Course Plan (Fundamentals of C Programming -22CS002)

CHITKARA UNIVERSITY

A. Course Handout

Institute/School Name	Chitkara University Institute of Engineering and Technology		
Department Name	Department of Computer Science & Engineering		
Programme Name	Bachelor of Engineering (B.E.), Computer Science & Engineering		
Course Name	Fundamentals of C Programming	Session	2023-2024
Course Code	22CS002	Semester/Batch	2nd/2023
L-T-P (Per Week)	4-0-4	Course Credits	06
Course Coordinator	Dr. Gurpreet Singh		
Course Team Head (CTH)	Dr. Gaganpreet Kaur		

1. Scope & Objectives of the Course

The course covers the basics of programming and demonstrates fundamental programming techniques, customs and terms including the most common library functions and the usage of the pre-processor. This course helps the students in gaining the knowledge to write simple C language applications, mathematical and engineering problems. The course provides a wide scope of learning & understanding of the subject. The main objectives of the courseare :

- To impart knowledge about the different problem solving aspects including general problem solving strategies and working backwards from solution.
- To expose students to the concepts like variables, identifiers, data types, basic input/output, operators etc. for C-Language
- To provide skills to use different control statement (sequential, conditional and iterative), the concepts of pointers and functions for logic building.
- To enable learners to assess the lifecycles of different identifiers by providing the knowledge about different storage structures, array, functions and file handling operations implementations
- To create efficient programming solutions in common engineering design situations.

2. Course Learning Outcomes (CLO)

After completion of the course, student should be able to:

	Course Outcome	*POs	**CL	***KC	Sessions
CLO01	Understand C-Language features and basics of problem solving aspects for logic building.	PO1,PO2,PO3,PO5, PO12	K2	Factual Conceptual	**06**
CLO02	Use of variables, data types, identifiers, different operators and expressions	PO1,PO3,PO4,PO5	K3	Conceptual Procedural	**16**
CLO03	Apply conditional statements, switch case statements and iterative statements as flow controls in C-Language to solve complex problems.	PO1, PO2,PO3,PO4, PO5,PO7, PO11	K3	Conceptual Procedural	**16**
CLO04	Implement functions and observe the use of storage classes in C-language.	PO3,PO4,PO5	K4	Procedural	**06**
CLO05	Use pointers and one/two dimensional arrays, structures to store and retrieve data items in C-language.	PO4, PO5	K3	Conceptual Procedural	**24**

CLO06	Apply the concept of recursion and file handling to solve complex problems, which require iterative function calls and permanent storage in C-language.	PO1,PO3,PO4, PO5,PO7, PO11	K3	Procedural	**12**
Total Contact Hours					**80**

Revised Bloom's Taxonomy Terminology

* PO's available at (shorturl.at/cryzF)
**Cognitive Level =CL
***Knowledge Categories = KC

Course Learning Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CLO01	H	M	M		H							M
CLO02	M		M	H	M							
CLO03	L	M	H	M	M		L				L	
CLO04			L	M	H							
CLO05				L	H							
CLO06	L		H	M	M		L				L	

H=High, M=Medium, L=Low

3. ERISE Grid Mapping

Feature Enablement	**Level(1-5, 5 being highest)**
Entrepreneurship	1
Research	1
Innovation	1
Skills	5
Employability	4

4. Recommended Books:

Text Books:

B01: Kanetkar, Yashwant, "Let us C", New Delhi BPB Publication 2019. 17th Edition.
B02: E. Balagurusamy,"Programming in ANSI C", McGraw Hill Education India, 2019, Edition-8
B03: Reema Thareja, " Computer Fundamentals and Programming in C", Oxford University Press, 2016, 2nd Edition
B04: Subburaj, R., "Programming in C", Vikas Publication House Pvt. Ltd. (New Delhi), 2001, 2nd Edition.

Reference Books:

B05: Schildt, Herbert, "C: The Complete Reference", McGraw Hill Education (New Delhi), 2018, 4th Edition
B06: Kernighan,Brian W.and Ritchie,Dennis M, "The C Programming Language", Pearson Education (New Delhi), 2007, 2nd Edition

E-Resourses:

- https://library.chitkara.edu.in/subscribed-books.php
- http://164.100.247.26/Record/38449930
- https://www.sciencedirect.com/science/article/pii/B9780123507723500069?via%3Dihub

5. Other readings and relevant websites:

Serial No	Link of Journals, Magazines, websites and Research Papers
1.	https://nptel.ac.in/courses/106106210
2.	https://www.coursera.org/specializations/c-programming
3.	https://www.coursera.org/learn/c-for-everyone
4.	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/
5.	https://ocw.mit.edu/courses/6-s096-introduction-to-c-and-c-january-iap-2013/
6.	https://catalogue.library.cern/literature/t50vw-6at59

6. Recommended Tools and Platforms

Code Blocks, GCC Compiler

7. Course Plan:

Session No.	Topics	Text Book
1-4	The Problem Solving Aspect, Problem definition phase, Getting started on a problem, The use of specific examples Similarities among problems, Working backwards from the solution, General Problem solving strategies	B01-Chpater-1, B04-Chpater-1
5-6	Introduction to programming in C, First Program in C	B01-Chapter-2, B04-Chpater-2
7-14	Variables and Identifiers, Data types, Basic Input Output in C - Characters, Basic Input Output in C - Formatted IO	B01-Chapter-1
15-22	Arithmetic Operators, Relational and Logical Operators, More Operators, Precedence and Associativity of operators	B01-Chapter-2, B04-Chpater-5
23-28	If statement, if-else statement, if statement mistakes, nested if statements	B01-Chapter-3
29-32	Conditional Operator, Switch statement	B01-Chapter-4 B01-Chapter-7
ST-1 (Syllabus = 30% (Session No. 1-32))		
33-35	While loop, Looping - For loop, Control with break and continue, Variants of for loop	B01-Chapter-5 B01-Chapter-6
36-38	Nested for loops , Printing patterns with loops, do-while loop	B01-Chapter-6
39-41	Functions in C, Definition and declaration of a function, Scope of a function	B01-Chapter-8, B02-Chapter-9
42-44	auto storage class, extern storage class, static storage class, register storage class	B01-Chapter-11
45-46	Introduction to Pointers in C, Parameter passing techniques, Pointer Arithmetic in C, Pointer Arithmetic with Pointers	B01-Chapter-9
47-48	Arrays, Searching an Element, Arrays and Memory in C,	B01-Chapter-13, B04-Chpater-8

49-50	Pointers with Arrays, Functions and Arrays	B01-Chapter-13, B02-Chapter-11
51-52	2D Arrays	B01-Chapter-14, B04-Chpater-8
ST-2 (Syllabus = 60% (Session No. 1-52))		
53-60	Declaring and Initializing String Variables, Reading and Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs (with and without using built-in string functions)	B01-Chapter-15, B02-Chapter-10
61-68	Introduction to recursion, Recursion basic programs like: factorial, Fibonacci, sum of digits	B01-Chapter-10
69-76	Structures: Introduction, Defining a structure, declaring structure variables, accessing structure members, structure initialization, array of structures, array within structure.	B01-Chapter-16
ST-3(Syllabus = 80% (Session No. 1-76))		
77-80	File Management in C: Introduction, Defining and opening a file, closing a file, Input/output	B01-Chapter-17, B04-Chpater-16, B02-Chapter-12
ETE (Syllabus = 100% (Session No. 1-80))		

8. Delivery/Instructional Resources

Session No.	Topics	Web References	Audio-Video
1-4	The Problem Solving Aspect, Problem definition phase, Getting started on a problem, The use of specific examples Similarities among problems, Working backwards from the solution, General Problem solving strategies	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec01/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-1 to Lecture-3
5-6	Introduction to programming in C, First Program in C	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-4, Lecture-8
7-14	Variables and Identifiers, Data types, Basic Input Output in C - Characters, Basic Input Output in C - Formatted IO	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec02/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-5
15-22	Arithmetic Operators, Relational and Logical Operators, More Operators, Precedence and Associativity of operators	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec02/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-11 to Lecture-14

23-28	If statement, if-else statement, if statement mistakes, nested if statements.Decision control sturctures.	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec03/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-15 to Lecture-16
29-32	Conditional Operator, Switch statement Decision control sturctures (contd.).	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec03/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-17 to Lecture-18 Lecture22 to Lecture-23
33-35	While loop, Looping - For loop, Control with break and continue, Variants of for loop. Iterative control structures.	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec03/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-19 to Lecture-21 Lecture-23 to Lecture-25
36-38	Nested for loops , Printing patterns with loops, do-while loop. Iterative control structures (Contd.).	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec04/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-19 to Lecture-21 Lecture-23 to Lecture-25
39-41	Functions in c, Definition and declaration of a function, Scope of a function	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec08/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-9 Lecture-35 to Lecture-38
42-44	auto storage class, extern storage class, static storage class, register storage class	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec08/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-35

45-46	Introduction to Pointers in C, Parameter passing techniques, Pointer Arithmetic in C, Pointer Arithmetic with Pointers	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec07/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-58 to Lecture-59
47-48	Arrays, Searching an Element, Arrays and Memory in C	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec05/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-26 to Lecture-30
49-50	Pointers with Arrays, Functions and Arrays	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec07/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-47
51-52	2D Arrays. Implementation, basic transformations on 2D arrays like transpose, addition, subtraction and multiplication.	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec05/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-34
53-60	Declaring and Initializing String Variables, Reading and Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs (with and without using built-in string functions)	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-35
61-68	Introduction to recursion, Recursion basic programs like: factorial, Fibonacci, sum of digits	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec12/	https://archive.nptel.ac.in/courses/106/105/106105171/ Lecture-53 to Lecture-54
69-76	Structures: Introduction, Defining a structure, declaring structure variables, accessing structure members, structure initialization, array of structures, array within structure.	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec06/	https://archive.nptel.ac.in/courses/106/105/106105234/

77-80	File Management in C: Introduction, Defining and opening a file, closing a file, Input/output	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/resources/mit6_087iap10_lec07/	https://archive.nptel.ac.in/courses/106/105/106105234/

9. Action plan for different types of learners

Learners Type-I	Learners Type-II	Learners Type-III
Remedial Classes, Doubt Sessions, Guided Tutorials	Workshop, Doubt Sessions	Coding Competitions, Projects

10. Evaluation Scheme & Components:

Evaluation Component	Type of Component	No. of Assessments	Weightage of Component	Mode of Assessment
Component 1	Lab Evaluations	02*	20%	Continuous Evaluation (CE)
Component 2	Sessional Tests (STs)	03**	30%	Computer Based Test (CBT)
Component 3	End Term Examination	01***	50%	Computer Based Test (CBT)
Total		**100%**		

* Continues Evaluation (CE) is mandatory evaluation taken twice in a semester, one will be considered as Mid-Term evaluation (CE-I) and other will be Final evaluation (CE-II) based on lab practicals. The average marks of CE-I and CE-II will be considered under Component-1.
**ST-1 & ST-2 have weightage 25% each and ST-3 have weightage 50% out of the total weightage of Component-2. All The ST's are compulsory.
***As per Academic Guidelines, minimum 75% attendance is required for appearing in the End-Semester Examination.
Appendix-1 is attached containing the rubrics of CE-1 and CE-II
Appendix-II is attached containing the list of practicals for Fundamentals of C Programming.

11. Syllabus of the Course:

Subject: Fundamentals of C Programming			
S.No.	**Topic (s)**	**No. of Sessions**	**Weightage %**
1	The Problem Solving Aspect, Problem definition phase, Getting started on a problem, The use of specific examples Similarities among problems, Working backwards from the solution, General Problem solving strategies. Introduction to programming in C, First Program in C, Variables and Identifiers, Data types, Basic Input Output in C - Characters, Basic Input Output in C - Formatted IO. Arithmetic Operators, Relational and Logical Operators, More Operators, Precedence and Associativity of operators. If statement, if-else statement, if statement mistakes, nested if statements. Conditional Operator, Switch statement	**32**	**30%**
ST-1 (Covering 30% syllabus)			

2	While loop, Looping - For loop, Control with break and continue, Variants of for loop, Nested for loops , Printing patterns with loops, do-while loop. Functions in c, Definition and declaration of a function, Scope of a function. Auto storage class, extern storage class, static storage class, register storage class. Introduction to Pointers in C, Parameter passing techniques, Pointer Arithmetic in C, Pointer Arithmetic with Pointers. Arrays, Searching an Element, Arrays and Memory in C, Pointers with Arrays, Functions and Arrays, 2D Arrays	**20**	**30%**
ST-2 (Covering 60% syllabus)			
3	Declaring and Initializing String Variables, Reading and Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs (with and without using built-in string functions), Introduction to recursion, Recursion basicprograms like: factorial, Fibonacci, sum of digits, Structures: Introduction, Defining a structure, declaring structure variables, accessing structure members, structure initialization, array of structures, array within structure.	**24**	**20%**
ST-3 (Covering 80% syllabus)			
4	File Management in C: Introduction, Defining and opening a file, closing a file, Input/output	**08**	**20%**
End Term (Covering 100% syllabus)			

This Document is approved by:

Designation	**Name**	**Signature**
Course Coordinator	Dr. Gurpreet Singh	
Head-Academic Delivery	Dr. Renu Popli and Dr. Srikant Mohapatra	
Associate Dean	Dr. Sunil Kumar	
Date (DD/MM/YYYY)		