Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Computer Applications

Name of the Program: BSC (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*
BSCDS101	Major	Programming 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

- Apply the Logics to solve real life problems.
- Demonstrate the concepts of Constructs, loops and arrays
- Describe and write the programs on 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: Concept of problem solving, Problem definition, Flowcharting, Decision table, Algorithm. Characteristics of a good program; Structure of a C program, C Tokens: Identifiers, Variables, Constants, Keywords, Data Types, Operators; Type conversion & type casting; Formatted & unformatted I/O; Type modifiers & storage classes. **5 hrs**

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UNIT- II

Control Constructs: if-else, for, while, do-while; Case switch statement; Break and Continue; **6 hrs**

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; Recursion.

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;

UNIT- IV

Strings: Introduction to Strings; Standard String Library Functions; Array of String. **6 hrs**

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

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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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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BSCDS102	Major	Database Management System	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 provide students with basic concepts in information system and the benefits of these systems.
- To understand the role, requirement and operations that an analyst needed to analyze, design, and implement the systems.
- To provide the knowledge of business data modeling for the designing of efficient information systems.
- To explain the various issues related with Data Security.

Course Outcomes: Students will be able to

- Understand the database systems concepts.
- Design any Desktop application using an entity relationship diagrams (ERD) to express requirements and demonstrates skills to model data requirements and create data models.
- Apply the knowledge of the subject to any particular database implementation using SQL.
- To learn and understand various Database Architectures and Applications.

UNIT- I **8hrs**

Introduction to Databases, Purpose of Database System, Database system vs file system, Database System concepts and architecture, Advantage of DBMS approach, various views of data, data independence, schema and subschema and instances, basic concepts of data models, Database languages, Database administrator and users, data dictionary.

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BSCDS102	Major	Database Management System	2	0	2	3	60	20	20	30	20

UNIT-II

ER model: basic concepts, notation for ER diagram, Entity types, mapping constraint, Concepts of keys: super, candidate, primary, alternate, foreign, weak and strong entity sets, inheritance. Domains and Relations: domains, relations, kind of relations, relational database.

UNIT-III

Relational Algebra and SQL: The structure, relational operations, idea of relational calculus. Relational Calculus: idea of relational calculus, tuple and domain calculus, Domain relational Calculus, calculus vs algebra.

Normalization: Introduction, non-loss decomposition, Functional dependency, Normal forms upto third normal form, Codd's rules.

UNIT-IV

SQL: Introduction, basic structure of SQL, Characteristics and Advantage of SQL set operations, aggregate functions, null values, SQL data types and literals. SQL operators, Types of SQL commands, join relations. Comparison between tables and views, updated views, indexes, clustering. Triggers in SQL.

UNIT-V

Transaction, concurrency and Recovery: basic concepts, ACID properties, Transaction states, Implementation of atomicity and durability, concurrency control, deadlock, storage structure types, data access, recovery and atomicity- log based recovery.

Database Security: Data Classification-Threats and risks – Database access Control – Cryptography.

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BSCDS102	Major	Database Management System	2	0	2	3	60	20	20	30	20

Text Books:

1. A Silberschatz, H.F Korth, Sudersan, "Database System Concepts", 6th Edition, MGH Publication 2013.
2. C.J. Date, "An introduction to Database Systems", 6th Edition, Pearson 2003.
3. Elmasri and Navathe, "Fundamentals of Database systems",7 th Edition, Pearson 2015.
4. B.C. Desai, "An introduction to Database systems", BPB.
5. Raghu Ramakrishnan, "Database Management Systems",3 rd Edition, TMH 2014.

List of Experiments:

1. To study Basic SQL commands (create database, create table, use, drop, insert) and execute the following queries using these commands:

- Create a database named "Employee".
- Use the database "Employee" and create table "Emp" with attributes "ename", "ecity", "salary", "enumber", "eaddress", "depttname".
- Create another table "Company" with attributes "cname", "ccity", "empnumber", in the database "Employee".

2. To study the viewing commands (select, update) and execute the following queries using these commands:

- Find the names of all employees who live in Delhi.
- Increase the salary of all employees by Rs.5,000.
- Find the company names where the number of employees is greater than10,000.
- Change the Company City to Gurgaon where the Company name is,, TCS".

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Vishwavidyalaya, Indore	Vishwavidyalaya, Indore		

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BSCDS102	Major	Database Management System	2	0	2	3	60	20	20	30	20

To study the commands to modify the structure of table (alter, delete) and execute the following queries using these commands:

- Add an attribute named Designation ‟to the table Emp”.
- Modify the table Emp Change the data type of ,salary attribute to float.
- Drop the attribute depttname from the table emp.
- Delete the entries from the table Company‟ where the number of employees are less than 500.

4. To use (and, or, in , not in, between , not between , like , not like) in compound conditions and execute the following queries using them:

- Find the names of all employees who live in “Gurgaon” and whose salary is between Rs.20,000 and Rs.30,000.
- Find the names of all employees whose names begin with either letter “A” or “B”.
- Find the company names where the company city is “Delhi” and the number of employees is not between 5000 and10,000.
- Find the names of all companies that do not end with letter “A”.

5. Using aggregate functions execute the following queries:

- Find the sum and average of salaries of all employees in computer science department.
- Find the number of all employees who live in Delhi.
- Find the maximum and the minimum salary in the HR department.

6. To execute the following queries using study the grouping commands (group by, orderby)

- List all employee names in descending order.
- Find number of employees in each department where number of employees is greater than5.
- List all the department names where average salary of a department is Rs.10,000.

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7. To write SQL queries to
   - Alter table Emp and make enumber as the primary key.
   - Alter table Company and add the foreign key constraint.
   - Add a check constraint in the table "Emp" such that salary has the value between 0 and Rs.1,00,000.
   - Alter table Company and add unique constraint to column cname.
   - Add a default constraint to column ccity of table company with the value "Delhi".
   - Rename the name of database to "Employee1".
   - Rename the name of table "Emp" to "Emp1".
   - Change the name of the attribute ename to empname.

8. To execute following queries using appropriate SQL statements to
   - Retrieve the complete record of an employee and its company from both the table using joins.
   - List all the employees working in the company "TCS".

9. To study the various set operations and execute the following queries using these commands:
   - List the enumber of all employees who live in Delhi and whose company is in Gurgaon or if both conditions are true.
   - List the enumber of all employees who live in Delhi but whose company is not in Gurgaon.

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

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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BSCDSMA102	Minor	Statistical Methods for Data Analysis	3	0	0	3	60	20	20	0	0

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, 8th Edn. 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, 3rd Edn., (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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			THEORY			PRACTICAL		L	T	P	CREDITS
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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*	L	T	P	CREDITS
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.

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