

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Computer Programming and Data Structures

(Code: 3336303)

Diploma Programmes in which this course is offered	Semester in which offered
Agriculture Engineering	Third Semester

1. RATIONALE

This Course intends to develop programming skills in the students, using a popular structured programming language 'C'. The students will learn step by step procedure (i.e. flowcharting & Algorithm) of any program development process. Development of application systems and software that use underlying architecture of machines efficiently and effectively requires the ability to use and manipulate various types of Data Structures and other constructs. This being a fundamental ability which is language neutral yet requires use of a language for its implementation.

2. LIST OF COMPETENCIES

The course content should be taught and implemented with the aim to develop the following competencies.

- i. Develop Simple Programs using 'C' Language
- ii. Implementing Linear Data Structure in 'C' Language

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			C	ESE	PA	ESE	PA	200
1	0	4	5	70	30	40	60	

Legends: L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit; ESE - End Semester Examination; PA - Progressive Assessment.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA terminology)	Topics and Sub-topics
Unit-I Basics of 'C'	Introduction to High-level Language and Problem Solving Techniques	1.1 Concepts of Programming Methodology
	Structure of 'C' Program	1.2 Flowcharts and Algorithms
	Building and Executing Expression	1.3 Character set, 'C' Tokens, Keywords and Identifiers, Constants
		1.4 Primary Data Types and User Defined Data Types
		1.5 Variable, Type casting and Different types of Operators in 'C' (scope and visibility of variable)
		1.6 Evaluation of Arithmetic and Logical Expressions
Unit-II Pre-processor Directives and Branching Looping	Use of Header Files	2.1 Introduction to directives, Standard Input Output Predefined streams
	Input Output Functions	2.2 Formatted and Unformatted Input Output
	Develop program using Decision making statements in 'C' Language	2.3 Input Output Functions : Scanf(), Printf(), Getch(), Putch(), Gets(), Puts()
		2.4 Decision Statements 2.4.1 If...Else Statement 2.4.2 Nested If...Else 2.4.3 Ladder Statement 2.4.4 Break, Continue and Go to statement 2.4.5 Switch Statement
		2.5 Loop Control Statement 2.5.1 For Loop 2.5.2 Nested For Loop 2.5.3 While Loop 2.5.4 Do..While Loop
Unit-III Introduction to Array, Pointers and Functions	Declaration and Defining Array	3.1 Declaration and Initialization of One-Dimensional and Two-Dimensional Array
	Character Array and Functions	3.2 Declaration and Initialization of Character Array and String Functions (strcmp, strcat, strlen,strupr, strlwr, strrev)
	Introduction to Features of Pointer	3.3 Built-in and User Defined functions
	Develop and Execute	3.4 Passing Arguments and Returning

	programs by writing and using Functions	Values 3.4.1 Call By Value 3.4.2 Call By Reference 3.4.3 Recursion
		3.5 Declaring and Initialization of Pointer
Unit-IV Basic Concepts of Derived Data types and Linear Data Structure	Introduction to Derived Data Types	4.1 Declaration and Initialization of Structure and Union
	Implementing Stack, Queue and Linked List	4.2 Declaration and Initialization of Stack and its Operations
		4.3 Declaration and Initialization of Queue
		4.4 Introduction to Linked List

5. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY)

UNIT	UNIT TITLE	TEACHING HOURS	DISTRIBUTION OF THEORY MARKS			
			R Level	U Level	A Level	Total Marks
1	Basics of 'C'	8	4	5	2	11
2	Pre-processor Directives and Branching Looping	6	4	6	10	20
3	Introduction to Array, Pointers and Functions	7	4	6	10	20
4	Basic Concepts of Derived Data types and Linear Data Structure	7	5	5	9	19
	TOTAL	28	17	22	31	70

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's Taxonomy)

6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (THEORY)

The exercises/practical/experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency. Following is the list of Exercises/practical/experiments for guidance.

Sr.no	Practical	No. Of Practical	Allotted Hours
1	Familiarizing with Turbo C ID	1	2
2	Building an executable version of C Program	1	2
3	Debugging a C Program	1	2
4	Develop and execute simple programs	2	4
5	Write a program to convert days into months and days.	1	2

6	Write a program that reads two nos. from key board and gives their addition, subtraction, multiplication, division and modulo.	1	2
7	Develop program using Decision making statements in 'C' Language.	3	6
8	Develop program using Looping statements in 'C' Language.	3	6
9	Write a program to select & print the largest of the three nos. using Nested-If-Else statement.	1	2
10	Develop program using one dimensional and two dimensional array.	2	2
11	Develop program using various Character Array and String Functions.	4	2
12	Program to print Patterns. (1) 1 2 3 4 5 (2) AAAAA 2 3 4 5 BBBB 3 4 5 CCC 4 5 DD 5 E	2	4
13	Develop program using structures and union.	2	4
14	Develop program using User defined functions.	2	2
15	Develop program using Local Global and External Variables.	1	2
16	Write a program using pointers.	1	2
17	Write a program to implement stack.	1	2
18	Implementing push/pop functions	1	2
19	Write a program to implement queue.	1	2
20	Developed Linked lists in C language.	1	2
21	Write a program to implement Insertion and Deletion Operation in data structure.	1	2
	Total	33	56

7. SUGGESTED LEARNING RESOURCES

A. Reference Books

- Programming in ANCI, By: C, E.Balagurusamy
- The C Programming Language By: Brian W. Kernighan, Dennis M. Ritchie
- Introduction to data structure in C , By: Ashok N. Kamthane
- Data Structure and Algorithms, By: Aho A.V, J.E. Hopcroft, J.D Ullman Addison-Wesley 1983
- Algorithms Design and Analysis, By: Horowitz, E. , S. Sahni
- Fundamentals of Data Structures in PASCAL, By: Horowitz, E. , S. Sahni

B. List of Major Equipment/ Instrument

Computer System with latest configuration and memory

C. List of Software/Learning Websites

- Introduction to C Programming Language, <http://www.learnonline.com/2010/03/introduction.html>
- Comp.lang.C Frequently Asked Questions, <http://www.c-faq.com>

- C Tutorial, <http://www.cprogramming.com/tutorial/c-tutorial.html>

8. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

Coordinator and Faculty Members from NITTTR Bhopal