C programming.

To understand and implement linear data structures such as arrays and linked lists.  
And introduce stack and queue data structures and their application

To study hierarchical data structures, focusing on binary trees and their variations  
And learn efficient algorithms for sorting and searching data.

Course Outcome (CO)	Bloom's Knowledge Level (KL)
At the end of course, the student will be able to understand	
CO1	Understand and implement basic data structures (arrays, linked lists, stacks, queues) and their operations in C. K2, K3
CO2	Apply dynamic memory allocation and manage dynamic data structures like linked lists in C K3
CO3	Implement and work with tree structures (binary trees, BST, AVL) and their operations K3,K4
CO4	Implement and analyze sorting (bubble, selection, merge, quick) and searching (linear, binary) algorithms. K3,K4
CO5	Analyze and optimize algorithm efficiency using Big O notation for sorting, searching, and data structure operations. K4,K5

## Unit 1: Introduction to Data Structures and C Basics

Introduction to Data Structures: Definition, Importance, and Classification (Linear vs Non-linear, Homogeneous vs Heterogeneous), Data Representation in Computers. Abstract Data Types (ADT). Overview of C Programming Language: Basic Syntax, Operators, Control Structures, Functions, Arrays, and Strings. Pointers and Dynamic Memory Allocation. File Handling, Basics of File Input/Output in C

## Unit 2: Arrays and Linked Lists

Arrays: Definition, Types of Arrays (1D, 2D, Multidimensional). Operations on Arrays (Insertion, Deletion, Searching, Sorting), Linked Lists. Singly Linked List (Creation, Traversal, Insertion, Deletion),

Doubly Linked List and Circular Linked List

Memory Management in Linked Lists

## Unit 3: Stacks and Queues

**Stacks:** Concept of Stack. Stack Operations (Push, Pop, Peek, is Empty), Applications of Stack (Expression Evaluation, Balancing Parentheses)

**Queues:** Concept of Queue, Queue Operations (Enqueue, Dequeue, Peek, is Empty), Types of Queues: Simple Queue. Circular Queue. Priority Queue, Applications of Queues (Scheduling, Buffers)

## Unit 4: Trees

**Introduction to Trees:** Basic Terminology (Root, Nodes, Edges, Height, Depth), Binary Trees, Binary Tree Traversals (Pre-order, In-order, Post-order), **Binary Search Tree (BST):** Operations on BST (Insertion, Deletion, Searching), **Balanced Trees:** AVL Trees, Basic Rotations and Balance Factors.

## **Unit 5: Sorting and Searching Algorithms**

**Sorting Algorithms:** Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort, Time Complexity of Sorting Algorithms (Best, Worst, and Average Case)

**Searching Algorithms:** Linear Search, Binary Search, Time Complexity and Applications of Searching Algorithms.

**Analysis of Algorithms:** Big O Notation (Time and Space Complexity), Asymptotic Analysis (Best, Worst, and Average Case)

### **Textbooks:**

1. "Data Structures Using C" by ReemaThareja
2. "Data Structures and Algorithms in C" by Adam Drozdek
3. "C Programming and Data Structures" by E. Balagurusamy

### **Reference Books:**

1. "Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein
2. "Data Structures and Algorithm Analysis in C" by Mark Allen Weiss

# OBJECT ORIENTED PROGRAMMING USING PYTHON

(Course Code: - B021223202)

Year: 1<sup>st</sup>

Semester: II

L T P C

30 0 3

Course Outcome ( CO)	Bloom's Knowledge Level (KL)
<b>COURSEOBJECTIVES</b>	
<b>Understand core object-oriented principles like classes, objects, inheritance, and polymorphism in Python.</b>	
<b>Apply OOP Techniques: Design and implement Python programs using object-oriented methods..</b>	
<b>Enhance Python Skills: Develop practical programming abilities with Python's object-oriented features.</b>	
At the end of course , the student will be able to understand	
CO 1	To read and write simple Python programs. K1
CO 2	To develop Python programs with conditionals and loops. K2
CO 3	To define Python functions and to use Python data structures — lists, tuples, dictionaries K3
CO 4	To do input/output with files in Python K2,K3
CO 5	To do Object Oriented programs K2, K4

## DETAILED SYLLABUS

Unit	Topic
1	Introduction: The Programming Cycle for Python, Python IDE, Interacting with Python Programs, Elements of Python, Type Conversion. Basics: Expressions, Assignment Statement, Arithmetic Operators, Operator Precedence, Boolean Expression
2	Conditionals: Conditional statement in Python (if-else statement, its working and execution), Nested-if statement and Elif statement in Python, Expression Evaluation & Float Representation. Loops: Purpose and working of loops, While loop including its working, For Loop , Nested Loops , Break and Continue.
3	Function: Parts of A Function, Execution of A Function, Keyword and Default Arguments, Scope Rules. Strings: Length of the string and perform Concatenation and Repeat operations in it. Indexing and Slicing of Strings.
4	Abstract Data Types: Abstract data types and ADT interface in Python Programming. Classes: Class definition and other operations in the classes, Special Methods (such as <code>_init_</code> , <code>_str_</code> , comparison methods and Arithmetic methods etc.), Class Example, Inheritance, Inheritance and OOP.
5	Python Data Structure: Tuples, Unpacking Sequences, Lists, Mutable Sequences, List Comprehension, Sets, Dictionaries Higher Order Functions: Treat functions as first-class Objects, Lambda Expressions Modules: Introduction, Importing Modules

**Text books:** 1. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

2. John V Guttag, —Introduction to Computation and Programming Using Python“, Revised and expanded Edition, MIT Press , 2013

**Reference Book:** 1. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.

2. Timothy A. Budd, —Exploring Python, Mc-Graw Hill Education (India) Private Ltd., 2015. 5. Kenneth A. Lambert, —Fundamentals of Python: First Programs, CENGAGE Learning, 2012.

# Indian Knowledge Systems

## Course Code: BSGUVA2407

Year: 1<sup>st</sup>  
Semester: II

L T PC  
3 00 3

### DETAILED SYLLABUS

<b>COURSE OBJECTIVES</b>		
<b>Revive and promote India's ancient knowledge across disciplines like science, philosophy, and medicine.</b>		
<b>Integrate traditional wisdom with modern subjects to foster well-rounded learning.</b>		
<b>Instill pride in India's intellectual and cultural heritage, emphasizing values like Dharma and Ahimsa.</b>		
Course Outcomes		Bloom's taxonomy
CO 1:	Understand the fundamental concepts and historical development of Indian Knowledge Systems	K2,K1
CO2:	Analyze the philosophical underpinnings and contributions of ancient Indian thinkers and scholars	K3
CO 3:	Examine the scientific and technological advancements in ancient India and their relevance to contemporary society	K4
CO 4:	Explore the integration of Indian Knowledge Systems in areas like education, governance, and stress management.	K3
CO 5:	Develop an appreciation for the holistic approach of Indian Knowledge Systems in promoting sustainable living and well-being.	K4

#### **Unit 1:**

**Introduction to Indian Knowledge Systems:** Overview of Indian Knowledge Systems: Definition, scope, and significance. Historical development: Vedic, Post-Vedic, and Classical periods. Key texts and scholars in Indian Knowledge Systems.

#### **Unit 2:**

**Philosophical Foundations:** Introduction to the Six Schools of Indian Philosophy (Shad Darshanas): Nyaya, Vaisheshika, Samkhya, Yoga, Mimamsa, and Vedanta. Concepts of Dharma, Karma, and Moksha. Role of Upanishads, Bhagavad Gita, and other key texts in shaping Indian philosophical thought.

#### **Unit 3:**

**Science and Technology in Ancient India:** Contributions to Mathematics: Concept of zero, geometry, and algebra. Astronomy and Astrology: Aryabhata, Varahamihira, and their works. Medicine and Ayurveda: Sushruta, Charaka, and the development of ancient Indian medical practices.

#### **Unit 4:**

**Integration of Knowledge Systems in Society:** Education systems in ancient India: Gurukula, Nalanda, and Takshashila. Governance and administration: Arthashastra and its relevance. Indian Knowledge Systems in arts, literature, and architecture.

#### **Unit 5:**

**Indian Knowledge Systems and Well-being:** Stress management through Yoga and

Meditation.Holistic health practices in Ayurveda.Environmental sustainability and ethical living in Indian traditions.

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**Reference Books:**

1. **Kapoor, Subodh** (Ed.). *Encyclopedia of Indian Heritage: Indian Knowledge Systems (Vols. 1-5)*. Cosmo Publications, 2002.
2. **Radhakrishnan, S.***Indian Philosophy, Vols. 1 & 2*. Oxford University Press, 2008.
3. **Dani, Ahmad Hasan.***History of Science and Technology in Ancient India*. Project of History of Indian Science, Philosophy and Culture, 1999.
4. **Frawley, David.***Yoga and Ayurveda: Self-Healing and Self-Realization*. Lotus Press, 1999.
5. **Rao, S. Ranganath.***The Vedic Age: History, Religion and Culture*. Bharatiya Vidya Bhavan, 2007.

## Computer Fundamentals of Data Science (Course Code: B021123204)

Year: 1<sup>st</sup>  
Semester: II

L T PC  
3 00 3

<b>COURSE OBJECTIVES</b>		
Learn the basic concepts, tools, and techniques used in data science, including data collection, cleaning, and visualization.		
Gain knowledge of essential computational methods, including statistics, probability, and basic machine learning algorithms.		
Apply data science principles to analyze datasets, extract meaningful insights, and solve real-world problems.		
Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course, the student will be able to understand		
CO 1	Describe the significance of data science and understand the Data Science process.	K2, K1
CO 2	Explain how data is collected, managed and stored for data science.	K2, K4
CO 3	Build, and prepare data for use with a variety of statistical methods and models	K4, K5
CO 4	Analyse Data using various Visualization techniques.	K3
CO 5	Choose contemporary models, such as machine learning, AI, techniques to solve practical problems	K4
DETAILED SYLLABUS		
Unit	Topic	
I	Benefits and uses – facets of data – Data Science Process: Overview – Defining research goals – Retrieving data – Data preparation – Exploratory Data analysis – build the model– presenting findings and building applications – Data Mining – Data Warehousing – Basic Statistical descriptions of Data	
II	Types of Data – Types of Variables -Describing Data with Tables and Graphs –Describing Data with Averages – Describing Variability – Normal Distributions and Standard (z) Scores	
III	Correlation –Scatter plots –correlation coefficient for quantitative data –computational formula for correlation coefficient – Regression –regression line –least squares regression line – Standard error of estimate – interpretation of $r^2$ –multiple regression equations –regression towards the mean	
IV	Mathematical Preliminaries: Probability, Descriptive Statistics, Correlation Analysis. Data Munging: Properties of Data, Languages for Data Science, Collecting Data, Cleaning Data, Crowdsourcing	
V	Supervised Learning: Linear Regression, Better Regression Models, Regression as Parameter Fitting, Simplifying Models through Regularization Classification and Logistic Regression, Issues in Logistic Classification, Naive Bayes, Decision Trees Classifiers	

### TEXT BOOKS:

1. Joel Grus," Data Science from Scratch" First Edition, April 2015

2. **Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani , “An Introduction to Statistical Learning-with Applications in R“, 2013**

**Reference Book:**

3. **Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2 edition (30 September 2014)**
4. **R Programming for Data Science, Roger D. Peng, LeanPub, 2015**

**Computer Fundamental for (AI/ML)**  
(Course Code: B020824204)

Year: 1<sup>st</sup>

L T P C

Semester: II

3 0 0 3

<b>COURSE OBJECTIVES</b>	
<b>Understand basic computer concepts:</b>	Learn about computer systems, data structures, algorithms, and programming languages relevant to AI/ML.
<b>Learn essential math for AI/ML:</b>	Gain knowledge in linear algebra, calculus, probability, and statistics to apply in machine learning algorithms.
<b>Build AI/ML models:</b>	Get hands-on experience with programming and tools to create and apply machine learning and deep learning models.

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course, the student will be able to understand		
CO1	Explain basic computer components: Understand how computer systems and programming are used in AI/ML.	K <sub>1</sub> , K <sub>2</sub>
CO2	Apply math to machine learning: Use math concepts like linear algebra and probability to work with machine learning models.	K <sub>3</sub>
CO3	Implement machine learning algorithms: Build and test models for tasks like classification, regression, and clustering.	K <sub>3</sub> , K <sub>4</sub>
CO4	Work with deep learning models: Create and train deep learning models for complex tasks like image and speech recognition.	K <sub>5</sub> , K <sub>3</sub>
CO5	Evaluate models and understand ethics: Assess machine learning model performance and recognize ethical issues like bias and privacy in AI.	K <sub>5</sub> , K <sub>2</sub>

**Unit 1: Introduction to Computer Fundamentals and Programming**

**Basic Computer Architecture:** Components of a computer (CPU, RAM, Storage, I/O devices)

**Data Representation:** Binary, Hexadecimal, ASCII, Unicode **Operating Systems Overview:**

Types, Processes, Memory Management **Introduction to Algorithms:** Problem-solving,

Flowcharts, Pseudocode, Basic Algorithm Design **Basic Programming Concepts:** Introduction to Programming Languages (Python, R, etc.), Variables, Data Types, Functions, Loops, Conditionals

**Data Structures:** Lists, Arrays, Tuples **Object-Oriented Programming (OOP):** Classes, Objects, Inheritance, Polymorphism

**Unit 2: Data Structures, Algorithms, and Mathematics for AI/ML**

**Data Structures:** Arrays, Linked Lists, Stacks, Queues, Trees (Binary Trees, Binary Search Trees),

Graphs and Graph Algorithms (DFS, BFS) **Algorithms:** Sorting (Quick Sort, Merge Sort), Searching (Binary Search), Recursion and Backtracking, Time and Space Complexity (Big-O notation)

**Mathematics for AI/ML: Linear Algebra:** Vectors, Matrices, Eigenvalues, and Eigenvectors **Calculus:** Differentiation, Gradient Descent for Optimization **Probability and**

**Statistics:** Probability Theory, Statistical Measures, Hypothesis Testing

**Unit 3: Introduction to Artificial Intelligence (AI) and Machine Learning (ML)**

**Overview of AI:** Types of AI (Narrow AI, General AI) **AI Problem-Solving Methods:** Search

Algorithms, Heuristics **Search Algorithms:** Breadth-First Search (BFS), Depth-First Search (DFS), A\* Algorithm **Machine Learning Basics: Supervised Learning:** Linear Regression, Classification (e.g., KNN, Decision Trees)

**Unsupervised Learning:** Clustering (K-Means), Dimensionality Reduction (PCA) **Reinforcement Learning:** Introduction to Q-Learning and Policy Gradients,

**Evaluation Metrics:** Accuracy, Precision, Recall, F1-Score

**Unit 4: Machine Learning Algorithms and Techniques**

**Supervised Learning Algorithms:** Linear Regression, Logistic Regression, Decision Trees,

Random Forests, Support Vector Machines (SVM), K-Nearest Neighbors (KNN) **Unsupervised Learning Algorithms:** K-Means Clustering, Hierarchical Clustering, DBSCAN, Principal Component Analysis (PCA), t-SNE **Model Evaluation and Tuning:** Cross-Validation, Hyperparameter Tuning, Regularization (L1, L2), Bias-Variance Tradeoff **Ensemble Learning:** Bagging, Boosting (AdaBoost, Gradient Boosting), Random Forests, XGBoost **Introduction to Neural Networks:** Perceptrons, Backpropagation, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs)

#### **Unit 5: Deep Learning, Applications, and Ethics in AI/ML**

**Deep Learning:** Deep Neural Networks (DNNs): Architecture and Training, Convolutional Neural Networks (CNNs) for Image Recognition, Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM), Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs) **Applications of AI/ML: Natural Language Processing (NLP):** Text Classification, Sentiment Analysis, Word Embedding's (Word2Vec, GloVe) **Computer Vision:** Image Classification, Object Detection, Image Segmentation **Speech Recognition and Synthesis, Recommender Systems, Ethics and Future of AI:** Ethical Issues: Bias in Data, Fairness, Privacy Concerns, Social Implications of AI: Employment Impact, Regulation, Accountability, The Future of AI: Trends and Challenges

**Computer Fundamental for (AI/ML) Lab**  
(Course Code: B020824254)

Year: 1<sup>st</sup>

L T P C

Semester: II

0 0 2 1

<b>COURSE OBJECTIVES</b>
Introduce students to the basic components of computer systems through practical exploration.
Develop skills in implementing data structures and algorithms essential for AI/ML.
Understand memory usage, how memory and storage management techniques impact AI/ML tasks.
Simulate operating system and system processes like paging and virtual memory management for AI/ML.
Provide hands-on experience with databases and cloud platforms for scalable AI/ML data handling.

Course Outcome (CO)	Bloom's Knowledge Level (KL)
At the end of course, the student will be able to understand	
CO1	Identify and explain the functionality of basic computer components and their significance in AI/ML systems. K <sub>1</sub>
CO2	Implement and work with fundamental data structures (arrays, linked lists, trees) relevant to AI/ML. K <sub>2</sub>
CO3	Apply and analyze algorithms, including sorting, searching and their time/space complexities, for AI/ML applications. K <sub>3</sub>
CO4	Simulate memory management techniques and understand their role in AI/ML model execution. K <sub>4</sub>
CO5	Use databases and cloud platforms to store, manage, and process AI/ML datasets. K <sub>5</sub>

**List of Experiments:**

1. Exploring Basic Components of a Computer System.
2. Understanding Number Systems and Binary Arithmetic.
3. Simulation of Logic Gates.
4. CPU Performance and Pipelining Simulation.
5. Comparing CPU and GPU for AI/ML.
6. Implementing Basic Data Structures (Arrays, Linked Lists).
7. Sorting and Searching Algorithms.
8. Trees and Graphs in AI/ML.
9. Virtual Memory and Paging Simulation.
10. Working with SQL/NoSQL Databases for AI/ML.

<b>School Name- School of Computer Applications</b>			
<b>Program- BCA</b>			<b>Semester-2<sup>nd</sup></b>
<b>Course Name- Computer Fundamentals for Cyber Security</b>			
<b>A.Y 2025-26</b>	<b>Course Code- B020924204</b>	<b>Batch- 2024-28</b>	<b>CIE Marks- 50 (MM)</b>
<b>Total Teaching Hours 45</b>	<b>Total Credits- 3</b>		<b>ESE Marks- 50 (MM)</b>
<b>Type of Course- Theory</b>			<b>Total Marks 100 (MM)</b>
<b>Course Objectives/Course Description</b>			
<ul style="list-style-type: none"> <li>To introduce students to basic computer architecture, operating systems, and networking concepts.</li> <li>To develop an understanding of cybersecurity fundamentals including threats, vulnerabilities, and common defense mechanisms.</li> <li>To provide hands-on experience with practical tools and techniques in securing systems and networks.</li> </ul>			
<b>UNIT-1</b>	<b>Topics</b>		<b>No. of Teaching hours/ (Lecture)</b>
<b>1</b>	<b>Introduction to Computer Systems and Cyber Security</b> <b>Computer Architecture:</b> Overview of computer system components: CPU, Memory (RAM, ROM), Storage (Hard Drives, SSDs), Input/Output devices, Ports, and Peripherals, Introduction to Operating Systems and their role in cybersecurity, System Software vs Application Software, Malware (Viruses, Trojans, etc.) <b>Cyber Security Overview:</b> Key concepts: Confidentiality, Integrity, Availability (CIA Triad), Types of Cybersecurity Threats: Malware (Virus, Worms, Ransomware), Phishing, Social Engineering, Cyber Attacks: Denial of Service (DoS), Man-in-the-Middle (MITM), SQL Injection.		<b>09</b>
<b>2</b>	<b>Networking Fundamentals and Security</b> <b>Computer Networks:</b> Types of Networks: LAN, WAN, MAN, PAN, OSI and TCP/IP Models: Functionality of each layer, Networking Protocols (HTTP, FTP, TCP, UDP), Understanding IP Addresses (IPv4 vs. IPv6), Subnetting. <b>Network Security:</b> Importance of Firewalls, VPNs, and Proxy Servers, Basic concepts of Wireless Network Security: WEP, WPA, WPA2, Common attacks on networks: DoS, DDoS, MITM.		<b>09</b>
<b>3</b>	<b>Operating System Security</b> <b>Operating System Security Basics:</b> User Accounts and Permissions (Windows/Linux), File System Security and File Permissions (NTFS, FAT32, ext4), Importance of Software Updates and Patches in Securing the OS. <b>Security Tools in OS:</b> Antivirus software, Firewalls, and Encryption Tools, Introduction to Windows and Linux security features, Monitoring System Logs and Auditing (Event Viewer in Windows, syslog in Linux).		<b>09</b>

4	<b>Cryptography and Encryption Basics</b> <b>Introduction to Cryptography:</b> Basic Terminology: Plaintext, Ciphertext, Encryption, Decryption, Symmetric vs. Asymmetric Encryption Algorithms, Public Key Infrastructure (PKI) and Digital Certificates, SSL/TLS for Web Security <b>Cryptographic Tools:</b> Introduction to encryption tools: PGP, GPG, Digital Signatures and Certificates	09
5	<b>Cyber Threats, Attacks, and Defensive Mechanisms</b> <b>Common Cyber Attacks:</b> Types of Malware: Viruses, Worms, Trojans, Ransomware, Phishing Attacks, Social Engineering, and Insider Threats, Denial of Service (DoS) and Distributed Denial of Service (DDoS), Cross-Site Scripting (XSS) and SQL Injection <b>Defensive Strategies:</b> Use of Intrusion Detection Systems (IDS) and Intrusion Prevention Systems (IPS), Importance of Patch Management, Anti-virus and Anti-malware Software, Basic Incident Response Procedures	09

**Course Outcomes**

**CO:** Define key cybersecurity principles, such as the CIA triad, and identify types of threats and attacks like malware, phishing, and SQL injection.

**CO2:Configure** and secure basic computer networks (LAN), configure network devices, and analyze network traffic using tools like Wireshark. Understand and apply security measures such as firewalls and VPNs.

**CO3:** Configure user accounts, file permissions, and monitor system logs on both Windows and Linux operating systems. Apply security patches and utilize OS-level security tools.

**CO: Apply** encryption tools (GPG) to encrypt/decrypt files and generate SSL certificates to secure web communications.

**CO5:** Simulate common cyber-attacks (DoS, phishing, malware) and use IDS/IPS systems like Snort to detect suspicious activity. Apply defensive strategies to mitigate security risks.

**Text books:**

1. Computer Networking: A Top-Down Approach" by James Kurose and Keith Ross
2. "Network Security Essentials" by William Stallings

**Reference books:**

1. "Principles of Information Security" by Michael Whitman

**Assessment method:** (Continuous Internal Assessment = 50th%, Final Examination = 50th%)

<b>School Name- School of Computer Applications</b>			
<b>Program- BCA</b>			<b>Semester-2<sup>nd</sup></b>
<b>Course Name- Computer Fundamentals for Cyber Security Lab</b>			
<b>A.Y 2025-26</b>	<b>Course Code- B020924254</b>	<b>Batch- 2024- 28</b>	<b>CIE Marks- 60 (MM)</b>
<b>Total Teaching Hours</b>	<b>Total Credits- 1</b>		<b>ESE Marks- 40 (MM)</b>
<b>Type of Course- Practical</b>			<b>Total Marks 100 (MM)</b>
<b>Course Objectives/Course Description</b>			
<ul style="list-style-type: none"> <li>• Learn about system architecture, operating systems, and common cybersecurity threats</li> <li>• Set up networks, configure firewalls, manage OS security settings, and apply encryption tools.</li> <li>• Simulate and respond to attacks like phishing, and use IDS/IPS tools to detect and prevent threats.</li> </ul>			
<b>UNIT-</b>	<b>Topics</b>		<b>No. of Teaching hours/ (Lecture)</b>
	<ol style="list-style-type: none"> <li>1. Identifying types of malware using antivirus software.</li> <li>2. Using Windows and Linux system tools to check for vulnerabilities.</li> <li>3. Setting up basic LAN with two PCs and configuring network settings.</li> <li>4. Using Wireshark to capture and analyze network traffic.</li> <li>5. Configuring a simple firewall on a system.</li> <li>6. Configuring user accounts and setting file permissions in Windows and Linux.</li> <li>7. Setting up a firewall on Windows or Linux using default OS tools.</li> <li>8. Encrypting and decrypting files using GPG.</li> <li>9. Generating and using SSL certificates in browsers or web servers.</li> <li>10. Simulating a phishing attack and implementing basic countermeasures.</li> <li>11. Using a tool like Snort for IDS/IPS to detect suspicious activity.</li> </ol>		
<b>Course Outcomes</b>			
<b>CO1:Identify and Analyze Cybersecurity Threats:</b> Recognize malware types and use system tools for vulnerability detection.			
<b>CO2:Apply Networking and Security Configurations:</b> Set up LANs, analyze network traffic, and			

configure firewalls.

**CO3:Implement Operating System Security:** Configure user accounts, file permissions, and OS firewalls.

**CO4:Apply Cryptographic Techniques:** Encrypt/decrypt files using GPG and configure SSL certificates

**CO5:Defend Against Cyber Attacks:** Simulate phishing attacks and use IDS/IPS tools like Snort.

**Assessment method:** (Continuous Internal Assessment = 60th%, Final Examination = 40th%)

## Data Structure using C Lab

### Course Code: B021223251

Year 1<sup>st</sup>  
Semester-2<sup>nd</sup>

L T P C  
0 0 2 1

<b>COURSE OBJECTIVES</b>		
Gain practical experience in implementing arrays, linked lists, stacks, queues, trees, and graphs using C.		
Develop skills to select and use appropriate data structures for efficient problem-solving.		
Improve proficiency in writing, testing, and debugging C programs with a focus on data structures.		
Course Outcome (CO)	Bloom's Knowledge Level (KL)	
At the end of course, the student will be able to understand		
CO 1	Ability to write C programs to create and manipulate basic data structures such as arrays and linked lists.	K3
CO 2	Proficiency in implementing stacks and queues using arrays and linked lists, and understanding their applications.	K3
CO 3	Ability to create and traverse trees and graphs, and implement related algorithms like tree traversal and graph search.	K3
CO 4	Understanding and applying various sorting and searching algorithms, analyzing their time and space complexity, and optimizing them for efficiency.	K4
CO 5	Implementing advanced data structures like heaps, hash tables, and understand their use cases in solving complex problems	K3

#### List of Experiments/Practical

S.No	Name of Experiment
1.	1) Write a program to input and display array elements. 2) Write a program to insert an element in array.
2.	1) Write a program to delete an element in array. 2) Write a program to find maximum element in an array.
3.	1) Write a program to find minimum element in an array. 2) Write a program to input array elements and find the sum of even and odd numbers.
4.	1) Write a program to perform addition of two matrices. 2) Write a program to transpose of a matrix.
5.	1) Write a program to find sum of lower triangular matrix element. 2) Write a program to find sum of upper triangular matrix element.
6.	1) Write a program to perform binary search. 2) Write a program to find factorial of a number using recursion.
7.	1) Write a program to sort an array using selection sort. 2) Write a program to sort an array using insertion sort.
8.	1) Write a program to perform reverse a string using stack. 2) Write a program to perform push and pop in stack.
9.	1) Write a program to create and display singly linked list. 2) Write a program to create a singly link list and count total number of nodes in a list.
10	1) Write a program to search an element in singly link list. 2) Write a program to insertion at last in singly link list.
11	1) Write a program to perform deletion at last in singly link list. 2) Write a program to perform deletion at beginning in singly link list.

## Object Oriented Programming Using Python Lab

Course Code: B021223252

Year 1<sup>st</sup>

L T P C

Semester 2<sup>nd</sup>

0 0 2 1

COURSE OBJECTIVES		
Gain hands-on experience with core object-oriented principles, such as classes, objects, inheritance, and polymorphism, using Python.		
Enhance programming skills through the practical application of Python's OOP features.		
Develop the ability to design, implement, and debug Python programs using object-oriented techniques.		
Course Outcome (CO)	Bloom's Knowledge Level (KL)	
At the end of course, the student will be able to understand		
CO 1	Create and manipulate classes and objects in Python.	K2
CO 2	Apply inheritance and polymorphism to create reusable code.	K3
CO 3	Develop complex Python applications using advanced OOP concepts.	K3
CO 4	Utilize modules and packages to organize and modularize code.	K4
CO 5	Debug and optimize Python programs for performance and efficiency	K3

### List of Experiments/Practical

S.No	Name of Experiment
1.	1.Program to print Resume.2.Program to add two numbers.
2.	3.Program to swap the variables.4.Program to calculate the simple Interest.
3.	5 Program to find the area of triangle.6.Program to find the square root of number.
4.	7.Program to find odd even number.8.Program to check the number is positive or negative.
5.	9.Program to check number is Armstrong.10.Program to print sum of series.
6.	11.Programs to print pyramid patterns.12program to reverse the number.
7.	13.Program to print Fibonacci series.14.Program to find the largest number among three numbers.
8.	15.Program to find the factorial of number using recursion.16.Program to make simple calculator.
9.	17.Program to find HCF & LCM of number. 18.Program to find ASCII value of character.
10	19.Program to convert decimal to binary, octal and Hexadecimal.20.Program to access index of a list using for loop.
11	21.program to print numbers and multiplication table.22.Program to flatten a nested list.
12	23.Program to slice lists.24.Program to sort dictionary &merge two dictionaries.
13	25.Program to find the list and add the elements of the list.26.program to convert string to date time to get a sub string.
14	27.Program to append to a file.28.python class and object using of in_ it functions.
15	29.Program to generate random numbers using random () functions.

## Computer Fundamentals of Data Science Lab

Course Code: B021123254

Year 1<sup>st</sup>  
Semester-2<sup>nd</sup>

L T P C  
0 0 2 2

COURSE OBJECTIVES		
Gain practical experience with essential data science tools and techniques, including data preprocessing, analysis, and visualization.		
Develop skills in using computational methods and statistical techniques for data exploration and analysis.		
Build the capability to implement data science projects, including data collection, cleaning, analysis, and interpretation.		
Course Outcome (CO)	Bloom's Knowledge Level (KL)	
At the end of course, the student will be able to understand		
CO 1	Clean and prepare raw data for analysis, handling missing values and outliers.	K2
CO 2	Use visualization tools to explore and present data insights.	K3
CO 3	Implement statistical techniques to analyze data and draw conclusions.	K3
CO 4	Use data science libraries (e.g., Pandas, NumPy) and tools (e.g., Jupyter Notebook) for data manipulation and analysis.	K4
CO 5	Execute data science projects from data collection to final analysis and interpretation.	K5

### List of Experiments/Practical

S.No	Name of Experiment
1.	Working with Numpy arrays
2.	Working with Pandas data frames
3.	Basic plots using Matplotlib
4.	Frequency distributions
5.	Averages
6.	Variability
7.	Normal curves
8.	Correlation and scatter plots
9.	Correlation coefficient
10	Regression

# Syllabus for "Team Building & Leadership" (2 Credits) - AEC

## Course Code:BSGUAE2406

### Course Outcomes (COs):

- **CO1:** Identify and describe the key components of effective team building.
- **CO2:** Analyze various leadership styles and their application in team management.
- **CO3:** Demonstrate the ability to work collaboratively within a team, contributing to group goals.
- **CO4:** Apply leadership skills in managing team dynamics and resolving conflicts.
- **CO5:** Evaluate team performance and provide constructive feedback for improvement.

### Unit 1: Introduction to Team Building

- Definition and importance of teams in organizations, Stages of team development: Forming, Storming, Norming, Performing, Adjourning, Characteristics of effective teams, Role of communication in team building.

### Unit 2: Leadership Fundamentals

- Definition and significance of leadership in team settings, Leadership vs. Management, Leadership theories: Trait theory, Behavioral theory, Contingency theory, Leadership styles: Autocratic, Democratic, Laissez-faire, Transformational, and Transactional leadership.

### Unit 3: Building and Leading Teams

- Team roles and responsibilities, Creating and sustaining high-performing teams, Leadership in diverse and cross-functional teams, Strategies for effective team leadership.

### Unit 4: Managing Team Dynamics

- Understanding team dynamics and group behavior, Conflict resolution in teams, Motivating team members, Enhancing team collaboration and trust.

### Unit 5: Assessing Team Performance

- Tools and techniques for evaluating team performance, Providing feedback and coaching, Continuous improvement in team processes, Case studies on successful team leadership.

### Reference Books:

1. Adair, J. (2009). *Effective Team Building*. Pan Books.
2. Northouse, P. G. (2018). *Leadership: Theory and Practice*. Sage Publications.
3. Lencioni, P. (2002). *The Five Dysfunctions of a Team: A Leadership Fable*. Jossey-Bass.
4. Blanchard, K. (2007). *Leading at a Higher Level*. FT Press.
5. Levi, D. (2015). *Group Dynamics for Teams*. Sage Publications.

# Digital Marketing

## Course Type: Skill Enhancement

(Course Code: BSGUSE2407)

L T PCredit

2 0 2 3

### Course Objectives:

Course Outcome (CO)	
CO 1	Analyze online Micro and Macro Environment
CO 2	Design and create website
CO 3	Discuss search engine marketing
CO 4	Create blogs, videos, and share

Unit	Topic
<b>1</b>	Introduction of the digital marketing, Digital vs. Real Marketing, Digital Marketing Channels, Creating initial digital marketing plan, Content management, SWOT analysis, Target group analysis.
<b>2</b>	Web design, Optimization of Web sites, MS Expression Web, Creating web sites, SEO Optimization, Writing the SEO content, Writing the SEO content, Google Ad Words-creating accounts, Google Ad Words- types.
<b>3</b>	Introduction to CRM, CRM platform, CRM models, CRM strategy, Introduction to Web analytics, Web analytics – levels, Introduction of Social Media Marketing, Social Media Marketing plan, Facebook Ads, Creating Facebook Ads, Ads Visibility, Business opportunities and Instagram options, Optimization of Instagram profiles, Integrating Instagram with a Web Site and other social networks, Keeping up with posts.
<b>4</b>	Creating business accounts on YouTube, YouTube Advertising, YouTube Analytics, E-mail marketing, Email marketing plan, E-mail marketing campaign analysis, Keeping up with conversions, Digital Marketing Budgeting - resource planning, cost estimating, cost budgeting, cost control.

### Suggested Readings

1. Chaffey, D, F.E. Chadwick, R. Mayer, and K. Johnston (2015). Internet Marketing: Strategy, Implementation, and Practice. Pearson India
2. Frost, Raymond D., Alexa Fox, and Judy Strauss (2018). E- Marketing. Routledge
3. Gupta, Seema (2018). Digital Marketing. McGraw Hill Education (India) Private Ltd.
4. Kapoor, Neeru. E-Marketing, Pinnacle learning

### Additional Resources :

1. Blanchard O. (2014) Social Media ROI: Managing and Measuring Social Media Efforts in Your Organisation.
2. Charlesworth, Alan (2018). Digital Marketing: A Practical Approach.
3. Gay, Richard, Alan Charlesworth, and Rita Esen. Online Marketing: a customer-led approach. Oxford University Press Inc., New York.

**Operating Systems**  
(CourseCode: **B021223301**)

**Year:2nd**  
**Semester:IIIrd**

**L T P C**  
**300 3**

<b>COURSEOBJECTIVES</b>		
1. To understand the basic concepts of Operating Systems .		
2. To understand the concept and functions Operating System.		
3. To recognize I/O management and File systems.		
<b>CourseOutcome(CO)</b>		<b>Bloom'sKnowledge Level(KL)</b>
<b>Attheendof course,thestudentwill be ableto understand</b>		
CO1	Understand the structure and functions of OS.	K <sub>1</sub> , K <sub>2</sub>
CO2	Learn about Processes, Threads and Scheduling algorithms.	K <sub>1</sub> , K <sub>2</sub>
CO3	Understand the principles of concurrency and Deadlocks.	K <sub>2</sub>
CO4	Learn various memory management scheme.	K <sub>2</sub>
CO5	Study I/O management and File systems.	K <sub>4</sub> , K <sub>2</sub>

**Unit 1 Introduction (Hrs-10)**

Introduction : Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocess Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.

**Unit2 Concurrent Processes(Hrs-10)**

Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation.

**Unit3 CPU Scheduling (Hrs-10)**

: Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

**Unit 4 Memory Management (Hrs-10)**

Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.

**Unit 5 I/O Management and Disk Scheduling(Hrs-10)**

I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.

**TextBooks:**

1. Silberschatz, Galvin and Gagne, “Operating Systems Concepts”, Wiley
2. SibsankarHalder and Alex A Aravind, “Operating Systems”, Pearson Education
3. Harvey M Dietel, “ An Introduction to Operating System”, Pearson Education

**Reference Book:** 1. D M Dhamdhare, “Operating Systems : A Concept based Approach”, 2nd Edition,  
2. TMH 5. William Stallings, “Operating Systems: Internals and Design Principles ”, 6th Edition,  
Pearson Education

# Artificial Intelligence

(Course Code: B021223302)

**Year: 2nd**  
**Semester: IIIrd**

**L T P C**  
**40 0 4**

COURSE OBJECTIVES
1. To understand the basic concepts of Intelligent Agents .
2. To understand the concept and working of Predicate Logic .
3. To recognize various AI applications .

Course Outcome (CO)	Bloom's Knowledge Level (KL)
<b>At the end of course, the student will be able to understand</b>	
CO1   Understand the basics of the theory and practice of Artificial Intelligence as a discipline and about intelligent agents.	K <sub>1</sub> , K <sub>2</sub>
CO2   Understand search techniques and gaming theory.	K <sub>2</sub> , K <sub>3</sub>
CO3   The student will learn to apply knowledge representation techniques and problem-solving strategies to common AI applications.	K <sub>4</sub> , K <sub>3</sub>
CO4   Student should be aware of techniques used for classification and clustering.	K <sub>2</sub> , K <sub>3</sub>
CO5   Student should be aware of basics of pattern recognition and steps required for it.	K <sub>4</sub> , K <sub>2</sub>

### Unit 1 Introduction

Introduction – Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents – Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

### Unit 2 Problem Solving Methods

Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games

### Unit 3 Knowledge Representation

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning with Default Information

### Unit 4 Software Agents

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

### Unit 5 AI Applications

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving

**Text Books:** 1. S. Russell and P. Norvig, “Artificial Intelligence: A Modern Approach”, Prentice Hall, Third Edition, 2009. 2. I. Bratko, —Prolog: Programming for Artificial Intelligence, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011. 3. M. Tim Jones, —Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers, Inc.; First Edition, 2008

**Reference Book:** 1. Nils J. Nilsson, —The Quest for Artificial Intelligence, Cambridge University Press

# Analyzing and Applying data Science with python

(CourseCode: B021123304)

**Year: 2nd**  
**Semester: IIIrd**

**L T P C**  
**3003**

## Unit 1 Introduction to Data Analytics

COURSE OBJECTIVES		
1. To understand the basic concepts of data analytics.		
2. To understand the concept and working of data streams.		
3. To recognize various data visualization tools.		
Course Outcome (CO)		Bloom's Knowledge Level (KL)
<b>At the end of course, the student will be able to understand</b>		
CO1	Discuss various concepts of data analytics pipeline	K <sub>1</sub> , K <sub>2</sub>
CO2	Apply classification and regression techniques	K <sub>3</sub>
CO3	Explain and apply mining techniques on streaming data	K <sub>2</sub> , K <sub>3</sub>
CO4	Compare different clustering and frequent pattern mining algorithms.	K <sub>4</sub>
CO5	Describe the concept of R programming and implement analytics on Big data using R.	K <sub>3</sub> , K <sub>2</sub>

Introduction, Sources and nature of data, classification of data (structured, semi-structured, unstructured), characteristics of data, introduction to Big Data platform, need of data analytics, evolution of analytic scalability, analytic process and tools, analysis vs reporting, modern data analytic tools, applications of data analytics. Data Analytics Lifecycle: Need, key roles for successful analytic projects, various phases of data analytics lifecycle – discovery, data preparation, model planning, model building, communicating results, operationalization.

### Unit 2 Data Analysis

Regression modeling, multivariate analysis, Bayesian modeling, inference and Bayesian networks, support vector and kernel methods, analysis of time series: linear systems analysis & nonlinear dynamics, rule induction, neural networks: learning and generalisation, competitive learning, principal component analysis and neural networks, fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, stochastic search methods.

### Unit 3 Data Streams

Mining Data Streams: Introduction to streams concepts, stream data model and architecture, stream computing, sampling data in a stream, filtering streams, counting distinct elements in a stream, estimating moments, counting oneness in a window, decaying window, Real-time Analytics Platform (RTAP) applications, Case studies – real time sentiment analysis, stock market predictions.

### Unit 4 Frequent Itemsets and Clustering

Frequent Itemsets and Clustering: Mining frequent itemsets, market based modelling, Apriori algorithm, handling large data sets in main memory, limited pass algorithm, counting frequent itemsets in a stream, clustering techniques: hierarchical, K-means, clustering high dimensional data, CLIQUE and ProCLUS, frequent pattern based clustering methods, clustering in noneuclidean space, clustering for streams and parallelism.

### Unit 5 Frame Works and Visualization

MapReduce, Hadoop, Pig, Hive, HBase, MapR, Sharding, NoSQL Databases, S3, Hadoop Distributed File Systems, Visualization: visual data analysis techniques, interaction techniques, systems and applications. Introduction to R - R graphical user interfaces, data import and export, attribute and data types, descriptive statistics, exploratory data analysis, visualization before analysis, analytics for unstructured data.

**ReferenceBooks**

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer
2. AnandRajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press.
3. Bill Franks, Taming the Big Data Tidal wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & Sons.

**Reference Book:** 1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley.

2. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big Data Analytics", EMC Education Series, John Wiley

**Linear Algebra  
CourseCode:B021223304)**

**Year:2nd**

**L T P C**

Course Outcome(CO)		Bloom's Knowledge Level(KL)
<b>At the end of course, the student will be able to understand</b>		
CO1	<b>Apply knowledge of database for real life applications.</b>	K <sub>3</sub>

**COURSE OBJECTIVES**

1. Gain a thorough understanding of fundamental linear algebra concepts, including vector spaces, matrices, determinants, eigenvalues, and eigenvectors.		
2. Enhance analytical skills by solving systems of linear equations and applying matrix operations, transformations, and vector space theory.		
3. Utilize linear algebra techniques to model and solve practical problems in various fields such as computer science, engineering, and data science. .		
CO2	<b>Apply query processing techniques to automate the real time problems of databases.</b>	K <sub>3</sub> ,K <sub>4</sub>
CO3	<b>Identify and solve the redundancy problem in database tables using normalization.</b>	K <sub>2</sub> ,K <sub>3</sub>
CO4	<b>Understand the concepts of transactions, their processing so they will familiar with broad range of database management issues including data integrity, security and recovery.</b>	K <sub>2</sub> ,K <sub>4</sub>
CO5	<b>Design, develop and implement a small database project using database tools.</b>	K <sub>3</sub> ,K <sub>6</sub>
<b>DETAILED SYLLABUS</b>		
Unit	Topic	Proposed Lecture
I	Fields, Vector-spaces, sub-spaces, linear-combination, linear-dependence and independence. Basis, dimensions and coordinates (each and every fact to be illustrated by suitable examples).	
II	Linear-transformation, definition and examples, matrix representation, similarity, range and kernel, rank-nullity theorem and its consequences.	
III	Singular and non singular linear transformations, sum and product of linear transformations, vector space of linear transformations, nilpotent linear transformations.	
IV	Inner product spaces, definition and examples, orthogonality, Cauchy-Schwartz Inequality, Minkowski Inequality, polarization Identity, complete orthonormal set, Bessel's Inequality, Gram-Schmidt's orthogonalization process.	
V	Linear functional, definition and examples, vector space of linear functional, dual vector spaces, adjoint, self adjoint, unitary and normal operators, examples and properties, eigen values and eigen vectors, diagonalisation of linear operators, quadratic forms, principle axis theorem (without proof), some applications to engineering problems.	

**Textbooks:**

1. Dym, H. Linear Algebra in action, University Press.2012
  2. Halmos, P.R.: Finite Dimensional Vector Spaces (1990) Narosa.
  3. Hoffman, K. and Kunze, R.: Linear Algebra PHI (2012)
  4. Kolman, B. And Hill, D.R.: Introductory linear algebra with applications(2008) Pearson
- Reference Book: 1. Lipschutz, S. and Lipson M.: Linear Algebra (2005) Schaum's Series.  
2, Noble, B. And Daniel, J.W.: Applied linear algebra. (1988) PHI

**Cyber Security**  
**(CourseCode:BSGUSE2416)**

**Year:2nd**  
**Semester:3<sup>rd</sup>**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>20</b>	<b>0</b>	<b>2</b>	

Course Outcome(CO)		Bloom's Knowledge Level(KL)
<b>At the end of course, the student will be able to understand</b>		
CO1	Learn, structure, mechanics and evolution of various crime threats	K1

### COURSE OBJECTIVES

1. Learn key concepts like confidentiality, integrity, availability, and the technologies to protect information systems.
2. Study various cybersecurity threats and the tools and methods for prevention, detection, and response.
3. Understand legal and ethical issues, including data protection laws, regulations, and responsibilities in cybersecurity.

CO2	Learn to protect information systems from external attacks by developing skills in enterprise security, wireless security and computer forensics.	K2
CO3	Analyse the risks involved while sharing their information in cyber space and numerous related solutions like sending protected and digitally signed documents	K2-K3
CO4	Insights of ethical hacking and usage of password cracking tools	K3
CO5	Get an overview of different ciphers used for encryption and decryption	K4

### DETAILED SYLLABUS

Unit	Topic
1	Definitions :Protection, Security, risk, threat, vulnerability, exploit, attack, confidentiality, integrity, availability, non-repudiation, authentication , authorization, codes, plain text, encryption, decryption, cipher text, key, ciphers, Symmetric and asymmetric 19 cryptography, Public key , private key ,Crypt analysis,, Cyber forensics. Substitution cipher (Caesar), Transposition cipher (Rail-Fence),
2	Risk analysis, process, key principles of conventional computer security, security policies, data protection, access control, internal vs external threat, security assurance, passwords, access control, computer forensics and incident response
3	CYBER ATTACKS (definitions and examples): Denial-of-service attacks, Man-in-the-middle attack, Phishing, spoofing and spam attacks, Drive-by attack, Password attack, SQL injection attack, Cross-site scripting attack, Eavesdropping attack, Birthday attack, Malware attacks, Social Engineering attacks
4	Brief Introduction of handling the attacks described in UNIT 3. Firewalls, logging and intrusion detection systems, e-mail security, security issues in operating systems, ethics of hacking and cracking
5	Definitions: Digital Signature and Electronic Signature, Digital Certificate i.[Section 43] Penalty and compensation for damage to computer etc. ii.[Section 65] Tampering with computer source documents iii.[Section 66A] Punishment for sending offensive messages through communication service etc. iv.[Section 66B] Punishment for dishonestly receiving stolen computer resource or communication device v.[Section 66C] Punishment for identity theft vi.[Section 66D] Punishment for cheating by impersonation by using computer resource vii.[Section 66E] Punishment for violation of privacy viii.[Section 66F] Punishment for cyber terrorism ix.[Section 67] Punishment for publishing or transmitting obscene material in electronic form x.[Section 67A] Punishment for publishing or transmitting of material containing sexually explicit act, etc. in electronic form xi.[Section 67B] Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc. in electronic form xii.[Section 72] Breach of confidentiality and privacy

**Text Book:**1."Principles of Information Security" by Michael E. Whitman and Herbert J. Mattord.

2."Computer Security: Principles and Practice" by William Stallings and Lawrie Brown.

3.Cyberlaw: The Law of the Internet and Information Technology" by Brian Craig

**Reference Book:**1.The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws" by Dafydd Stuttard and Marcus Pinto.

2."Information Technology Law: The Law and Society" by Andrew Murray

**Analyzing and Applying data Science with python lab**  
(CourseCode: **B021123354**)

**Year:2nd**  
Semester:IIIrd

**L T P C**  
**0 0 2 1**

<b>COURSEOBJECTIVES</b>		
1. Provide an overview of data science principles and techniques.		
2. Develop skills in Python and essential libraries for data analysis.		
3. each data preprocessing methods for cleaning and transforming data.		
CourseOutcome(CO)	Bloom's Knowledge Level(KL)	
At the end of course, the student will be able to understand		
CO1	Understand key concepts and applications of data science.	K1
CO2	and libraries like NumPy, pandas, and Matplotlib for data analysis.	K2
CO3	Apply techniques to clean and prepare data for analysis.	K4
CO4	Implement and apply basic machine learning algorithms.	K3, K4
CO5	Perform exploratory data analysis and visualize data.	K5

**List of Experiments/Practical**

- 1. To get the input from user and perform numerical operations (MAX, MIN, AVG, SUM, SQRT, ROUND) using in Python.**
- 2. To perform data import/export (.CSV, .XLS, .TXT) operations using data frames in Python.**
- 3. To get the input matrix from user and perform Matrix addition, subtraction, multiplication, inverse transpose and division operations using vector concept in Python.**
- 4. To perform statistical operations (Mean, Median, Mode and Standard deviation) using Python.**
- 5. To perform data pre-processing operations i) Handling Missing data ii) Min-Max normalization**
- 6. To perform dimensionality reduction operation using PCA for Houses Data Set**
- 7. To perform Simple Linear Regression with Python.**
- 8. To perform K-Means clustering operation and visualize for iris data set**

**9. Write R script to diagnose any disease using KNN classification and plot the results.**

**10. To perform market basket analysis using Association Rules (Apriori).**

## Operating System Lab using Linux (CourseCode: B021223351)

**Year: 2nd**  
**Semester: IIIrd**

**L T P C**  
**0 0 21**

<b>COURSE OBJECTIVES</b>
1. Introduce basic concepts and functions of operating systems
2. Develop skills in using Linux commands and utilities.
3. Learn to navigate, manage, and secure Linux file systems.

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course, the student will be able to understand		
CO1	Grasp the key concepts and architecture of operating systems.	K1
CO2	Proficiently use Linux commands and shell scripting.	K2
CO3	Perform basic Linux system administration tasks like user management and system monitoring.	K3
CO4	Manage and monitor processes and services in Linux.	K3-K4
CO5	Navigate and manage Linux file systems, including permissions and security	K5

List of Experiments (Indicative & not limited to)

1. Study of hardware and software requirements of different operating systems (UNIX, LINUX, WINDOWS XP, WINDOWS 7/8).
2. Execute various UNIX system calls for :i. Process managementii. File management,  
iii. Input/output Systems calls
3. Implement CPU Scheduling Policies:i. SJF, ii. Priority, iii. FCFS, iv. Multi-level queue
4. Implement file storage allocation technique:i. Contiguous(using array), ii. Linked –list(using linked-list)  
iii. Indirect allocation (indexing)
5. Implementation of contiguous allocation techniques: i. Worst-Fit, ii. Best- Fit iii. First- Fit
6. Calculation of external and internal fragmentation  
i. Free space list of blocks from system  
ii. List process file from the system
7. Implementation of compaction for the continually changing memory layout and calculate total movement of data.
8. Implementation of resource allocation graph RAG.
9. Implementation of Banker's algorithm.
10. Conversion of resource allocation graph (RAG) to wait for graph (WFG) for each type of method used for storing graph.
11. Implement the solution for Bounded Buffer (producer-consumer) problem using inter process communication techniques-Semaphores.

12. Implement the solutions for Readers-Writers problem using inter process communication technique - Semaphore.

SDGI GLOBAL UNIVERSITY, GHAZIABAD (SGU)

Session:2024-2025

Cyber Security Lab

(CourseCode: BSGUSE2466)

Year:

L T P C

Semester:

20 2 3

COURSEOBJECTIVES
To provide hands-on experience with cybersecurity tools and techniques.
To understand the practical aspects of securing computer networks, systems, and data.
To simulate and analyze security threats and vulnerabilities in real-world scenarios.

CourseOutcome(CO)	Bloom'sKnowledge Level(KL)
<b>Attheendof course,thestudentwill be abletounderstand</b>	
CO1	Understand and apply various cybersecurity tools for system and network security. K1
CO2	Analyze and simulate common security threats and vulnerabilities. K2
CO3	Implement basic security measures such as firewalls, encryption, and intrusion detection systems. K3
CO4	Perform vulnerability assessments and penetration testing on computer systems. K4
CO5	Respond to security incidents and perform digital forensics to investigate breaches. K5

**List of Experiments:**

1. Introduction to Virtual Machines for Cybersecurity.
2. Installation and configuration of cybersecurity tools (e.g., Wireshark, Nmap).
3. Basic command-line tools for system security (e.g., netstat, iptables).
4. Configuring and analyzing firewall rules.
5. Packet sniffing and network traffic analysis using Wireshark.
6. Implementing and testing secure network configurations.
7. Vulnerability scanning using tools like Nessus or OpenVAS.
8. Exploiting vulnerabilities in controlled environments using Metasploit.
9. Reporting and mitigating discovered vulnerabilities.
10. Implementing symmetric and asymmetric encryption using tools like OpenSSL.
11. Securing communications using SSL/TLS.
12. Encrypting files and disk partitions for data protection.
13. Simulating security breaches and analyzing logs.
14. Conducting digital forensics on compromised systems.
15. Incident response planning and execution.

**Text and Reference Books:**

1. "The Web Application Hacker's Handbook" by DafyddStuttard and Marcus Pinto - Wiley.
2. "Hacking: The Art of Exploitation" by Jon Erickson - No Starch Press.
3. "Network Security Essentials: Applications and Standards" by William Stallings - Pearson.
4. "Penetration Testing: A Hands-On Introduction to Hacking" by Georgia Weidman - No Starch Press.
5. "Digital Forensics and Incident Response" by Gerard Johansen - Packt Publishing.

<b>School Name- School of Computer Application</b>			
<b>Program- BCA</b>			<b>Semester-3<sup>rd</sup></b>
<b>Course Name- Introduction to Cyber Crime and Information Security</b>			
<b>A.Y 2025-26</b>	<b>Course Code- B020924304</b>	<b>Batch- 2024-28</b>	<b>CIE Marks- 50 (MM)</b>
<b>Total Teaching Hours 45</b>	<b>Total Credits-03</b>		<b>ESE Marks- 50 (MM)</b>
<b>Type of Course- Theory</b>			<b>Total Marks- 100(MM)</b>
<b>Course Objectives/Course Description</b>			
<ul style="list-style-type: none"> <li>To introduce students to the concept of cybercrime by exploring its definitions, origins, and classifications, and to foster a global perspective on emerging threats and survival strategies in the digital era.</li> <li>To provide insights into the tools and techniques used in cybercrimes, such as phishing, spyware, Trojans, DoS/DDoS attacks, SQL injection, buffer overflow, and attacks on wireless networks, with an emphasis on preventive measures.</li> <li>To cultivate awareness about the importance of information security policies at individual, organizational, and national levels to ensure safe and responsible use of digital technologies.</li> </ul>			
<b>UNIT-1</b>	<b>Topics</b>		<b>No. of Teaching hours/ (Lecture)</b>
<b>1</b>	<b>Introduction To Cyber Crime</b> Cybercrime- Definition and Origins of the word Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens. Cyber offenses: How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cybercafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector.		<b>09</b>
<b>2</b>	<b>Cyber Crime</b> Mobile and Wireless Devices-Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era.		<b>09</b>
<b>3</b>	<b>Tools and Methods Used in Cybercrime</b> Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan-horses and Backdoors, Steganography, DoS and DDoS At-tacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks. Phishing and Identity Theft: Introduction to Phishing, Identity Theft (ID Theft).		<b>09</b>

4	<p><b>Understanding Computer Forensics</b> Introduction, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation. Forensics and Social Networking Sites: The Security/Privacy Threats, Challenges in Computer Forensics.</p>	09
5	<p><b>Introduction to Security Policies and Cyber Laws</b> Need for An Information Security Policy, Introduction to Indian Cyber Law, Objective and Scope of the Digital Personal Data Protection Act 2023, Intellectual Property Issues, Overview of Intellectual Property Related 04 Legislation in India, Patent, Copyright, Trademarks.</p>	09

**Course Outcomes**

**CO1 Define and explain** key concepts related to cybercrime, its evolution, types, and global implications. Also **Identify** various cyber offenses and **describe** how attackers plan and execute crimes using tools like botnets and social engineering techniques.

**CO2 Examine** security challenges and threats in mobile and wireless environments and **apply** appropriate organizational security measures.

**CO3 Utilize and demonstrate** the functionality of common cybercrime tools such as keyloggers, phishing techniques, DoS attacks, and SQL injections.

**CO4 Analyze** cyber forensics concepts and **evaluate** procedures for investigating digital crimes, including email analysis and network forensics.

**CO5 Explain** the importance of security policies and cyber laws and **critically evaluate** the impact of Indian legal frameworks, including the Digital Personal Data Protection Act 2023.

**Text books:**

1. SunitBelapure and Nina Godbole, “Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives”, Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, Publish Date 2013.
2. Basta, Basta, Brown, Kumar, Cyber Security and Cyber Laws, 1st edition ,Cengage Learning publication.
3. Dr. Surya PrakashTripathi, RitendraGoyal, Praveen Kumar Shukla, KLSI. “Introduction to information security and cyber laws”.Dreamtech Press. ISBN: 9789351194736, 2015.
4. Cyber Security and Date Privacy by Krishan Kumar Goyal ,AmitGarg , SaurabhSinghal , HP HAMILTON LIMITED Publication, ISBN-13-978-1913936020
5. Thomas J. Mowbray, “Cybersecurity: Managing Systems, Conducting Testing
6. Investigating Intrusions”, Copyright © 2014 by John Wiley & Sons, Inc, ISBN: 978 - 1-118 -84965 1.
7. James Graham, Ryan Olson, Rick Howard, “Cyber Security Essentials”, CRC Press, 15-Dec 2010.
8. Anti- Hacker Tool Kit (Indian Edition) by Mike Shema, McGraw-Hill Publication.

**Assessment method:** (Continuous Internal Assessment =50 %, Final Examination = 50 %)

<b>School Name- School of Computer Application</b>			
<b>Program- BCA</b>			<b>Semester-3<sup>rd</sup></b>
<b>Course Name- Introduction to Cyber Crime and Information Security Lab</b>			
<b>A.Y 2025-26</b>	<b>Course Code- B020924354</b>	<b>Batch- 2024-28</b>	<b>CIE Marks- 60 (MM)</b>
<b>Total Teaching Hours 15</b>	<b>Total Credits-01</b>		<b>ESE Marks- 40 (MM)</b>
<b>Type of Course- Practical</b>			<b>Total Marks- 100(MM)</b>
<b>Course Objectives/Course Description</b>			
<ul style="list-style-type: none"> <li>• To enable students to identify and classify different types of cybercrimes through real-world case study analysis, enhancing their understanding of global cyber threat landscapes.</li> <li>• To familiarize students with mobile device security by evaluating and configuring security settings on Android/iOS platforms to prevent unauthorized access.</li> <li>• To provide hands-on experience in securing mobile devices in enterprise environments, including configuring registry settings and authentication services.</li> <li>• To draft and propose a practical cybersecurity policy tailored for educational institutions or small organizations, incorporating elements from Indian Cyber Law and the Digital Personal Data Protection (DPDP) Act 2023.</li> </ul>			
<b>UNIT-1</b>	<b>Topics</b>		<b>No. of Teaching hours/ (Lecture)</b>
	<b>Experiments (Indicative &amp; not limited to)</b> <ol style="list-style-type: none"> <li>1. Create a report identifying and classifying at least five types of cybercrimes based on real-life case studies from global incidents.</li> <li>2. Simulate a basic social engineering attack (like phishing or baiting) in a controlled environment and analyze the psychological tactics involved.</li> <li>3. Analyze the security settings of Android/iOS devices and demonstrate how to secure mobile devices against unauthorized access.</li> <li>4. Simulate a credit card fraud scenario in a secure environment to demonstrate how attackers exploit mobile payment vulnerabilities.</li> <li>5. Configure registry settings and authentication services for securing a mobile device in an enterprise environment.</li> <li>6. Perform phishing detection and create a demo phishing website to understand the red flags of phishing attacks (use localhost).</li> <li>7. Demonstrate how keyloggers work using a test keylogger in a</li> </ol>		

	<p>virtual environment and show mitigation steps.</p> <p>8. Execute a SQL Injection attack on a test web application (like DVWA) and suggest mitigation techniques.</p> <p>9. Analyze a sample email header to trace the origin of a suspicious email (email forensics).</p> <p>10. Draft a basic cybersecurity policy for an educational institute or small organization considering the Indian Cyber Law and the DPDP Act 2023.</p>	
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**Course Outcomes**

**CO1** Identify and analyze common cyber threats and vulnerabilities

**CO2** Implement basic security measures and countermeasures

**CO3** Apply basic cyber forensic analysis

**CO4** Use cybersecurity tools and technologies

**CO5** Understand and implement Communicate security issues effectively

**Assessment method:** (Continuous Internal Assessment = 60 %, Final Examination = 40 %)

<b>School Name- School of Computer Application</b>			
<b>Program- BCA</b>			<b>Semester-3<sup>rd</sup></b>
<b>Course Name- Mathematical Foundations for Artificial Intelligence</b>			
<b>A.Y 2025-26</b>	<b>Course Code- B020824304</b>	<b>Batch-2024-28</b>	<b>CIE Marks- 50 (MM)</b>
<b>Total Teaching Hours 45</b>	<b>Total Credits-03</b>		<b>ESE Marks- 50 (MM)</b>
<b>Type of Course- Theory</b>			<b>Total Marks- 100(MM)</b>
<b>Course Objectives/Course Description</b>			
<ul style="list-style-type: none"> <li>• To develop a strong foundation in descriptive statistics, including the use of diagrams, measures of central tendency, dispersion, skewness, and kurtosis for effective data summarization and interpretation.</li> <li>• To introduce foundational concepts in probability theory, such as conditional probability, Bayes' theorem, and random variables, and to explore probability distributions, expectations, and important inequalities like Markov and Chebyshev.</li> <li>• To build a deep understanding of inferential statistics, including sampling, estimation, hypothesis testing (t-tests, z-tests, ANOVA, chi-square), and non-parametric tests like permutation/randomization tests.</li> <li>• To develop conceptual and computational knowledge of vector spaces, including subspaces, linear independence, basis, inner products, and orthonormal bases using the Gram-Schmidt process.</li> </ul>			
<b>UNIT-1</b>	<b>Topics</b>		<b>No. of Teaching hours/ (Lecture)</b>
<b>1</b>	<b>Descriptive Statistics &amp; Probability</b> Diagrammatic representation of data, measures of central tendency, measures of dispersion, measures of skewness and kurtosis, correlation, inference procedure for correlation coefficient, bivariate correlation, multiple correlations, linear regression and its inference procedure, multiple regression. Probability: Measures of probability, conditional probability, independent event, Bayes' theorem, random variable, discrete and continuous probability distributions, expectation and variance, markov inequality, chebyshev's inequality, central limit theorem.		<b>09</b>
<b>2</b>	<b>Inferential Statistics &amp; Regression</b> Sampling & confidence interval, Inference & Significance. Estimation & Hypothesis Testing, Goodness of fit, Test of Independence, Permutations and Randomization Test, ttest/z-test (one sample, independent, paired), ANOVA, chi-square. Linear Methods for Regression Analysis: multiple regression analysis, linear dimension reduction using principal component analysis (PCA).		<b>09</b>

<b>3</b>	<p><b>Pseudo-Random Numbers &amp; Monte Carlo Integration</b>  Random number generation, Inverse-transform, acceptance-rejection, transformations, multivariate probability calculations.  Monte Carlo Integration: Simulation and Monte Carlo integration, variance reduction, Monte Carlo hypothesis testing, antithetic variables/control variates, importance sampling, stratified sampling  Markov chain Monte Carlo (McMC): Markov chains; Metropolis-Hastings algorithm; Gibbs sampling; convergence</p>	<b>09</b>
<b>4</b>	<p><b>Vector Spaces</b>  Vector Space, Subspace , Linear Combination, Linear Independence, Basis, Dimension, Finding a Basis of a Vector Space , Coordinates, Change of Basis Inner Product Spaces- Inner Product, Length, Orthogonal Vectors, Triangle Inequality, CauchySchwarz Inequality, Orthonormal (Orthogonal) Basis, Gram-Schmidt Process.</p>	<b>09</b>
<b>5</b>	<p><b>Linear Transformations</b>  Linear Transformations and Matrices for Linear Transformation, Kernel and Range of a Linear Transformations, Change of Basis Eigenvalues and Eigenvectors- Definition of Eigenvalue and Eigenvector, Diagonalization , Symmetric Matrices and Orthogonal Diagonalization.</p>	<b>09</b>
<p><b>Course Outcomes</b>  <b>CO1</b> Demonstrate a sound understanding of Descriptive Statistics &amp; Probability and their role and importance in artificial intelligence and machine learning  <b>CO2</b> Demonstrate a good understanding of Sampling &amp; Confidence Interval, Inference &amp; Significance. Estimation and Hypothesis Testing,  <b>CO3</b> Understanding of random number generation and Monte Carlo Integration  <b>CO4</b> Understanding of concepts of vector spaces.  <b>CO5</b> Demonstrate a good understanding of linear transformations and matrices.</p>		

**Text books:**

1. S.C. Gupta & V.K. Kapoor, “Fundamentals of Mathematical Statistics”, Sultan Chand & Sons
2. Sheldon M. Ross, “Introduction to Probability and Statistics for Engineers and Scientists”, Academic Press.
3. Dudewicz, E.J., Mishra, S.N., “Modern Mathematical Statistics”, Willy.
4. Purohit S. G., Gore S. D., Deshmukh S. K., “Statistics using R, Narosa.
5. Rizzo, M. L., “Statistical Computing with R”, Boca Raton, FL: Chapman & Hall/CRC Press.
6. Normal Maltoff, The Art of R programming, William.
7. Dalgaard, Peter, “Introductory statistics with R”, Springer Science & Business Media.
8. M. D. Ugarte, A. F. Militino, A. T. Arnholt, “Probability and Statistics with R”, CRC Press.
9. Kundu, D. and Basu, A., “Statistical computing – existing methods and recent developments”, Narosa.
10. Gentle, James E., Härdle, Wolfgang Karl, Mori, Yuich, “Handbook of Computational Statistics”, Springer.
11. Givens and Hoeting, “Computational Statistics”, Wiley Series in Prob. and Statistics.
12. Elementary Linear Algebra by Ron Larson, 8th edition, Cengage Learning, 2017

**Assessment method:** (Continuous Internal Assessment = 50 %, Final Examination = 50 %)

<b>School Name- School of Computer Application</b>			
<b>Program- BCA</b>			<b>Semester-3<sup>rd</sup></b>
<b>Course Name- Mathematical Foundations for Artificial Intelligence Lab</b>			
<b>A.Y 2025-26</b>	<b>Course Code- B020824354</b>	<b>Batch-2024-28</b>	<b>CIE Marks- 60 (MM)</b>
<b>Total Teaching Hours 15</b>	<b>Total Credits-01</b>		<b>ESE Marks- 40 (MM)</b>
<b>Type of Course- Practical</b>			<b>Total Marks- 100(MM)</b>
<b>Course Objectives/Course Description</b>			
<ul style="list-style-type: none"> <li>• To develop hands-on proficiency in implementing and manipulating vectors, matrices, and linear transformations using Python and NumPy, enabling students to strengthen their understanding of core linear algebra operations.</li> <li>• To simulate and visualize probability distributions and perform basic probability calculations using Python, reinforcing foundational concepts in probability and statistics.</li> <li>• To build and train basic machine learning models such as linear and logistic regression, and evaluate their performance using appropriate metrics like accuracy and confusion matrix.</li> <li>• To integrate mathematical and programming knowledge in a final project, where students solve a real-world AI problem (e.g., classification, regression, or reinforcement learning) using the concepts and tools learned throughout the course.</li> </ul>			
	<b>Topics</b>		<b>No. of Teaching hours/ (Lecture)</b>
	<b>List of Experiments (Indicative &amp; not limited to)</b> <ol style="list-style-type: none"> <li>1. Implement matrix operations (addition, multiplication, transpose) in Python.</li> <li>2. Use NumPy to perform basic vector and matrix manipulations.</li> <li>3. Visualize vector spaces and linear transformations.</li> <li>4. Solve a set of linear equations using Python.</li> <li>5. Implement Gaussian elimination for solving linear systems.</li> <li>6. Simulate random variables using Python (NumPy).</li> <li>7. Implement basic probability calculations and visualize distributions.</li> <li>8. Apply Bayes' theorem in simple problems.</li> <li>9. Implement SVD in Python and apply PCA to reduce dimensions of a dataset.</li> <li>10. Use SVD for collaborative filtering in recommendation systems.</li> <li>11. Implement gradient descent for minimizing a simple quadratic function.</li> </ol>		

12. Use Python to apply gradient descent to train a linear regression model.
13. Implement basic derivatives and gradients using Python.
14. Calculate gradients for a simple neural network in a toy example.
15. Implement linear regression from scratch using gradient descent.
16. Compare performance with closed-form solution (normal equation).
17. Implement logistic regression and train it on a simple classification dataset.
18. Evaluate performance using metrics such as accuracy and confusion matrix.
19. Implement a simple neural network using NumPy.
20. Apply backpropagation for training a neural network on a classification problem.
21. Implement a basic CNN using TensorFlow/Keras.
22. Train a CNN model on a dataset like MNIST or CIFAR-10.
23. Apply kernel trick for non-linear classification problems.
24. Implement a linear SVM using Scikit-learn.
25. Final project where students apply the mathematical techniques they learned to an AI problem (e.g., classification, regression, or reinforcement learning).

**Required Tools for the lab practical:**

- Python (3.x)
- NumPy, SciPy, Matplotlib, Scikit-learn, TensorFlow, Keras
- Jupyter Notebooks (recommended)

**Course Outcomes**

**CO1** Apply key mathematical concepts in AI models and implement algorithms based on mathematical foundations.

**CO2** Perform mathematical manipulations and visualizations and understand and implement reinforcement learning concepts

**CO3** Analyze and solve machine learning problems using mathematical techniques

**CO4** Demonstrate proficiency in solving AI problems with neural networks

**CO5** Evaluate and compare machine learning models and algorithms

**Assessment method:** (Continuous Internal Assessment = 60 %, Final Examination = 40 %)

# "Creative Writing" (AEC) - 2 Credits

Course Code: BSGUAE2407

Year:2nd  
Semester:IVth

L T P C  
2 0 0 2

## Course Outcomes (COs):

- **CO1:** Demonstrate the ability to produce original creative writing in various genres such as poetry, fiction, and creative nonfiction.

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- **CO2:** Apply different writing techniques to create engaging and imaginative content.

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- **CO3:** Critically evaluate and revise their own and peers' creative works to improve clarity, style, and effectiveness.

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- **CO4:** Explore and experiment with different literary forms and structures to enhance their writing skills.

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- **CO5:** Develop a personal writing style and voice through regular practice and feedback.

## Unit I: Introduction to Creative Writing

- Definition and scope of creative writing, Exploring different forms: Poetry, Fiction, and Non-fiction, The writing process: Idea generation, drafting, and revising.

## Unit II: Poetry Writing

- Elements of poetry: Imagery, metaphor, meter, rhyme, Different types of poetry: Haiku, sonnet, free verse, Writing and analyzing poems.

## Unit III: Fiction Writing

- Elements of fiction: Character, plot, setting, dialogue, Short stories vs. novels, Writing and developing short fiction pieces.

## Unit IV: Creative Non-fiction

- Exploring memoir, personal essays, and narrative journalism, Techniques for creative non-fiction: Voice, tone, and perspective, Writing and analyzing creative non-fiction.

## Unit V: Revision and Peer Review

- Techniques for revising creative work, Peer review and constructive criticism, Final project: Creating a portfolio of revised work.

## Reference Books:

1. "Creative Writing: A Beginner's Manual" by AnjanaNeiraDev and Others.
2. "Writing Down the Bones: Freeing the Writer Within" by Natalie Goldberg.
3. "The Elements of Style" by William Strunk Jr. and E.B. White.
4. "Bird by Bird: Some Instructions on Writing and Life" by Anne Lamott.
5. "On Writing: A Memoir of the Craft" by Stephen King.

## Fundamentals of Mathematics (Bridge)

(Course Code: BSGUBR2401)

**Duration: 30 Hrs**

**Course Objective:** *To provide a solid foundation in number systems and basic arithmetic operations, enabling students to handle numerical computations and real-life mathematical problems effectively.*

### Unit 1

**Number Systems and Basic Arithmetic:** Types of number systems: natural, whole, integers, rational, real, and complex numbers, Prime numbers, factorization, and divisibility rules, Basic arithmetic operations (addition, subtraction, multiplication, division), Fractions, decimals, and percentages, HCF, LCM, and simple, problem-solving using these concepts.

### Unit 2

**Algebraic Expressions and Equations:** Algebraic expressions: terms, factors, and coefficients, Simplification of expressions, Laws of exponents and radicals, Solving linear equations (one and two variables), Quadratic equations: solving methods (factorization, quadratic formula), Introduction to inequalities and their graphical representation.

### Unit 3

**Geometry and Mensuration:** Basic geometric figures: points, lines, planes, and angles, Properties of triangles, quadrilaterals, and circles, Theorems related to triangles (Pythagoras theorem), parallel lines, and circles, Perimeter and area of 2D shapes, Surface area and volume of 3D shapes (cylinders, cones, spheres, prisms), Introduction to coordinate geometry: distance formula and equation of a line.

### Unit 4

**Trigonometry Basics:** Introduction to angles (degrees and radians), Trigonometric ratios: sine, cosine, tangent, and their reciprocal functions, Trigonometric identities and basic equations, Applications of trigonometry in right-angled triangles, Graphs of sine, cosine, and tangent, functions, Introduction to inverse trigonometric functions

### Unit 5

**Probability and Statistics:** Basic concepts of probability: experiments, events, outcomes, Rules of probability (addition and multiplication rules), Introduction to statistics: data , collection, representation (bar charts, histograms, pie charts), Measures of central tendency: mean, median, mode, Measures of dispersion: range, variance, standard deviation, Basic concepts of probability distributions