INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

INFORMATION TECHNOLOGY

COURSE DESCRIPTOR

Course Title	**COMPUTER PROGRAMMING**				
Course Code	ACS001				
Programme	B.Tech				
Semester	I	CSE | IT| ECE | EEE			
	II	AE | CE| ME			
Course Type	Foundation				
Regulation	IARE - R16				
Course Structure		**Theory**			**Practical**	
		Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
		3	1	4	4	2
Chief Coordinator	Dr. K Srinivasa Reddy, Professor & HOD, IT				
Course Faculty	Ms N Jayanthi Dr. G Ramu Dr. J Sirisha Devi Dr. K Suvarchala Ms. B Rekha Ms. B Padmaja Ms. G Geetha Reddy Ms. K Laxmi Narayanamma Mr. R M Norullah				

I. COURSE OVERVIEW:

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 preprocessor. This course helps the students in gaining the knowledge to write simple C language applications, mathematical and engineering problems. This course helps to undertake future courses that assume this programming language as a background in computer programming. Topics include variables, data types, functions, control structures, pointers, strings, arrays and dynamic allocation principles. This course in reached to student by power point presentations, lecture notes, and lab involve the problem solving in mathematical and engineering areas.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites
-	-	-	Basic Mathematics and Logical Thinking

III. MARKSDISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Computer Programming	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✔	Chalk & Talk	✔	Quiz	✔	Assignments	✘	MOOCs
✔	LCD / PPT	✔	Seminars	✘	Mini Project	✔	Videos
✘	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

The course will be evaluated for a total of 100 marks, with 30 marks for Continuous Internal Assessment (CIA) and 70 marks for Semester End Examination (SEE). Out of 30 marks allotted for CIA during the semester, marks are awarded by taking average of two CIA examinations or the marks scored in the make-up examination.

Semester End Examination (SEE): The SEE is conducted for 70 marks of 3 hours duration. The syllabus for the theory courses is divided into fiveunits and each unit carries equal weightage in terms of marks distribution. The question paper pattern is as follows. Two full questions with "either" or "choice" will be drawn from each unit. Each question carries 14 marks. There could be a maximum of two sub divisions in a question.

The emphasis on the questions is broadly based on the following criteria:

50 %	To test the objectiveness of the concept.
50 %	To test the analytical skill of the concept OR to test the application skill of the concept.

Continuous Internal Assessment (CIA):
CIA is conducted for a total of 30 marks (Table 1), with 25 marks for Continuous Internal Examination (CIE), 05 marks for Quiz/ Alternative Assessment Tool (AAT).

Table 1: Assessment pattern for CIA

Component	Theory		Total Marks
Type of Assessment	CIE Exam	Quiz / AAT	
CIA Marks	25	05	30

Continuous Internal Examination (CIE):
Two CIE exams shall be conducted at the end of the 8th and 16th week of the semester respectively. The CIE exam is conducted for 25 marks of 2 hours duration consisting of two parts. Part–A shall have five compulsory questions of one mark each. In part–B, four out of five questions have to be answered where, each question carries 5 marks. Marks are awarded by taking average of marks scored in two CIE exams.

Quiz / Alternative Assessment Tool (AAT):
Two Quiz exams shall be online examination consisting of 25 multiple choice questions and are be answered by choosing the correct answer from a given set of choices (commonly four). Marks shall be awarded considering the average of two quizzes for every course. The AAT may include seminars, assignments, term paper, open ended experiments, five minutes video and MOOCs.

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

	Program Outcomes (POs)	Strength	Proficiency assessed by
PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.	3	Assignments
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences	3	Assignments
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 the public health and safety, and the cultural, societal, and environmental considerations.	2	Seminars, Viva
PO 4	**Conduct investigations of complex problems**: Use research-based knowledge and researchmethods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	1	5 minutes video

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

	Program Specific Outcomes (PSOs)	Strength	Proficiency assessed by
PSO 1	**Engineering knowledge:** Graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication.	2	Projects
PSO 2	**Broadness and diversity:** Graduates will have a broad understanding of economical, environmental, societal, health and safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage	3	Lectures, Assignments
PSO 3	**Self-Learning and service:** Graduates will be motivated for continuous self-learning in engineering practice and/ or pursue research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.	1	5 minutes video

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Learn adequate knowledge by problem solving techniques.
II	Understand programming skills using the fundamentals and basics of C Language.
III	Improve problem solving skills using arrays, strings, and functions.
IV	Understand the dynamics of memory by pointers.
V	Study files creation process with access permissions

IX. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
ACS001.01	CLO 1	Identify and understand the working of key components of a computer system.	PO 1, PO 4	2
ACS001.02	CLO 2	Analyze a given problem and develop an algorithm to solve the problem.	PO 2, PO 3	3
ACS001.03	CLO 3	Describe the fundamental programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.	PO 2, PO 4	2
ACS001.04	CLO 4	Gain knowledge to identify appropriate C language constructs to write basic programs.	PO 1, PO 3	3
ACS001.05	CLO 5	Identify the right data representation formats based on the requirements of the problem.	PO 2,PO 3	3
ACS001.06	CLO 6	Describe the operators, their precedence and associativity while evaluating expressions in program statements..	PO 1, PO 4	2
ACS001.07	CLO 7	Understand branching statements, loop statements and use them in problem solving.	PO 1,PO 4	2
ACS001.08	CLO 8	Learn homogenous derived data types and use them to solve statistical problems.	PO 2, PO 3	3
ACS001.09	CLO 9	Understand procedural oriented programming using functions.	PO 2	3
ACS001.10	CLO 10	Understand how recursion works and write programs using recursion to solve problems.	PO 1, PO 2	3
ACS001.11	CLO 11	Differentiate call by value and call by reference parameter passing mechanisms.	PO 2	3
ACS001.12	CLO 12	Understand pointers conceptually and apply them in C programs.	PO 1	3
ACS001.13	CLO 13	Distinguish homogenous and heterogeneous data types and apply them in solving data processing applications.	PO 3	2
ACS001.14	CLO 14	Explain the concept of file system for handling data storage and apply it for solving problems.	PO 1, PO 3	3
ACS001.15	CLO 15	Differentiate text files and binary files and write the simple C programs using file handling functions. Searching, Sorting.	PO 2	3
ACS001.16	CLO 16	Apply the concepts to solve real-time applications using the features of C language.	PO 2	3
ACS001.17	CLO 17	Possess the knowledge and skills for employability and to succeed in national and international level competitive examinations.	PO 1, PO 4	2

3 = High; 2 = Medium; 1 = Low

X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

CLOs	Program Outcomes POs												Program Specific Outcomes PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	3			1										3	
CLO 2		3	2										2		1
CLO 3		3		1									2		

CLOs	Program Outcomes POs												Program Specific Outcomes PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 4	3			1									2		
CLO 5		3	2										2	3	
CLO 6	3			1											1
CLO 7	3			1										3	
CLO 8		3	2										2		
CLO 9		3												3	
CLO 10	3	3											2		1
CLO 11		3												3	
CLO 12	3												2	3	
CLO 13			2										2		
CLO 14	3		2											3	1
CLO 15		3												3	
CLO 16		3												3	
CLO 17	3			1									2		

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES–DIRECT

CIE Exams	PO 1, PO2, PO 3, PO 4	SEE Exams	PO 1, PO2, PO 3, PO 4	Assignments	PO 2	Seminars	PO 3
Laboratory Practices	PO 1	Student Viva	PO 3	Mini Project	-	Certification	-
Term Paper	-						

XII. ASSESSMENT METHODOLOGIES-INDIRECT

✔	Early Semester Feedback	✔	End Semester OBE Feedback
✘	Assessment of Mini Projects by Experts		

XIII. SYLLABUS

UNIT-I	INTRODUCTION

Introduction to computers: Computer systems, computing environments, computer languages, creating and running programs, algorithms, flowcharts; Introduction to C language: History of C, basic structure of C programs, process of compiling and running a C program, C tokens, keywords, identifiers, constants, strings, special symbols, variables, data types; Operators and expressions: Operators, arithmetic, relational and logical, assignment operators, increment and decrement operators, bitwise and conditional operators, special operators, operator precedence and associativity, evaluation of expressions, type conversions in expressions, formatted input and output.

UNIT-II	CONTROL STRUCTURES

Control structures: Decision statements; if and switch statement; Loop control statements: while, for and do while loops, jump statements, break, continue, goto statements; Arrays: Concepts, one dimensional arrays, declaration and initialization of one dimensional arrays, two dimensional arrays, initialization and accessing, multi dimensional arrays; Strings concepts: String handling functions, array of strings.

UNIT-III	ARRAYS AND FUNCTIONS

Functions: Need for user defined functions, function declaration, function prototype, category of functions, inter function communication, function calls, parameter passing mechanisms, recursion, passing arrays to functions, passing strings to functions, storage classes, preprocessor directives.

Pointers: Pointer basics, pointer arithmetic, pointers to pointers, generic pointers, array of pointers, pointers and arrays, pointers as functions arguments, functions returning pointers.

UNIT-IV	STRUCTURES, UNIONS AND POINTERS

Structures and unions: Structure definition, initialization, accessing structures, nested structures, arrays of structures, structures and functions, passing structures through pointers, self referential structures, unions, bit fields, typedef, enumerations; Dynamic memory allocation: Basic concepts, library functions.

UNIT-V	FILE HANDLING AND BASICALGORITHMS

Files: Streams, basic file operations, file types, file opening modes, file input and output functions, file status functions, file positioning functions, command line arguments.

Text Books:

1. Stephen G. Kochan, "Programming in C", Addison-Wesley Professional, 4th Edition, 2014.
2. B. A. Forouzan, R. F. Gillberg, "C Programming and Data Structures", Cengage Learning, India, 3rd Edition, 2014.

Reference Books:

1. W. Kernighan Brian, Dennis M. Ritchie, "The C Programming Language", PHI Learning, 2nd Edition, 1988.
2. Yashavant Kanetkar, "Exploring C", BPB Publishers, 2nd Edition, 2003.
3. E. Balagurusamy, "Programming in ANSI C", Mc Graw Hill Education, 6th Edition, 2012.
4. Schildt Herbert, "C: The Complete Reference", Tata Mc Graw Hill Education, 4th Edition, 2014.
5. R. S. Bichkar, "Programming with C", Universities Press, 2nd Edition, 2012.
6. Dey Pradeep, Manas Ghosh, "Computer Fundamentals and Programming in C", Oxford University Press, 2nd Edition, 2006.

XIV. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Lecture No	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1 – 2	Introduction to Computers: computer systems, computing environments.	CLO 1	T2:1.1-1.2
3 – 4	Computer languages, creating and running programs, program development.	CLO 1	T2:2.1-2.2
5 – 6	Algorithms, flowcharts	CLO 2	T2:1.4-1.5
7 – 8	Introduction to C Language: background, C programs.	CLO 3	T2:2.1-2.2
9 – 10	Identifiers, data types, Input/output, variables, constants, Operators (arithmetic, relational, logical, bitwise etc).	CLO 3	T2: 2.3- 2.6,7
11 – 12	Expressions, precedence and associativity, expression evaluation, type conversions	CLO 6	T2:3.1-3.5
13 – 14	Statements - selection statements (making decisions) – if statement, switch statement.	CLO 7	T2: 5.2-5.3
15 – 16	Repetition statement (loops)-while, dowhile statements, for statements, loop examples	CLO 7	T2: 6.1-6.6
17 – 18	Other statements related to looping – break, continue, go to, simple C program examples.	CLO 7	T2: 6.7
19 – 20	Arrays- Concepts, using arrays in C, declaration and initialization of one dimensional array, C program example. Two dimensional arrays, initialization and accessing, multi dimensional arrays, C program example.	CLO 8	T2: 8.1-8.3,8.7-8.8
21-22	Strings – Strings concepts: String handling functions, array of strings, C program examples.	CLO 8	T2: 11.1-11.5
23-- 24	Functions- Need for user defined functions, function declaration, function prototype. Category of functions, inter function communication, function calls, parameter passing mechanisms.	CLO 9	T2: 4.1-4.5
25	Recursion, passing arrays to functions, passing strings to functions, Storage classes and preprocessor commands.	CLO 10	T1:7 T2:6.9 T2:G.1
26-27	Pointer basics, pointer arithmetic, pointers to pointers, generic pointers. Pointer applications-Arrays and pointers, pointer arithmetic and arrays, passing an array to a function.	CLO 12	T1:1.0
28 – 29	Array of pointers, pointers and arrays, pointers as functions arguments, functions returning pointers	CLO 12	T2:10.3-10.5
30 – 31	Structures – declaration, initialization, accessing structures, operations on structures.	CLO 13	T1:8
32 – 33	Complex structures, structures and functions, passing structures through pointers, self-referential structures.	CLO 13	T2: 12.3-12.4
34 – 35	Unions, C programming examples, Bit fields, typedef, enumerations.	CLO 13	T2:12.4 T2:12.1- 12.2
36 -- 38	Dynamic memory allocation: Basic concepts, library functions	CLO 13	T2:2.1-2.2
39 – 40	Files: Concept of a file, streams, types of files and file opening modes.	CLO 14	R3:12.1-12.3
41 – 42	File input/output functions (standard input/output functions for files).	CLO 14	R3:12.4

Lecture No	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
43 – 44	File status functions (error handling), positioning functions, C program examples.	CLO 15	R3:12.5
45	Command-line arguments.	CLO 15	R3:12.7

XV. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S No	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	Updating latest version and new features of the C language	Laboratory Sessions	PO5	PSO2
2	Familiarizing the role of C language in developing system level programs.	Assignments / Industrial visits	PO1,PO2	PSO2
3	Familiarizing different areas where C language can be used.	Seminars	PO12	PSO3
4	Solving different problems and Practicing various debugging strategies to become a good programmer	Extra Lab Sessions, Participating in Coding contests	PO2	PSO3

Prepared by:
N Jayanthi, Assistant Professor

HOD, CSE