# UNIVERSITY OF CALICUT

**THENHIPALAM, CALICUT UNIVERSITY P.O**

# SYLLABUS

**FOR**

# COMPUTER SCIENCE (COMPLEMENTARY)

**(CHOICE BASED CREDIT AND SEMESTER SYSTEM)**

**UNDER THE**

# FACULTY OF SCIENCE

**FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2014 – 15 ONWARDS**

## BOARD OF STUDIES IN COMPUTER SCIENCE (UG)

**THENHIPALAM, CALICUT UNIVERSITY P.O**
**KERALA, 673 635, INDIA**
**JUNE, 2017**

# REGULATIONS

**FOR**

# COMPUTER SCIENCE - COMPLEMENTARY
## (CHOICE BASED CREDIT AND SEMESTER SYSTEM)

## EFFECTIVE FROM THE ACADEMIC YEAR 2017-18

## COURSE EVALUATION

Total marks for each complementary course, including lab course, shall be 80 marks.

The evaluation scheme for each course shall contain two parts (1) Internal evaluation (2) external evaluation

16 marks shall be given to the internal evaluation. The remaining 64 marks shall be for the external evaluation.

## INTERNAL EVALUATION

16 marks in each course, including lab, are for internal examinations.

The internal assessment shall be based on a predetermined transparent system involving written test, assignments, seminars and attendance in respect of theory courses and on test/record/viva/attendance in respect of lab courses.

Components with percentage of marks of Internal Evaluation of Theory Courses are:

| | | |
|---|---|---|
| Test paper | – | 8 Marks |
| Attendance | – | 4 Marks |
| Assignment/Seminar/Viva | – | 4 Marks |

Components with percentage of marks of Internal Evaluation of Lab Courses are:

| | | |
|---|---|---|
| Test paper | – | 8 Marks |
| Attendance | – | 4 Marks |
| Assignment/Lab involvement | – | 4 Marks |

Attendance of each course will be evaluated as below:

| | | |
|---|---|---|
| Above 90% attendance | – | 4 Marks |

| | | |
|---|---|---|
| 85 to 89% | – | 3 Marks |
| 80 to 84% | – | 2 Marks |
| 76 to 79 % | – | 1.5 Marks |
| 75% | – | 1 Marks |

(If a fraction appears in the final internal marks awarded, nearest whole number is to be taken)

To ensure transparency of the evaluation process, the internal assessment marks awarded to the students in each course in a semester shall be notified on the notice board at least one week before the commencement of external examination. There shall not be any chance for improvement for internal marks. The course teacher(s) shall maintain the academic record of each student registered for the course, which shall be forwarded to the University by the college Principal after obtaining the signature of both course teacher and HOD.

The marks secured for internal examination only need be sent to university, by the colleges concerned.

## EXTERNAL EVALUATION:

There shall be University examinations for each course at the end of each semester.

Practical examinations shall be conducted by the University at the end of fourth semester.

External evaluation carries 64 Marks, for each course.

External evaluation of even (2 and 4) semesters will be conducted in centralized valuation camps immediately after the examination. Answer scripts of odd semester (1 and 3) examination will be evaluated by home valuation. All question papers shall be set by the university.

The model of the question paper for external examination (theory courses) of 3 Hrs. duration shall be:

1. **Section A**: 9 compulsory objective type questions (MCQ/fill in the blank/ matching/one word/etc) of 1 mark each (**Total 9Marks**)

2. **Section B:** 5 compulsory short answer type questions of 2 Marks each (either a single question or can have subdivisions) **(Total 10 Marks)**

3. **Section C:** 5 short essay type questions of 5 Marks each, to be attempted from a set of 8 questions – at least one question from each unit (either a single question or can have subdivisions**) (Total 25 Marks)**

4. **Section D:** 2 long essay type questions of 10 Marks each, to be attempted from a set of 3 questions (either a single question or can have subdivisions) **(Total 20 Marks)**

The external examination in theory courses is to be conducted with question papers set by external experts. The evaluation of the answer scripts shall be done by examiners based on a well-defined scheme of valuation and answer keys shall be provided by the University. The external examination in practical courses shall be conducted by two examiners, one internal and an external, appointed by the University.

The model of the question paper for external examination (lab courses) of 3 Hrs. duration shall be:

1. **Section A**: One marked question of 25 Marks from Programming Lab Part A (C Programming) is to be attempted (Design - Algorithm/Flowchart/Interface: 5 Marks, Code: 10 Marks and Result: 10 Marks. **Total 25 Marks**)
2. **Section B**: One marked question of 25 Marks from Programming Lab Part B (VB.NET Programming) is to be attempted (Design - Algorithm/Flowchart/Interface: 5 Marks, Code: 10 Marks and Result: 10 Marks. **Total 25 Marks**)
3. **Section C**: Lab viva voce (**Total 10 Marks**)
4. **Section D**: Lab Record (**Total 4 Marks**)

## REVALUATION:

In the new system of grading, revaluation is permissible. The prevailing rules for revaluation are applicable. Students can apply for photocopies of answer scripts of external examinations. Applications for photocopies/scrutiny/revaluation should be submitted within 10 days of publication of results. The fee for this shall be as decided by the university.

## IMPROVEMENT COURSE

A maximum of two courses (Common, Core, Complementary or Open) can be improved in each semester. Improvement of a particular semester can be done only once. The student shall avail the improvement chance in the succeeding year after the successful completion of the semester concerned. The internal marks already obtained will be carried forward to determine the grades/marks in the improvement examination. If the candidate fails to appear for the improvement examination after registration, or if there is no change in the results of the improvement examination appeared, the marks/grades obtained in the first appearance will be retained.

Improvement and supplementary examinations cannot be done simultaneously.

## EVALUATION AND GRADING

Mark system is followed instead of direct grading for each question (for both internal and external examinations). For each course in the semester letter grade, grade point and % of marks are introduced in 7- point indirect grading system. The grading on the basis of a total internal and

external mark will be indicated for each course and for each semester and for the entire programme.

Indirect Grading System in 7 point scale is as below:

| **% of Marks** | **Grade** | **Interpretation** | **Grade Point (G)** | **Range of Grade Points** | **Class** |
|---|---|---|---|---|---|
| 90 and above | A+ | Outstanding | 6 | 5.5 to 6 | First class with distinction |
| 80 to below 90 | A | Excellent | 5 | 4.5 to 5.49 | |
| 70 to below 80 | B | Very Good | 4 | 3.5 to 4.49 | First class |
| 60 to below 70 | C | Good | 3 | 2.5 to 3.49 | |
| 50 to below 60 | D | Satisfactory | 2 | 1.5 to 2.49 | Second class |
| 40 to below 50 | E | Pass/Adequate | 1 | 0.5 to 1.49 | Pass |
| Below 40 | F | Failure | 0 | 0 to 0.49 | Fail |

An aggregate of E grade with 40% marks (after external and internal put together) is required in each course for a pass and also for awarding a degree.

Appearance for Internal Assessment (IA) and End Semester Evaluation (ESE-external)) are compulsory and no grade shall be awarded to a candidate if she/he is absent for IA/ESE or both. For a pass in each course 40% marks or E grade is necessary

A student who fails to secure a minimum grade for a pass in a course is permitted to write the examination along with the next batch.

After the successful completion of a semester, Semester Grade Point Average (SGPA) of a student in that semester is calculated using the formula given below. For the successful completion of a semester, a student should pass all courses. However, a student is permitted to move to the next semester irrespective of SGPA obtained.

The Semester Grade Point Average can be calculated as

i.e.

where G1, G2, … are grade points of different courses; C1, C2, ... are credits of different courses of the same semester and n is the total credits in that semester.

The Cumulative Grade Point Average (CGPA) of the student is calculated at the end of a programme. The CGPA of a student determines the overall academic level of the student in a programme and is the criterion for ranking the students. CGPA can be calculated by the following formula

The Cumulative Grade Point Average (CGPA) can be calculated as:

# ATTENDANCE

A student shall be permitted to appear for the semester examination, only if he/she secures not less than 75% attendance in each semester. Attendance shall be maintained by the concerned Department Condonation of shortage of attendance to a maximum of 9 days in a semester subject to a maximum of two times during the whole period of the degree programme may be granted by the University. Benefit of attendance may be granted to students who attend the approved activities of college/university with prior concurrence of the Head of the institution. Participation in such activities may be treated as presence in lieu of their absence on production of participation attendance certificate. It should be limited to a maximum of 9 days in a semester.

The condonation of shortage of attendance shall be granted according to the existing prescribed norms.

# CURRICULUM FOR B.Sc. COMPUTER SCIENCE

## (COMPLEMENTARY)

## (2017-18 ACADEMIC YEAR ONWARDS – AS PER THE CUCBCSSUG 2014 REGULATIONS)

| Total Courses: 5 | | | | Total Credits: 12 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Semester | Course No | Course Code | Course Title | Marks | | | Contact Hours | | | Credits |
| | | | | Internal | External | Total | Theory | Lab | Total | |
| 1 | 1 | CSC1C01 | Computer Fundamentals | 16 | 64 | 80 | 2 | 2 | 4 | 3 |
| II | 2 | CSC2C02 | Fundamentals of System Software, Networks & DBMS | 16 | 64 | 80 | 2 | 2 | 4 | 3 |
| III | 3 | CSC3C03 | Problem solving using C programming | 16 | 64 | 80 | 3 | 2 | 5 | 2 |
| IV | 4 | CSC4C04 | Data Structures Using C Programming | 16 | 64 | 80 | 3 | 2 | 5 | 2 |
| IV | 5 | CSC4C05 | Programming Lab: C & Data Structures | 16 | 64 | 80 | 0 | 0 | 0 | 2 |
| Total ( 5 Courses) | | | | | | 400 | | | | 12 |

# CSC1C01 – Computer Fundamentals

**Semester:**1
**Course Number**: 1
**Contact Hours:**2T+2L
**Number of Credits:**3
**Number of Contact Hours:**60
**Course Evaluation:**Internal – 16 Marks + External – 64 Marks

## Aim of the Course:

To impart the students with fundamental principles and operations of various units of computer and to impart them with the basic skill in application packages.

## Objectives of the Course:

To learn the basics of computer hardware units and how they work together
To acquire basic skill with office packages

## Prerequisites:

Background of the basic science at +2 level

## Course Outline

### UNIT I (6T+6L)

Number systems- Non-positional number systems and positional number systems (Binary, Octal and Hexadecimal), Converting from one number system to another- decimal to a new base, converting to decimal from another bases, converting from base other than ten to base other than ten, short cut method for converting from binary to octal, octal to binary, binary to hexadecimal and hexadecimal to binary, Computer Codes (BCD, EBCDIC, ASCII) error detecting and correcting codes, parity bit, Hamming Code, computer arithmetic ,importance of binary, binary addition and subtraction.

### UNIT II (6T+6L)

Boolean Algebra and Logic circuits- fundamental concepts of Boolean Algebra, postulates, Principle of duality, theorems of Boolean Algebra, Boolean functions, minimization, complement, canonicals forms, conversion between canonical forms. Logic Gates- AND, OR, NOT, NAND, NOR, XOR and XNOR, logic circuits, converting expression to logic circuit, universal NAND and NOR gates, Exclusive OR and equivalence functions, Design of Combinational circuits (Half Adder, Subtractor and Full Adder)

**UNIT III (6T+6L)**

Basic Computer Organization-Input Unit, Output Unit, Storage Unit (Direct, Sequential and Random Access), CPU organization, Control Unit (micro programmed and hardwired control), primary storage, memory hierarchy, storage locations and addresses, storage capacity, bit, byte, nibble, RAM, ROM, PROM and EPROM, cache memory, registers. Secondary storage devices (Magnetic tape, Hard disk and CD drive)

**UNIT IV (6T+6L)**

I/O devices - Input Devices-identification and its use, keyboard, pointing devices (mouse, touch pad and track ball), Video digitizer, remote control, joystick, magnetic stripes, scanner, digital camera, microphone, sensor, and MIDI instruments, Output Devices identification and its use, monitor, printer (laser, inkjet, dot-matrix), plotter, speaker, control devices (lights, buzzers, robotic arms, and motors)

**UNIT V (6T+6L)**

Planning a Computer program, purpose of program planning, algorithm, flowchart - symbols, sample flowcharts, advantages and limitations

**References:**

1. Pradeep K. Sinha and PritiSinha, Computer Fundamentals, BPB
2. Peter Nortorn, Introduction to Computer, TMH
3. Rajaraman, V, Fundamental of Computers, Prentice Hall India
4. B. Ram,Computer Fundamentals

## Lab List

**Word Processing**

- Paragraph formatting
- Newspaper style Document
- Table creation
- Mail merge
- Page formatting & printing

**Spreadsheet**

- Worksheet entries, including formulas
- Formatting cells
- Chart creation

- Functions

**Presentation Software**

- Creating presentation
- Animations
- Sound
- Inserting picture

## CSC3C02 – Fundamentals of System Software, Networks & DBMS

**Semester**: 2
**Course Number**: 2
**Contact Hours**: 2T+2L
**Number of Credits**: 3
**Number of Contact Hours**: 60
**Course Evaluation:** Internal – 16 Marks + External – 64 Marks

### Aim of the Course:

To impart the students with the basic concepts of system software, Computer Networks and Database.

### Objectives of the Course:

To learn the basic concepts of various system software
To learn the basics of Computer Networks
To learn the basics of Databases

### Prerequisites:

Background of the basic science at +2 level

### Course Outline

**UNIT I [6 T+6L]**

System software - classification of programming languages (Machine, assembly & High level), Characteristics and Comparison, language processors (Assembler, Interpreter and Compiler),

Operating Systems- Functions, types of OS (batch, multiprogramming, time sharing, real time and distributed)

**UNIT II [6 T+6L)**

Computer networks- goals of networking, network topologies, types of networks (LAN, MAN and WAN), network model, OSI model- 7 layers, Internet Layer- 5 layers, Communication Media-Guided (Twisted Pair, Coaxial Cable and Fiber Optic) and Unguided (microwave, satellite)

**UNIT III [6 T+6L]**

Database Management Systems-definition, structure of Database, data models (Record based Data model, Network model: - Basic Components, Record types, data types, links, relationships,Hierarchical model and Relational model)

**UNIT IV [6 T+6L]**

Structured query language - Create, insert, select, update, delete, alter, drop commands

**UNIT V [6 T+6L]**

HTML-hypertext, hyper media, understanding basic HTML tools- HTML editor, web browser, General structure of HTML document, different types of elements-doc type, comment element, structural element, HTML tags and attributes: <html>, <body>, <head>,
<title>, <h1>,... ,<h6>, <br>, <table>, <img>, <hr>, adding links, background image to the body, creating lists.

**References:**

1. P. K Sinha, Fundamentals of Computers
2. D. M Dhamdhere,Operating System: A concept based Approach
3. Behrouz A Forouzan, Data Communication & Networking, MC Graw Hill
4. Joel Sklar,Principles of Web Page Design, Vikas Publications

## Lab List

**HTML**

1. Simple HTML document creation
2. HTML document with tables
3. HTML document with various lists
4. HTML document with links to different parts of the same

5. documents and to separate documents

**MySQL**

1. Table creation
2. Data insertion and deletion
3. Data retrieval
4. Alteration of tables

## CSC2C03 – Problem Solving Using C Programming

**Semester**: 3
**Course Number**: 3
**Contact Hours**: 3T+2L
**Number of Credits**: 2
**Number of Contact Hours**: 76 Hrs.
**Course Evaluation:** Internal – Internal – 16 Marks + External – 64 Marks

### Aim of the Course:

To equip the students with the basic concepts of problem solving using computers.

### Objectives of the Course:

To learn the concepts of programming.
To learn the C language

### Prerequisites:

Background of the basic science at +2 level

### Course Outline

**UNIT I [9 T+6L]**

Introduction to C- Structure of C program, Character Set, Keywords, Identifiers, Data Types, Qualifiers, Variables, Declarations, Symbolic Constants, Expressions, Statements, Different Types of Operators (Arithmetic, Logical, Relational & Equality, Unary and Conditional), Operator Precedence and Associativity, Library Functions, Comments, I/O functions-( Formatted scanf() &printf(), getchar (), putchar (), getche(), gets(), puts())

**UNIT II [9 T+6L]**

Control Statements- Selection Statements (if, if-else, else if ladder, switch), iteration (while, do while, for), jumping (goto, break, continue), Nested Control Statements

**UNIT III [9 T+6L]**

Structured Data types - Arrays (One dimensional and Two Dimensional), Character and String Functions, Structure (Definition,Processing-period Operator), Union

**UNIT IV [9 T+6L]**

User defined Functions - Advantages, Definition, Accessing functions, formal and Actual Parameters, Recursion, Storage Classes- Automatic, External, Static and Register Variable, Argument Passing Mechanism

**UNIT V [10T+6L]**

Pointers and data files- Pointers, advantages, declaration, operations on pointers, pointers and one dimensional arrays, dynamic memory allocation. Data files (sequential), file handling functions (fopen(), fclose(), fputc(), fgetc(), fgets(), fputs(), fscanf(), fprintf()

**References:**


1. E Balagurusamy, *Programming in Ansi C*, Tata McGraw Hill
2. ByranGotfried, *Programming with C*, Schaum Series
3. Kezningham& Ritchie,*Programming in C*
4. YashvantKanetkar, *Let us C*, BPB publications
5. Mullish Cooper, *The spirit of C*, Jasco books
6. Herbert Schildt, *The Complete reference C*, Tata McGraw Hill


## CSC4C04 – Data Structure Using C

**Semester**: **4**

**CourseNumber: 4**

**ContactHoursperWeek:3**(3T+2L)

**NumberofCredits:2**

**NumberofContactHours**:76

**CourseEvaluation:**Internal – 16 Marks+External – 64 Marks

### Objective

Tointroducetheconceptofdatastructures
Tomakethestudentsawareofvariousdatastructures
Toequipthestudentsimplementfundamentaldatastructures

## Prerequisites

KnowledgeinCProgrammingLanguage

## CourseOutline

**Module I [10 T+6L]**

Primitive Data types & Abstract Data Types(ADT) - Introduction to data structures – definition - characteristics of data structures - categories of data structures – algorithm - space complexity and time complexity of an algorithm.

**Module II [6 T+6L]**

Arrays & Singly Linked Lists - 1D, 2D and Multi-dimensional arrays – operations on arrays - Sparse matrix Representation

**Module III [9 T+6L]**

Lists- Linked List- Definition –Creation- Operations ,Basics of Doubly Linked List, Circular Linked List, Header Linked List

**Module IV [11 T+6L]**

Stack & Queues – Definition & Operations on stack - Implementation of Stack using arrays and linked lists - Applications of Stacks - Polynomial Addition

Queues – Definition, Implementations of queue using arrays and linked lists – basics of Circular queue, Dequeue - Priority queues - Applications of queues.

**Module V [10 T+6L]**

Searching and Sorting: Searching: Linear search & Binary search. Sorting – Linear sort - Bubble sort - Selection sort - Insertion sort - Quick sort - Merge sort – Comparisons and implementations.

**TEXT BOOKS**

11. SeymourLipschutz, “DataStructures”,TataMcGraw-HillPublishingCompanyLimited,Schaum’sOutlines,NewDelhi.
12. YedidyanLangsam,MosheJ.Augenstein,andAaronM.Tenenbaum,

"DataStructuresUsingC",PearsonEducation.,NewDelhi.

13. HorowitzandSahani,
"FundamentalsofdataStructures",GalgotiaPublicationPvt.Ltd.,NewDelhi.

**REFERENCEBOOKS**

1. Trembley, J.P. And Sorenson P.G., "An Introduction to Data Structures With Applications", Mcgraw- Hill International Student Edition, New York.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Addison- Wesley, (An Imprint of Pearson Education), Mexico City.

# CSC4C05 – Programming Lab: C &Data structure

**Semester**: 4

**Course Number**: 5

**Number of Credits**: 2

**Course Evaluation**: Internal – 16 Marks + External – 64 Marks

**Aim of the Course:**

To provide practical skill in Programming

## Objectives of the Course:

To develop C Programming skills
To make the students equipped to solve mathematical or scientific problems using C
To learn how to implement various data structures.

## Prerequisites:

Background of the basic computing knowledge

## Course Outline

### LAB LIST

#### C programming

Write programs and draw flowchart to do the following

1. Find roots of a quadratic equation
2. Find the area and nature of a triangle
3. Find the sum of digits and reverse of a number
4. Find the factorial of a number
5. Find Sin(x)
6. Find Cos(x)
7. Display pyramid using '*'
8. Check for leap year
9. To display count of +ves, -ves and zeros in a set of N numbers
10. Find first n prime numbers
11. Find LCM and HCF of 2 numbers
12. To print Armstrong numbers within range

13. Evaluate the series $1 + x + x^2/2! + x^3/3! + \ldots. + x^n/n!$
14. Convert a decimal number to a new base
15. Find the decimal equivalent of a number(base other than 10)
16. Calculate percentage of marks obtained for N students appeared for examination in M subjects.
17. To calculate standard deviation of N numbers.
18. To merge two arrays
19. To find $N^{th}$ Fibonacci number
20. To find row and column totals of a matrix
21. Matrix addition, multiplication and transpose
22. To find the trace of a square matrix
23. To sort n numbers
24. Find the strings end with a particular character
25. Find the number of words in a given sentence
26. To check whether given string is palindrome or not
27. Swapping of two numbers using function
28. Reverse a string using recursion
29. Find the number of vowels in a string
30. To find length of a string using pointer
31. To count the occurrence of a word in a sentence.
32. To generate mark list of N students in a class using array of structures.
33. To insert an element at the correct position in a sorted array
34. To store and read from a text file
35. Write odd and even numbers into two files

**Data Structure Programming**

1. Sort a given list of strings
2. Reverse a string using pointers.
3. Search an element in a 1-dimensional array
4. Search an element in a 2-dimensiolnal array
5. Implement Pascals Triangle using 2-dimensional array.
6. Merge two sorted array into one sorted array.
7. Search an element in the array using recursive binary search.
8. Implement sparse matrix
9. Implement polynomial using arrays
10. Implement singly linked list of integers.
11. Delete an element from a singly linked list
12. Implement a doubly linked list of integers
13. Implement a circular linked list.
14. Implement polynomial using linked list

15. Addition of 2 polynomials
16. Implement Stack using array
17. Implement Stack using linked list
18. Implement Queue using array
19. Implement Queue using linked list
20. Implement linear sort
21. Implement bubble sort
22. Implement selection sort.
23. Implement insertion sort.
24. Implement quick sort.
25. Implement merge sort.

All lab works should be neatly recorded in a Laboratory Record Book in written form. However Program results can be pasted in the left hand side of the fare record. The laboratory record should have a minimum of:

- 20 lab exercises from C Programming
- 15 lab exercises from Data structure Programming

All students should maintain a rough record (observation note book) too, in which they write all the works to be carried out in the lab prior to his/her entry into the lab. He/She may also note down the i/p and o/p for program verification in the rough record.