

Progressive Education Society's
**Modern College of Arts, Science and
Commerce,**
Shivajinagar, Pune 5
(An Autonomous College Affiliated to Savitribai Phule Pune University)

Detailed Syllabus

For

For B.Sc. (Computer Science)

(2019-20 Course)

(with effect from 2019-20)

CIA: Continuous Internal Evaluation

Semester 1 (First Year)

Course Type	Course Code	Course / Paper Title	Hours / Week	Credit	CIA	End Sem Exam	Total
CCT-1	19CsCmpU101	Problem Solving and Introduction to C Programming	3	2	40	60	100
CCT-2	19CsCmpU102	Introduction to Scripting Languages (HTML, CSS)	3	2	40	60	100
CCP-1	19CsCmpU103	Lab Course on C Programming and Scripting Languages	4	2	40	60	100
Total			10	6	120	180	300
SECT-1	19CpPedU101	Physical Education – I	1	0.5	20	30	50
	Extra credentials	Activity Based Learning –I (MOOC or IIT Spoken Tutorial like courses) Introduction to Computers, HTML			40	60	100

Semester 2 (First Year)

Course Type	Course Code	Course / Paper Title	Hours / Week	Credit	CIA	End Sem Exam	Total
CCT-3	19CsCmpU201	Advanced C Programming	3	2	40	60	100
CCT-4	19CsCmpU202	Relational Database Systems	3	2	40	60	100
CCP-2	19CsCmpU203	Lab Course on Advanced C Programming and Relational Database Systems	4	2	40	60	100
Total			10	6	120	180	300
SECT-2	19CpPedU201	Physical Education – II	1	0.5	20	30	50
	Extra credentials	Activity Based Learning –II (online courses like MOOC or IIT Spoken Tutorial courses) Programming in C			40	60	100

Progressive Education Society's
Modern College of Arts, Science and Commerce (Autonomous),
Shivajinagar, Pune – 5
First Year of B. Sc. Physics (2019 Course)

Course Code: 19CsCmpU101
Course Name: Problem Solving Using Computers and Introduction to ;C;
Programming

Teaching Scheme: TH: 3 Lectures /Week

Credit: 02

Examination Scheme: CIA: 40 Marks

End-Sem: 60 Marks

Prerequisite:

- Basic Mathematical operations and statistical operations.
- Operations on Set Theory and Matrices.

Course Objectives:

- To introduce foundations of problem-solving methodologies and programming.
- To develop the ability in student to analyze the problem and develop algorithm to solve the problem.
- To develop the programming skill and logic to solve the arithmetic and logical problems.
- To understand the various steps in program development through the structured programming approach.
- To learn the syntax and semantics of C programming language thereby learning the programming concepts in general.

Course Outcomes:

On completion of the course, student will be able to–

- Develop his / her own algorithms, flowcharts for a given problem.
- Write the program from the pseudo code.
- Develop his / her own logic to solve any problem using programming tool.
- Formulate the problem in the form of program of any programming language.
- Code, test and debug the given logic in C programming language.
- To decompose a problem into functions and to develop modular reusable code.

Course Contents

Chapter1	Introduction to Computer Languages	1 lecture
	1.1 Machine language 1.2 Assembly language 1.3 High level languages 1.4 Compilers, Interpreter and Assembler	
Chapter 2	Problem Solving using Computers	2lectures
	2.1 Introduction to Problem-Solving using Computers 2.2 Algorithms 2.3 Flowcharts 2.4 Writing Simple Algorithm andflowchart	

Chapter 3	Introduction to C	2lectures
	3.1 History of C Language 3.2 Advantages and Limitations of C 3.3 Applications of C Language 3.4 Structure of a C program 3.5 C Program development life cycle	
Chapter 4	C Language Constructs	9lectures
	4.1 C Character Set 4.2 C Tokens:Keywords, Identifiers, Variables, Constants – character, integer, float, string, escape sequences 4.3 Data types and Qualifiers– built-in and user defined, enum 4.4 Operators and Expressions 4.5 Operator types (arithmetic, relational, logical,assignment, compoundassignment, increment, decrement, bitwise, conditional , other operators(comma,sizeof)) 4.6 Precedence and associativityrules 4.7 Introduction and Feature of C preprocessor Directives: #define, File Inclusion(#include) 4.8 Formatted Input and Output 4.9 Sample programs using printf and scanf	
Chapter 5	Control Structures	11 lectures
	5.1 Decision making structures: If, if-else, nested if_else, else_if ladder, switch statement, Use of enum in switch statement 5.2 Loop Control structures: While, Do-while, and For 5.3 Nested control structures 5.4 break, continue, goto statement and exit	
Chapter 6	Functions in C	10lectures
	6.1 Introduction and Need of function 6.2 Advantages of functions 6.3 6.4 User defined functions: Declaration, Definition, Function call, parameter passing (by value), return keyword 6.4 Standard library functions 6.5 Scope of Variables: Local, Global 6.6 Storage Classes 6.7 Recursion	
Chapter 7	Experiential Learning	1 lecture
	Experiential Learning: a review report on various programming languages	

Reference Books:

1. Problem Solving and Programming Concept, Maureen Sprankle,7th Edition, Pearson Publication,ISBN-10: 0-13-119459-3,ISBN-13: 978-0-13-119459-5.
2. How to Solve it by Computer, R.G. Dromey, Pearson Education. ISBN-10: 81-317-0562-5
3. Let us C by YashwantKanetkar, BPB Publication 2018, ISBN 9387284492, 9789387284494
4. C: the Complete Reference, Schildt Herbert, 4th edition, McGraw Hill, ISBN 0071502394,

9780071502399

5. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, Cengage Learning India, ISBN8131507629, 9788131507629
6. The 'C' programming language, Brian Kernighan, Dennis Ritchie, PHI ,2nd Edition,ISBN0131103628, 9780131103627
7. Programming in C ,A Practical Approach, Ajay Mittal , Pearson , ISBN 978-81-317-2934-2
8. Programming with C, B. Gottfried, 2nd edition, Schaum's outline Series, Tata McGraw Hill, ISBN 0071142592, 9780071142595
9. Programming in ANSI C, E. Balagurusamy, 6th Edition, McGraw Hill, ISBN 129051005

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First Year of B. Sc. Physics (2019 Course)

Course Code: 19CsPCmpU102
Course Name: Introduction to Scripting Languages (HTML, CSS)

Teaching Scheme: TH: 3 Lectures /Week
Examination Scheme: CIA: 40 Marks

Credit: 02
End-Sem: 60 Marks

Prerequisites:

- Basic Computer Awareness

Course Objectives:

- Students can design dynamic web pages using HTML, CSS
- Students can apply CSS properties suitably to make screen design attractive.
- Students can design the database by considering Normalization.

Course Outcomes:

On completion of the course, student will be able to–

- Design web pages using HTML& CSS
- Apply linguistic theory like Database Design etc.

Course Contents

Chapter1	Introduction to HTML	6 lectures
	1.1 Introduction to Markup Language HTML 1.2 HTML Document Structure 1.3 HTML Programming using Basic Tags 1.4 HTML Programming using formatting Tags 1.5 HTML Programming using Lists, Tables, Images and Hyperlinks 1.6 HTML Programming using Frames 1.7 Creation of Forms 1.8 CASE Studies	
Chapter 2	Introduction to CSS	4 lectures
	2.1 Concept of CSS 2.2 Creating Style Sheet 2.3 CSS Properties 2.4 CSS Styling 2.5 CSS Color 2.6 Creating Page Layout and Site Design	
Chapter 3	Introduction of DBMS	7 lectures

	3.1 Introduction to File, File Organization, Databases 3.2 File system VsDBMS 3.3 Describing & Storing data (Data models (Relational, Hierarchical, Network)) 3.4 Levels of Abstraction 3.5 Data Independence 3.6 Structure of DBMS 3.7 Users of DBMS 3.8 Advantages & Disadvantages of DBMS	
Chapter 4	Conceptual Design(E-R model)	11 lectures
	4.1 Overview of DB design 4.2 ER Data Model (entities, attributes, entity sets, relations, relationship sets) 4.3 Schema 4.4 Additional constraints(Key constraints, Mapping constraints, Strong & Weak entities, Aggregation/Generalization) 4.5 Conceptual design using ER modeling (entities VS attributes, Entity Vs relationship, Binary Vs Ternary) 4.6 Case studies	
Chapter 5	Relational Data Model	7 lectures
	5.1 Structure of Relational Databases (Concepts of a Table, a row, a relation, Tuple and a key in a Relational Database) 5.2 Conversion of E-R to Relational Model 5.3 Integrity Constraints(Primary Key, Referential Integrity, Unique Constraint, Null constraint, Check constraint)	
Chapter 6	Experiential Learning	1 lecture
	5.1 Experiential Learning : a review report on various types of websites and their design standards	

References

1. Database System Concepts, Henry F. Korth, Abraham Silberschatz, S. Sudarshan ISBN:9780071289597,Tata McGraw-Hill Education
2. Database Management Systems, Raghu Ramakrishnan, ISBN:9780071254342, Mcgraw-hill higher Education
3. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, McGraw-Hill Science/Engineering/Math; 3 edition, ISBN: 9780072465631
4. Database Systems, Shamkant B. Navathe, Ramez Elmasri, ISBN:9780132144988, PEARSON HIGHER EDUCATION
5. An introduction to Database systems, Bipin C Desai, Galgotia Publications
6. HTML The Complete Reference.

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First Year of B. Sc. Physics (2019 Course)

Course Code: 19CsCmpU103
Course Name: Basic 'C' Programming and HTML Programming

Teaching Scheme: TH: 3 Lectures /Week
Examination Scheme: CIA: 40 Marks

Credit: 02
End-Sem: 60 Marks

Objective :-

- Design and implement a 'C' programs for simple problems
- Understand appropriate use of data types and array structures
- Understand use of appropriate control structures

Note :Initial 3 practical slots (12 lectures) should be used for teaching basic operating systems commands and use of editors

No	Topic	Lectures
1	Assignment to demonstrate use of data types, simple operators (expressions)	4
2	Assignment to demonstrate decision making statements (if and if-else, nested structures) and decision-making statements (Switch case), menu driven programs	4
3	Assignment to demonstrate use of simple loops and nested loops	4
4	Assignment to demonstrate menu driven programs.	4
5	Assignment to demonstrate writing C programs in modular way (use of user defined functions)	4
6	Assignment to demonstrate writing C programs using recursive functions	4
7	Creating Simple HTML Pages, HTML Programming using lists, hyperlinks	4
8	HTML Programming using table, frames and iframes	
9	Advanced feature of HTML (Using Inline CSS) =.	4
10	Advanced features of HTML(Using internal CSS and External CSS).	4
11	Creation of forms, small case study to create HTML pages using all the above learnt techniques.	4
12	Creation of Forms layout designing by using div element with CSS property.	4

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Course Code: 19CsCmpU201
Course Name: Advanced 'C' Programming

Teaching Scheme: TH: 3 Lectures /Week
Examination Scheme: CIA: 40 Marks

Credit: 02
End-Sem: 60 Marks

Prerequisite:

- Basic Mathematical operations and statistical operations.
- Problem Solving Techniques
- Knowledge of Basic C

Course Objectives:

- To understand the various steps in program development through the structured programming approach.
- To learn the syntax and semantics of C programming language thereby learning the programming concepts in general.
- To learn the use of structured programming approach in solving problems.
- To decompose the problem in structured way.
- To test, debug and execute the program and to learn to fix logical errors in the program.

Course Outcomes:

On completion of the course, student will be able to–

- Develop his / her own algorithms, flowcharts for a given problem.
- Write the program from the pseudo code.
- Develop his / her own logic to solve any problem using programming tool.
- Formulate the problem in the form of program of any programming language.
- Code, test and debug the given logic in C programming language.
- To decompose a problem into functions and to develop modular reusable code.

Course Contents

Chapter 1	Arrays	5 lectures
	1.1 Array definition, declaration, initialization 1.2 Advantages and Disadvantages of arrays 1.3 Types – one, two and multidimensional, array slice 1.4 Memory representation of Arrays 1.5 Passing arrays to functions	
Chapter 2	Pointers	7lectures
	2.1 Pointer declaration, initialization 2.2 De-referencing pointers 2.3 Pointer arithmetic 2.4 Pointer to pointer 2.5 Arrays and pointers 2.6 Functions and pointers – passing pointers to Functions(call by reference), function returning pointers, function pointer	

	2.7 Dynamic memory allocation (malloc, calloc, realloc, free)	
Chapter 3	Strings	5lectures
	3.1 Declaration and initialization, string input/output, format specifiers 3.2 Standard library string functions 3.3 User defined string operations 3.4 Strings and pointers 3.5 Array of strings 3.6 Command Line Arguments	
Chapter 4	Structure and Union	9 lectures
	4.1 Introduction 4.2 Creating structures 4.3 Accessing structure members 4.4 Structure initialization 4.5 Nested structures 4.6 Array of structures 4.7 Passing structures to functions 4.8 Returning structure from function 4.9 Pointers and structures (passing structure to function, returning structure, pointer to structure) 4.10 Typedef 4.11 Self-referential structure 4.12 Union 4.13 Difference between structures and unions	
Chapter 5	File Handling	6 lectures
	5.1 Streams 5.2 Types of Files 5.3 Modes of file opening 5.4 Operations on files 5.5 File I/O operations 5.6 Random access to files	
Chapter 6	C Preprocessor	2lectures
	6.1 Difference between function and Macro 6.2 Format of Preprocessor directive - Conditional compilation (#ifdef, #endif, #if, #else, #ifndef) 6.3 Macro substitution, nested Macro, parameterized Macro	
Chapter 7	Bitwise Operators	1 lecture
	7.1 Bitwise operators (Bitwise AND, Bitwise OR, Bitwise NOT, Bitwise XOR) 7.2 Shift operators 7.3 Applications of bitwise operators	
Chapter 8	Experiential Learning	1 lecture
	Develop a menu driven system for student information system	

Reference Books:

1. Problem Solving and Programming Concept, Maureen Sprankle, 7th Edition, ,Pearson Publication, ISBN-10: 0-13-119459-3, ISBN-13: 978-0-13-119459-5
2. Let us C by Yashwant Kanetkar, BPB Publication 2018, ISBN 9387284492, 9789387284494
3. Understanding pointers in C, Yashwant Kanetkar, BPB Publication, 4th Edition, ISBN 9788176563581
4. C: the Complete Reference, Schildt Herbert, 4th edition, McGraw Hill, ISBN 0071502394, 9780071502399
5. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, Cengage

Learning India, ISBN8131507629, 9788131507629

6. The 'C' programming language, Brian Kernighan, Dennis Ritchie, PHI, 2nd Edition, ISBN0131103628, 9780131103627
7. Programming in C, A Practical Approach, AjayMittal, Pearson, ISBN 978-81-317-2934-2
8. Programming with C, B. Gottfried, 2nd edition, Schaum's outline Series, Tata McGraw Hill, ISBN 0071142592, 9780071142595
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First Year of B. Sc. Physics (2019 Course)

Course Code: 19CsCmpU202
Course Name: Relational Database Systems

Teaching Scheme: TH: 3 Lectures /Week
Examination Scheme: CIA: 40 Marks

Credit: 02
End-Sem: 60 Marks

Prerequisites:

- To understand Basic Organization of Data using files
- Knowledge of Set Theory Operations

Course Objectives:

- To understand creations, manipulation and querying of data in databases
- Introduction to structured / unstructured/semi-structured data (SQL/NoSQL)
- To learn implementation of SQL (DDL, DML) commands

Course Outcomes:

On completion of the course, student will be able to–

- Apply linguistic theory like Relational database Design(Normalization) etc.
- Have basic awareness of NOSQL
- Students can design simple as well as nested queries using SQL

Course Contents

Chapter 1	Structured Query Language	10 Lectures
	1.1 Introduction to SQL 1.2 Basic Structure 1.3 DDL commands with examples 1.4 Set operations 1.5 Aggregate functions 1.6 Null values 1.7 Nested Sub-queries 1.8 Modifications to Database (DML commands)	
Chapter 2	SQL Joins	5 Lectures
	2.1 SQL mechanisms for joining relations 2.2 Inner Joins 2.3 Outer Joins and Types 2.4 Examples on SQL joins	
Chapter 3	Relational Database Design	10 Lectures
	3.1 Pitfalls in Relational-Database Design (Undesirable properties of a RDB design like repetition, inability to represent certain information) 3.2 Functional Dependencies (Basic concepts, F+ Closure of an Attribute set)	

	3.3 Concept of Decomposition 3.4 Desirable Properties of Decomposition (Lossless Join & Dependency Preservation)	
Chapter 4	Normalization	5 Lectures
	4.1 Concept of Normalization 4.2 Normal forms (only definitions) 1NF, 2NF, 3NF, BCNF 4.3 Examples on Normalization 4.4 Concept of De-normalization	
Chapter 5	NoSQL	5 Lectures
	5.1 Structured, Semi structured, Unstructured data 5.2 Introduction to NoSQL 5.3 Different Types of NoSQL Databases 5.4 Examples of NoSQL Databases 5.5 Comparison of SQL with NoSQL Databases 5.6 Limitations of NoSQL Databases	
Chapter 6	Experiential Learning	1 Lecture
	4.1 To prepare review of different databases containing their types, advantages, disadvantages, etc. 4.2 Consider one case study, create database using different databases	

References

1. Database System Concepts, Henry F. Korth, Abraham Silberschatz, S. Sudarshan, ISBN:9780071289597, Tata McGraw-Hill Education
2. Database Management Systems, Raghu Ramakrishnan, ISBN:9780071254342, McGraw-hill higher Education
3. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, McGraw-Hill Science/Engineering/Math; 3 edition, ISBN: 9780072465631
4. Database Systems, Shamkant B. Navathe, Ramez Elmasri, ISBN:9780132144988, PEARSON HIGHER EDUCATION
5. Beginning Databases with Postgre SQL: From Novice to Professional, Richard Stones, Neil Matthew, ISBN:9781590594780, A press
6. Postgre SQL, Korry Douglas, ISBN:9780672327568, Sams
7. Practical Postgre SQL (B/CD), John Worsley, Joshua Drake, ISBN:9788173663925 Shroff/O'reilly Publications.
8. "Professional NoSQL" by Shashank Tiwari
9. Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement 1st Edition by Eric Redmond (Author), Jim Wilson (Author)
10. Getting Started with NoSQL (By: Gaurav Vaish)

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First Year of B. Sc. Physics (2019 Course)

Course Code: 19CsCmpU203
Course Name: Advanced 'C' Programming and Database Handling Practical

Teaching Scheme: TH: 3 Lectures /Week
Examination Scheme: CIA: 40 Marks

Credit: 02
End-Sem: 60 Marks

Objective :-

- Understanding basic SQL
- Writing C programs using complex data structures such as pointers, structures, etc.

No	Topic	Lectures
1	Assignment to demonstrate use of arrays (1-d and 2-D arrays) and functions	4
2	Assignment to demonstrate use of pointers, string and pointers	
3	Assignment to demonstrate array of strings, array and functions	4
4	Assignment to demonstrate structures and unions	4
5	Assignment to demonstrate command line arguments and preprocessor directives and bitwise operators.	4
6	Assignment to demonstrate file handling (text files, binary files and random access files)	4
7	Assignment to create simple tables, with only the primary key constraint (as a table level constraint & as a field level constraint)(include all datatypes)	4
8	Assignment to create more than one table, with referential integrity constraint, PK constraint, check constraint, unique constraint and not null constraint.	4
9	Assignment on DDL and DML statements of a table in the Database.	4
10	Assignment to query the tables using simple form of select statement Select <field-list> from table [where <condition> order by <field list>] Select <field-list, aggregate functions > from table [where <condition> group by, <> having <> order by <>], set operations (union, intersect)	4
11	Assignments to query tables using nested queries ('In' clause, '>some', '>any', '><some', '><any' clauses) and use of 'exists', 'not exists' clauses	4
12	Assignment related to small case studies (Each case study will involve creating tables with specified constraints, inserting records to it & writing queries for extracting records from these tables)	4