Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Computer Applications

B.Sc. (Data Science)

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BCABDA101	Major	Software Foundation with C	2	0	2	3	60	20	20	30	20

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
*__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

- To learn the basic logic and programming skills using C.
- To understand and develop modular programming skills.
- To understand the basic idea of Arrays and Pointers.
- To handle the Strings and implement the structures.
- To provide the knowledge of Files and preprocessor directives.

Course Outcomes: Students will be able to

- Describe Logic and programming skills.
- Describe Constructs, loops and arrays
- Describe and write the programs on of function, pointers and operators
- Implement the concepts of Arrays and Strings
- Implement programs of file handling and preprocessor directives.

UNIT- I

Introduction to C Programming: Background of C, Structure of a C program, C Tokens: Identifiers, Variables, Constants, Keywords, Data Types, Operators; Control Constructs: if- 5 hrs

else, for, while, do-while; Case switch statement; Break and Continue; Type conversion & type casting; Formatted & unformatted I/O; Type modifiers & storage classes.

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UNIT- II

Functions: Arguments; Return value; Parameter passing – call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable, static variable; Calling a function; 8 hrs

Recursion: Basic Introduction, types of recursion- direct, indirect;

UNIT- III

Arrays: Declaration and Initialization; Arrays as Function Parameters; 2-Dimensional Arrays. 6 hrs

Introduction to Pointers: Introduction; Declaring Pointer Variables; & and * operators; pointer expressions; Pointer Increments and Scale Factor; Pointer Arithmetic; Pointers and Arrays; Dynamic Memory Management functions like malloc(), calloc(), free();

UNIT- IV

6 hrs

Strings: Introduction to Strings; Standard String Library Functions; Array of String.

Structures: Introduction; Defining a structure; declaring structure variables; accessing structure members; structure initialization; array of structures.

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UNIT- V

File Management in C: Introduction; Defining and opening a file; closing a file; Input/output and Error Handling on Files. 5 hrs

Preprocessor: basics; #Include; #define; #undef; conditional compilation directive like #if, #else, #elif, #endif, #ifdef and #ifndef.

Text Books:

1. Kanitkar Yashwant, 'Let us C', BPB New Delhi
2. Balaguruswami, 'Ansi C', TMH, Delhi
3. Kerninghan & Ritchie "The C programming language", PHI
4. Schildt "C: The Complete reference" 4th ed TMH.
5. Cooper Mullish "The Spirit of C", Jaico Publishing House, Delhi.

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BCABDA103N	Major	Software Engineering Fundamentals	2	0	2	3	60	20	20	30	20

Legends: **L** – Lecture; **T** – Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** – Credit;

*__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Education Objectives (CEOs):

- To provide knowledge about system development.
- To impart knowledge about software process models.
- To provide detailed knowledge about software development.
- To acquaint students with programming part.
- To provide study Software Architecture, Design, and Patterns.
- To provide the students Job Opportunities and Skillsets

Course Outcomes (COs): Students will be having:

- An ability to understand system development.
- An ability to apply knowledge of software process models.
- An ability to develop software.
- An ability to apply programming on software development problems

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Board of Studies	**Faculty of Studies**	**Shri Vaishnav Vidyapeeth**	**Shri Vaishnav Vidyapeeth**
Shri Vaishnav Vidyapeeth	**Shri Vaishnav Vidyapeeth**	**Vishwavidyalaya, Indore**	**Vishwavidyalaya, Indore**
Vishwavidyalaya, Indore	**Vishwavidyalaya, Indore**		

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BCABDA103N	Major	Software Engineering Fundamentals	2	0	2	3	60	20	20	30	20

- An ability to understand Software Architecture, Design, and Patterns.
- An ability to acquire Job Opportunities and Skillsets.

UNIT I: What is Software Engineering?

Introduction to the SDLC, Phases of the SDLC, Activity: Phases in the SDLC, Building Quality Software, Requirements, Software Development Methodologies Software Versions, Software Testing, Software Documentation, Roles in Software Engineering Projects, Insiders' Viewpoint: Job Roles in Software Engineering Teams, The Software Building Process and Associated Roles.

UNIT 2: Introduction to Software Development

Overview of Web and Cloud Development, Learning Front-End Development, The Importance of Back-End Development, Teamwork and Squads, Insiders' Viewpoint: Teamwork in Software Engineering, Pair Programming, Insiders' Viewpoint: Pair Programming, Activity: Categorizing Front- and Back-End Technologies, Introduction to Development, Application Development Tools, More Application Development Tools, Software Stacks, Hands-on Lab: Getting Started With an IDE, Insiders' Viewpoint: Tools and Technologies, Tools in Software Development.

UNIT 3: Introduction to Programming

Comparing Compiled and Interpreted Languages Query and Assembly Languages, understanding Code Organization Methods, Insiders' Viewpoint: Types of Languages, Activity: Programming

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BCABDA103N	Major	Software Engineering Fundamentals	2	0	2	3	60	20	20	30	20

Logic and Organizational Methods, Programming Languages and Organization, Branching and Looping Programming Logic, Introduction to Programming, Hands-on Lab: Programming Fundamentals with Python, Introduction to Programming Concepts

UNIT 4: Software Architecture, Design, and Patterns

Introduction to Software Architecture, Software Design and Modeling, Object-Oriented Analysis and Design, Insiders' Viewpoint: Importance of Design and Software Architecture, Activity: Create an Architectural Diagram, Software Architecture and Design, Approaches to Application Architecture, Architectural Patterns in Software, Application Deployment Environments, Production Deployment Components, Insiders' Viewpoint: Deployment Architecture, Software Architecture Patterns and Deployment Topologies.

UNIT 5

Job Opportunities and Skillsets

What Does a Software Engineer Do?, A Day in the Life of a Software Engineer, Skills Required for Software Engineering, Insiders' Viewpoint: Advice to Future Software Engineers, Insiders' Viewpoint: Women in Software Engineering, Job Outlook for Software Engineers, Career Paths in Software Engineering, Software Engineering Job Titles, Insiders' Viewpoint: Career Paths, Activity: Matching Roles with Responsibilities, Code of Ethics.

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BCABDA103N	Major	Software Engineering Fundamentals	2	0	2	3	60	20	20	30	20

Text Book

1. R. S. Pressman, “Software Engineering – A practitioner’s approach”, 6th ed., McGraw Hill Int.
2. Pankaj Jalote “Software Engineering”, Kindle Edition, Wiley Publications.
3. Ian Sommerville : Software Engineering 6th Edition (Addison-Wesley).
4. Richard Fairley : Software Engineering Concepts (TMH).
5. Elis Awad, "System Analysis & Design", Galgotia publications.
6. W.S. Jawadekar: Management Information Systems, TMH Publication, India.

List of Experiments:

1. Problem Statement and Feasibility Study
2. Preparation of Software Requirement Specification (SRS)
3. Use Case Diagram for the proposed system
4. Functional and Non-functional Requirements & RTM
5. Data Flow Diagrams (DFD) – Level 0, Level 1, Level 2
6. Entity Relationship Diagram (ERD)
7. UML Class Diagram
8. UML Sequence Diagram
9. UML Activity Diagram
10. User Interface (UI) Design / Prototype
11. Coding Standards Demonstration

Chairperson **Board of Studies** **Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**	**Chairperson** **Faculty of Studies** **Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**	**Controller of Examination** **Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**	**Joint Registrar** **Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**

12. Module Implementation (Sample Code)
13. Test Case Design – Black Box & White Box
14. Unit Testing and Integration Testing

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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BSCDSMA101	Minor	Calculus	3	0	0	3	60	20	20	0	0

Course Objective

To introduce the students with the fundamentals of the Calculus and its applications and Differential Equations

Course Outcomes

After the successful completion of this course students will be able to:

1. *Understand the significance of derivatives.*
2. *Know about the basic concepts of partial differentiations.*
3. *Apply the concept of derivatives and partial derivatives to practical problems.*
4. *Apply the basic concepts of integral calculus.*
5. *Know the basic concepts of differential equations and find the solution of the differential equations.*

Course Content:

UNIT – I

Derivative and its geometrical and physical interpretation, Sign of derivatives and monotonic increasing and decreasing functions, Rolle's and Mean value theorems and simple applications. Successive differentiation, Leibnitz theorem, Maclaurin's and Taylor's series expansion.

UNIT – II

Partial differentiation, Euler's theorem, total derivatives.Functions of two and three variables, Maxima and minima of functions of two variables - Lagrange's Method of undetermined multiplier - Problems only. Implicit function in case of function of two variables (existence assumed) and derivative.

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BSCDSMA101	Minor	Calculus	3	0	0	3	60	20	20	0	0

UNIT – III
Quadrature, Rectification, Surface, and volume formed by revolution of plane curves.

UNIT – IV
Formation of differential equations, Variable separable form, Linear Differential equations, Bernoulli's equation, Exact differential equation, Equation reducible to exact differential equation.

UNIT – V
Differential equation of first order and higher degree, Solvable for x, y, p. Clairaut's equation and singular solution, Linear differential equations with constant coefficients.

Reference Books:

1. Principles of Mathematical Analysis: W. Ruddin, McGraw-Hill,New York, 1976
2. Differential Calculus: Gorakh Prasad, Pothishala Pvt. Ltd. Allahabad.
3. Differential Calculus: Shantinarayan.
4. An elementary treatise on the Differential Calculus: J. Edwards, Radha Publishing House.
5. Advanced Calculus – David V. Widder (Prentice Hall)
6. Differential & Integral Calculus (Vols. I & II) – Courant & John.
7. Mathematics Analysis: T.M. Apostol, Eddison Wesley Publishing Co.
8. Calculus, Vol. I-II, T.M. Apostol, Wiley.
9. Differential Equations – S. L. Ross (John Wiley).
10. An Elementary Course in Partial Differential Equation – T. Amarnath (Narosa).

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BSCDSMA102	Minor	Statistical Methods for Data Analysis	3	0	0	3	60	20	20	0	0

11. Higher Engineering Mathematics: B.S. Grewal, Khanna Publisher.

Course Objective

To introduce the students with the fundamentals of the Statistical Methods.

Course Outcomes

After the successful completion of this course students will be able to:

1. *Know various methods of data collection.*
2. *Create and interpret frequency tables.*
3. *Apply data graphically and its interpretation.*
4. *Memorize, understand and calculate the measures of central tendency, dispersion, skewness and kurtosis.*
5. *Understand the basic ideas of correlation and regression.*
6. *Create and interpret the line of best fit.*

Course Content:

UNIT – I

Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. Data: quantitative and qualitative, attributes, variables, scales of measurement nominal, ordinal, interval and ratio.

UNIT– II

Presentation: tabular and graphical, including histogram and ogives, consistency and independence of data with special reference to attributes.

UNIT – III

Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, Moments, absolute moments, factorial moments, Skewness and Kurtosis, Sheppard's corrections.

UNIT – IV

Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation. Simple linear regression, principle of least squares and fitting of polynomials and exponential curves.

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BSCDSMA102	Minor	Statistical Methods for Data Analysis	3	0	0	3	60	20	20	0	0

UNIT – V

Attributes- Notion and terminology, contingency table, class frequencies, and ultimate class frequencies, consistency. Association of attributes, Independence, Measure of association for 2x2 table. Chi-square, Karl Pearson's and Tschuprow's coefficient of association.Contingency tables with ordered categories.

SUGGESTED READING:

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8thEdn. The World Press, Kolkata
2. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7thEdn.), Pearson Education, Asia.
3. Mood, A.M. Graybill, F. A. and Boes, D.C. (2007): Introduction to the Theory of Statistics, 3rdEdn., (Reprint), Tata McGraw-Hill Pub. Co. Ltd.
4. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, S Chand & Co.
5. E.N. Nadar, Statistics, PHI Learning.
6. P. Mukhopadhya, Mathematical Statistics, New Central Book Agency, Calcutta.
7. Jim Frost, Introduction to Statistics: An Intuitive Guide for Analyzing Data and Unlocking Discoveries, Jim Frost MS.

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Semester I& II (Batch 2022-26)

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
ENG101	AEC	Foundation English	60	20	20	-	-	4	0	0	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs): The students will

- **CEO 1** Understand the different nuances of communication.
- **CEO2** understand the features of listening and reading skills.
- **CEO3** Comprehend the factors that influence use of grammar and vocabulary in speech and writing
- **CEO4** study the essential aspects of effective written communication through Business letters and email writing for professional success.
- **CEO5** Develop competency in professional communication.

Course Outcomes (COs): The students will be able to

- **CO1** develop a comprehensive understanding of the theoretical and practical aspects of communication.
- **CO2** understand and the different aspects of listening and reading.
- **CO3** Apply grammatical rules in speech and writing.
- **CO4** Use proper formats of written business communication.
- **CO5** Demonstrate different strategies for using professional communication skills.

ENG101
Foundation English

COURSE CONTENTS

UNIT I
Communication
Communication: Nature, Meaning, Definition, Process, Functions and importance, Characteristics of Communication, Verbal and Non-Verbal Communication, Barriers to Communication.

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
ENG101	AEC	Foundation English	60	20	20	-	-	4	0	0	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
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UNIT II
Listening and Reading Skills
Listening: Process, Types, Difference between Hearing and Listening, Benefits of Effective Listening, Barriers to Effective Listening, Overcoming Listening Barriers, and How to Become an Effective Listener, Developing Reading Skills: Reading Comprehension, Process, Active & Passive reading, Reading speed Strategies, Benefits of effective reading, SQ3R Reading technique.

UNIT III
Basic Grammar
Basic Language Skills: Grammar and usage- Parts of Speech, Tenses, Subject and Verb Agreement, Prepositions, Articles, Types of Sentences, Direct - Indirect, Active - Passive voice, Phrases & Clauses.

UNIT IV
Business Letters
Business Correspondence: Business Letters, Parts & Layouts of Business Letter, Job application and Resume, Application Calling/ Sending Quotations/ Orders/ Complaints. E-mail writing, Email etiquettes

UNIT V
Professional Skills
Negotiation Skills, Telephonic Skills, Interview Skills: Team building Skills and Time management

Suggested Readings:

- Adair John (2003). **Effective Communication**. London: Pan Macmillan Ltd.
- Thomson A.J. and Martinet A.V. (1991). **A Practical English Grammar** (4th ed). New York: Ox- ford IBH Pub
- Rizvi Ashraf (2005). **Effective Technical Communication**. New Delhi: Tata Mc Graw Hill
- Kratz Robinson (1995). **Effective Listening Skills**. Toronto: ON: Irwin Professional Publishing.