BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOT

COURSE PLAN

Title of Course	:	Introduction to C Programming	Course Code	:	22UCS120E
Credits	:	03	Contact Hours/ Week	:	2Hrs/Week
Total Hours	:	46 Hrs	Tutorial Hours	:	00
CIE Marks	:	50	SEE Marks	:	50
Semester	:	I	Year	:	2023-24

Prerequisites: Data Structures

Course Objectives:

	The Course objectives are:
1	Explain the basic architecture and functionalities of a Computer
2	Apply programming constructs of C language to solve the real-world problems
3	Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems
4	Design and Develop Solutions to problems using structured programming constructs such as functions and procedures

Course Outcomes:

	At the end of the course the student should be able to:
1	Describe the basic architecture and functionalities of a computer and also recognize the hardware parts.
2	Apply programming constructs of C language to solve the real world problem.
3	Explore user-defined data structures like arrays in implementing solutions to problems like searching, sorting and tabular data processing.
4	Explore user-defined data structures like structures in implementing solutions like heterogeneous data processing.
5	Design and Develop Solutions to problems using modular programming constructs using functions.

Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO).

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2			2							
CO2		1			2							2
CO3		1										2
CO4		2										2
CO5		3	3	2								2

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.

Unit Learning Outcomes (ULO):

Unit Learning Outcome (ULO)	CO	BLL	PI addressed
Describe the basic architecture and functionalities of a computer and also recognize the hardware parts.	1 & 2	2.4	1.4.1
Apply programming constructs of C language to solve the real world problem.	1 & 2	3,5	1.4.1
Explore user-defined data structures like arrays in implementing solutions to problems like searching, sorting and tabular data processing.	3	5	1.4.1
Explore user-defined data structures like structures in implementing solutions like heterogeneous data processing.	4	3	1.4.1
Design and Develop Solutions to problems using modular programming constructs using functions.	5	5	1.4.1

Course Content:

Hours Required	Topic to be covered	Mode of Delivery
01	**Basic Organization of a Computer:** Steps in problem solving, Algorithms and Flowcharts with examples.	i. **Chalk and talk in classroom** ii. **Presentation** iii. **Lecture combined with discussions** iv. **Tutorial and Assignments** v. **Demonstration** vi. **Group Assignment**
01	**Overview of C:** Features of C, Structure of C program	
01	Process of compiling and executing the C program. **Constants, Variables and Data types:** Introduction,	
01	Declaration of variables, Example programs. **Operators and Expressions:** Arithmetic operators,	
01	Relational operators, Logical operators, Assignment operators, Increment and Decrement operators,	
01	Conditional operator, Bitwise operators, Special operators, Arithmetic expressions,	
01	Evaluation of expressions, Precedence of arithmetic operators, Type conversion in expressions,	
01	Operator precedence and associativity.	
01	**Managing Input and Output Operations:** Formatted	i. **Chalk and talk in classroom** ii. **Presentation** iii. **Lecture combined with discussions** iv. **Tutorial and Assignments** v. **Demonstration** vi. **Group Assignment**
01	Unformatted input and output statements.	
01	**Decision making and Branching:** Decision making with *if*,	
01	*if-else*, Nesting of *if-else* statements,	
01	*else-if ladders*, *switch* statement, ?: Operator, *goto* statement.	
01	**Decision making and Looping:** *while* statement, *do-while* statement,	
01	*for* statement, jumps inloops.	
01	**Arrays:** Introduction, One dimensional arrays,	i. **Chalk and talk in classroom** ii. **Presentation** iii. **Lecture combined with discussions** iv. **Tutorial and Assignments** v. **Demonstration** vi. **Group Assignment**
01	declaration and initialization of one-dimensional arrays,	
01	Two dimensional arrays, Operations on arrays.	
01	declaration and initialization of two-dimensional arrays.	
01	**Strings:** Introduction, Declaring	
01	initializing string variables,	
01	String-handling functions, Array of String.	
01	**User defined functions:** Introduction, Need for user-defined functions, a multi-function program,	i. **Chalk and talk in classroom** ii. **Presentation** iii. **Lecture combined with discussions** iv. **Tutorial and Assignments** v. **Demonstration** vi. **Group Assignment**
01	Elements of user defined function,	
01	Definition of functions, Return values and their types,	
01	Function calls, Function declaration.	
01	Category of functions: Based on call by value, call by reference,	
01	argument and return type, Recursion with examples	

01	**Structures:** Defining a structure, Declaring structure variables,	
01	Accessing structure members, Initialization, Arrays of structure, Structures and Functions.	

Review Questions:

Review Questions	ULO	BLL	PI addressed
With a neat block diagram, explain the basic architecture of a digital computer.	1	1	1.4.1
Write a C program to perform all the arithmetic operations.	1,2	2,3	1.4.1
Define array. Discuss how to declare and initialize single and double dimensional arrays with suitable examples	03	1,2	1.4.1
Define recursion and write a C program to find factorial of a number using recursion	04,05	1,3,4	1.4.1

Evaluation Scheme:

Assessment	Marks	Weightage
CIE-I	**20**	**20**
CIE-II	**20**	**20**
Assignments/ Quizzes/ Case Study/ Course Project/ Term Paper/Field Work	**10**	**10**
SEE	**100**	**50**
Total	**150**	**100**

Details of Assignment:

Assignment	Marks (10)	CO	PI	CA	PO
Assignment 1	**Marks- 5**	**1,2**			**2**
Assignment 2	**Marks - 5**	**3,4,5**			**3**

COURSE PLAN

Title of Course	:	Innovation and Design Thinking	Course Code	:	21UHS129C
Credits	:	01	Contact Hours/ Week	:	1Hrs/Week
Total Hours	:	15 Hrs	Tutorial Hours	:	00
CIE Marks	:	50	SEE Marks	:	50
Semester	:	I	Year	:	2023-24

Prerequisites: Data Structures

Course Objectives:

	The Course objectives are:
1	To explain the concept of design thinking for product and service development
2	To explain the fundamental concept of innovation and design thinking.
3	To discuss the methods of implementing design thinking in the real world

Course Outcomes:

	At the end of the course the student should be able to:
1	Demonstrate the knowledge and concepts of design thinking.
2	Analyze various tools of design thinking and use an appropriate tool for design thinking.
3	Describe the role of design thinking in IT industry.
4	Demonstrate design thinking solutions to business challenges.

Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO).

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	-	3	3	2	-	-	-	-	-	-	-	-
CO2	-	2	3	2	3	-	-	-	-	-	-	-
CO3	-	-	1	1	3	-	-	-	-	-	-	-
CO4	-	3	2	1	-	-	-	-	-	-	-	-

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.

Unit Learning Outcomes (ULO):

Unit Learning Outcome (ULO)	CO	BLL
To explain the concept of design thinking for product and service development	1 & 2	2
To explain the fundamental concept of innovation and design thinking.	2 & 3	2,3
To discuss the methods of implementing design thinking in the real world	4	4

Course Content:

Hours Required	Topic to be covered	Mode of Delivery
01	**Understanding Design thinking:** Introduction about the design thinking, Explore presentation	i. Chalk and talk in classroom ii. Presentation iii. Lecture combined with discussions iv. Tutorial and Assignments v. Demonstration vi. Group Assignment
01	steps in Design Thinking Empathize, Design, Ideate, Prototype and Test,	
01	Designers across globe–MVP or Prototyping.	
01	**Tools for Design Thinking**: Importance of tools for design thinking	i. Chalk and talk in classroom ii. Presentation iii. Lecture combined with discussions iv. Tutorial and Assignments v. Demonstration vi. Group Assignment
01	Visualization**,** Journey mapping, Value chain analysis, Mind mapping,	
01	Rapid concept development, Assumption testing,	
01	Prototyping, Customer co-creation, Learning launches, Storytelling.	
01	**Design Thinking in IT:** Agile in Virtual collaboration environment	i. Chalk and talk in classroom ii. Presentation iii. Lecture combined with discussions iv. Tutorial and Assignments v. Demonstration vi. Group Assignment
01	Scenario based Prototyping.	
01	**DT For strategic innovations:** Growth – Story telling representation,	
01	predictability- Strategic Foresight, Change – Sense Making	
01	**DT For strategic innovations:** Relevance–Value redefinition.	i. Chalk and talk in classroom ii. Presentation iii. Lecture combined with discussions iv. Tutorial and Assignments v. Demonstration vi. Group Assignment
01	Extreme Competition–experience design, Standardization–Humanization	
01	Creative Culture–Rapid prototyping,	
01	Strategy and Organization–Business Model design.	

Evaluation Scheme:

Assessment	Marks	Weightage
CIE-I	20	20
CIE-II	20	20
Assignments/ Quizzes/ Case Study/ Course Project/ Term Paper/Field Work	10	10
SEE	100	50
Total	150	100

Details of Assignment:

Assignment	Marks (10)	CO	PI	CA	PO
Assignment 1	Marks- 5	1,2			2
Assignment 2	Marks - 5	3,4,5			3

BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOT

COURSE PLAN

Title of Course	:	Principles of Programming Using C	Course Code	:	22UCS119C
Credits	:	3	Contact Hours/ Week	:	(2+2)
Total Hours	:	46 (26T+20P)	Tutorial Hours	:	0
CIE Marks	:	50	SEE Marks	:	50
Semester	:	I	Year	:	2023-24

Prerequisites:

Nil

Course Objectives:

	The Course objectives are:
1)	Explain the basic architecture and functionalities of a computer.
2)	Apply programming constructs of C language to solve real-world problems.
3)	Explore user-defined data structures like arrays, structures, and pointers in implementing solutions to problems.
4)	Design and develop solutions to problems using structured programming constructs such as functions and procedures.

Course Outcomes:

	At the end of the course, the student should be able to:
1)	Explain the basic architecture and functionalities of a computer and recognize the hardware parts.
2)	Apply programming constructs of C language to solve the real-world problem.
3)	Explore the usage of arrays in implementing solutions to problems.
4)	Illustrate the modular programming approach using user-defined functions.
5)	Design and develop solutions to problems using a modular programming approach.

Course Articulation Matrix: Mapping of Course Outcomes (CO) with Programme Outcomes (PO) and Programme Specific Outcomes (PSO)

No	Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
The students will be able to:																
1	Explain the basic architecture and functionalities of a computer and recognize the hardware parts.	3	2													
2	Apply programming constructs of C language to solve the real-world problem.		1													
3	Explore the usage of arrays in implementing solutions to problems.		1													
4	Illustrate the modular programming approach using user-defined functions.		2													
5	Design and develop solutions to problems using a modular programming approach.		3	3												

Competencies Addressed in the course and Corresponding Performance Indicators

Programme Outcome: Any of 1 to 12 PO's:

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.	
Competency	**Indicators**
1.4 Demonstrate competencein specialized engineering knowledge to the program	1.4.1 Apply theory and principles of computer science and engineering to solve anengineering problem

PO2: Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	
Competency	**Indicators**
2.1 Demonstrate an abilityto identify and formulate complex engineeringproblem	2.1.1 Identify processes/modules/algorithms of a computer-based system andparameters to solve a problem

PO 3: 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 public health and safety, and cultural, societal, and environmental considerations.	
Competency	**Indicators**
3.8 Demonstrate an ability to advance an engineering design to defined end state	3.8.2 Able to implement and integrate the modules 3.8.3 Able to verify the functionalities and validate the design.

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.

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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.

Unit Learning Outcomes (ULO):

Unit Learning Outcome (ULO)	CO	BLL	PI addressed
Explain the basic architecture and functionalities of a computer and recognize the hardware parts	1	1,2	1.4.1
Apply programming constructs of C language to solve the real-world problem	2,3	3,4	1.4.1,2.1.1
Understand and utilize user defined data structures like arrays, structures and union to solve the problems	4	3,4	1.4.1, 2.1.1
Design and Develop Solutions to problems using modular programming approach	5	5	1.4.1,2.1.1, 3.8.2, 3.8.3

Course Content:

Hours Required	Topic to be covered	Mode of Delivery
01	**Basic Organization of a Computer.**	i. Chalk and talk in classroom ii. Lecture combined with discussions iii. Assignments
01	Steps in problem solving, Algorithms with examples.	
01	Flowcharts with examples.	
01	**Overview of C:** Features of C, Structure of C program., process of compiling and executing the C program	
01	C**onstants, Variables and Data types:** Introduction, Character set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of variables, Example programs.	
01	**Operators and Expressions:** Arithmetic operators, Relational operators, Logical operators, Assignment operators	
01	Increment and Decrement operators, Conditional operator, Bitwise operators, Special operators	
01	Arithmetic expressions, Evaluation of expressions, Precedence of arithmetic operators, Type conversion in expressions, Operator precedence and Associativity.	
01	**Managing Input and Output Operations:** Formatted and Unformatted input statements.	i. Chalk and talk in classroom ii. Lecture combined with discussions iii. Assignments
01	Formatted and Unformatted output statements.	
01	**Decision making and Branching:** Decision making with *if*, *if-else*, Nesting of *if-else* statements	
01	*else-if* ladders, *switch* statement, ?: Operator, *goto* statement.	
01	**Decision making and Looping:** *while* statement, *do-while* statement	
01	*for* statement, jumps in loops.	
01	**Arrays:** Introduction, One dimensional arrays, declaration, and initialization of one-dimensional arrays	i. Chalk and talk in classroom ii. Lecture combined with discussions iii. Assignments
01	Examples of one-dimensional arrays	
01	Two dimensional arrays, declaration and initialization of two-dimensional arrays. Operations on arrays.	
01	Examples of two-dimensional arrays	
01	**Strings:** Introduction, Declaring and initializing string variables	
01	String-handling functions, Array of String.	
01	**User defined functions:** Introduction, Need for user-defined	i. Chalk and talk in

	functions, a multi-function program	classroom
01	Elements of user defined function, Definition of functions, Return values and their types, Function calls, Function declaration.	ii. Lecture combined with discussions iii. Assignments
01	Category of functions: Based on call by value, call by reference	
01	argument and return type and recursion.	
01	**Structures and Unions:** Defining a structure, declaring structure variables, Accessing structure members	
01	Initialization, Arrays of structure, Structures and Functions.	
01	**Pointers:** Introduction, Accessing the address of a variable, Declaring and initialization of pointer variables,	
01	Pointers as function arguments.	

Review Questions:

Review Questions	ULO	BLL	PI addressed
With a neat block diagram, explain the basic architecture of a digital computer	1	1,2	**1.4.1**
Differentiate between an algorithm and flowchart and write an algorithm and flowchart to find smallest among 3 numbers.	1	2,3	**1.4.1,2.1.1**
Discuss the features of C language.	1	2	**1.4.1**
What do you mean by token in C? List tokens in C and identify the same in the following expression, $ci= (float) p * (pow((1+r/100),t)-p;$	1	2,3	**1.4.1**
Write a C program to find the sum of digits of a 4 digit number.	2	3,4	**1.4.1,2.1.1**
Differentiate between: Formatted and Unformatted I/O statements, return and break	2	2	**1.4.1**
Write a C program to check whether the input number is divisible by 4 but not by 6, and display the message accordingly.	2	3,4	**1.4.1,2.1.1**
Discuss on following statements with suitable syntax and flowchart. i. Nested if ii. else-if ladder.	2	2	**1.4.1**
With syntax and examples, explain the declaration and initialization of one-dimensional and two-dimensional arrays.	3	2	**1.4.1**
Write a C program to search an element in an array using linear search and print its position. Also print the array elements.	3	3,4	**1.4.1,2.1.1**
With syntax and example, explain the working of any four string handling functions.	3	2	**1.4.1,2.1.1**
Write a C program to perform the addition of 2 matrices.	3	3,4	**1.4.1,2.1.1**
Explain the four different categories of functions with example.	4	2	**1.4.1**
Write a C program to find x^y using user defined function.	4	3,4	**1.4.1,3.8.2,3.8.3**
Discuss with syntax and example, the definition, declaration, and initialization of structure variable.	4	2	**1.4.1**
Use structures to read, write and compute average- marks of the students. Also, list the students scoring above and below the average marks for a class of N students.	4	3,4	**1.4.1, 3.8.2,3.8.3**

Evaluation Scheme:

Assessment	Marks	Weightage
CIE-I	20	20
CIE-II	20	20
Assignments/ Quizzes/ Case Study/ Course Project/ Term Paper/Field Work	10	10
SEE	100	50
Total	150	100

Details of Assignment:

Assignment	Marks (10)	CO	PI	CA	PO
Assignment I : Writeup to explain or solve problems using c features	5	1,2,3,4,5	1.4.1	--	1,2,3
Assignment 2: Quiz	5	2,3,4	1.4.1	--	1,2,3