# Thiagarajar College

(An Autonomous Institution Affiliated to Madurai Kamaraj University)
Re-Accredited with 'A' Grade by NAAC

## *Thirty Ninth Academic Council Meeting*

## Department of Computer Science

## Dr. Rm. Murugappan
### Dean – Curriculum Development

# THIAGARAJAR COLLEGE, MADURAI – 9
## (Re-Accredited with 'A' Grade by NAAC)
## Curriculum structure for
### B.Sc., CS, IT & BCA BBA & B.Com
## (For those who join in June 2020 and after)

| Category | Course | No. of Courses | Credit Distribution | Hrs/ Week | Total Credits |
|---|---|---|---|---|---|
| Part I | Tamil | 2 | 3 | - | 06 |
| Part II | English | 2 | 3 | - | 06 |
| | | **Sub Total** | | | **12** |
| Part III | Core | | | - | 84+2 |
| | Elect –Main | 2 | 5 | - | 10 |
| | Elect – Generic | 2+2 | 5 | - | 20 |
| | | **Sub Total** | | **-** | **116** |
| Part IV | **AECC** I &II Sem | I sem EVS II Sem. VE | 2 + 1 | 2 I &II Sem | 03 |
| | **NME** III & IV Sem | 2 | 2 | 2 III & IV Sem | 04 |
| | **SEC** V & VI Sem | 3 | 2 | 2 V & VI Sem | 04 |
| | | **Sub Total** | | **06** | **11** |
| | | **Total** | | | **139** |
| Part V | **NCC (Army &Navy)/ PE/ NSS / Rotaract/ Quality Circle/ Library/ SSL/ Nature Club/Value Education/ YRC / WSC** | | | | **1** |
| | | **Grand Total** | | | **140** |

AECC –     Ability Enhancement Compulsory Course
SEC   –     Skill Enhancement Course
NME   –     Non Major Elective
For Choice based credit system (CBCS)

- For NME every department offers two papers (one in each at III &IV semester)
- For SEC every department offer two papers for each course (Sem IV, V & VI)
- For Major elective there may be an option for choice.

| Semester | Courses |
|---|---|
| I | EVS |
| II | VE |
| III | NME |
| IV | NME |
| V | SEC |
| VI | SEC |

# B.Sc. Computer Science

## Programme Code - UCS

## (Aided & SF)

# Programme outcome-PO (Aligned with Graduate Attributes) - Bachelor of Science(B.Sc.,)

### Scientific Knowledge and Critical Thinking

Apply the knowledge of Life Science, Physical and Chemical Science, Mathematics, statistics, Computer science and humanities for the attainment of solutions to the problems that come across in our day-to-daylife/activities.

### Problem Solving

Identify and analyze the problem and formulate solutions for problems using the principles of mathematics, natural sciences with appropriate consideration for the public health, safety and environmental considerations.,

### Communication and Computer Literacy

Communicate the fundamental and advanced concepts of their discipline in written and oral form. Able to make appropriate and effective use of information and information technology relevant to their discipline

### 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.

### Ethical, Social and Professional Understanding

Commitment to principles, codes of conduct and social responsibility in order to behave consistently with personal respect. Acquire the responsibility to contribute for the personal development and for the development of the community. Respect the ethical values, social responsibilities and diversity.

### Innovative, Leadership and Entrepreneur Skill Development

Function as an individual, and as a member or leader in diverse teams and in multidisciplinary settings. Become an entrepreneur by acquiring technical, communicative, problem solving, intellectual skills.

# THIAGARAJAR COLLEGE, MADURAI – 9.

## (Re-Accredited with 'A' Grade by NAAC)

## DEPARTMENT OFCOMPUTER SCIENCE

**Vision:**

- To be frontier in educating Computer Science and to produce globally competent graduates with moral values committed to build a vibrant nation.

**Mission:**

- To strengthen the core competence in Computer Science through analytical learning.
- To produce successful graduates with personal and professional responsibilities and commitment to lifelong learning.
- To uplift innovative research in computer science to serve the needs of industry, government and society.

**Programme Educational Objective (PEO):**

Graduates will be able to

| | |
|---|---|
| PEO1 | Be employed successfully or continue their professional education. |
| PEO2 | Apply knowledge of computing, mathematics and basic sciences that are relevant and appropriate to the domain. |
| PEO3 | Use and develop skills as required for effective professional practices |
| PEO4 | Remain abreast in their profession and be leaders in our technologically vibrant society. |
| PEO5 | Lead a successful technical or professional career including supportive and leadership roles on multidisciplinary teams. |

**Programme Specific Outcome (PSO):-B.Sc., Computer Science**

On the successful completion of B.Sc., Computer Science the students will

| | |
|---|---|
| PSO1 | Develop the knowledge on principles of hardware and software aspects of computing systems. |
| PSO2 | Build up programming efficiency by designing algorithms and applying standard practices in software project development. |
| PSO3 | Apply knowledge on software development tools, software systems and open source platforms. |
| PSO4 | Perceive technical, practical and communicative skills among the students to face the industrial needs. |
| PSO5 | Create awareness on the current issues, latest trends in technological development and there by innovate new ideas and solutions to existing problems. |

# THIAGARAJAR COLLEGE, MADURAI – 9

## (Re-Accredited with "A" Grade by NAAC)

### DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc. Computer Science on or after June 2020)

| | | | | | | Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | **I SEMESTER** | | |
| Course | Code No. | Title of the paper | Hrs/wk | Crd. | Total Hrs | CIA | SE | TOT |
| Part 1 | U20P111C | இக்காலத் தமிழும் இடைக்காலத் தமிழும் | 5 | 3 | 75 | 25 | 75 | 100 |
| Part 2 | U20EN12 | English for Comm. I | 3 | - | - | - | - | - |
| Core 1 | UCS20C11 | Digital Computer Fundamentals | 5 | 4 | 75 | 25 | 75 | 100 |
| Core 2 | UCS20C12 | Programming in C | 5 | 4 | 75 | 25 | 75 | 100 |
| Allied I | UMA20GE11I | Mathematical Foundation for Computer Science | 5 | 5 | 75 | 25 | 75 | 100 |
| Core Lab1 | UCS20CL11 | C Programming Lab | 5 | 2 | 75 | 40 | 60 | 100 |
| EVS | U20ES11 | Environmental Studies | 2 | 2 | 30 | 15 | 35 | 50 |
| Total | | | 30 | 20 | | | | 650 |

**\*- English Examination will be held at end of the year**

| | | | | | | Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | **II SEMESTER** | | |
| Course | Code No. | Title of the paper | Hrs/wk | Crd. | Total Hrs | CIA | SE | TOT |
| Part 1 | U20P121C | சமயத் தமிழும் செவ்வியல் தமிழும் | 5 | 3 | 75 | 25 | 75 | 100 |
| Part 2 | U20EN12 | English for Comm. I | 3 | 6 | 45 | 25 | 75 | 100 |
| Core 3 | UCS20C21 | Web Technology | 5 | 4 | 75 | 25 | 75 | 100 |
| Core 4 | UCS20C22 | Computer Organization and Architecture | 5 | 4 | 75 | 25 | 75 | 100 |
| Allied -II | UMA20GE21I | Probability and Statistics | 5 | 5 | 75 | 25 | 75 | 100 |
| Core Lab2 | UCS20CL21 | Web Technology Lab | 5 | 2 | 75 | 40 | 60 | 100 |
| VE | U20VE21 | Value Education | 2 | 1 | 30 | 15 | 35 | 50 |
| Total | | | 30 | 25 | | | | 650 |

## III SEMESTER

| Course | Code No. | Title of the paper | Hrs/ wk | Crd | Total Hrs | Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | CIA | SE | TOT |
| Core 5 | UCS20C31 | Data structures and Algorithms | 5 | 4 | 75 | 25 | 75 | 100 |
| Core 6 | UCS20C32 | System Software | 5 | 4 | 75 | 25 | 75 | 100 |
| Core 7 | UCS20C33 | Relational Database Management Systems | 5 | 4 | 75 | 25 | 75 | 100 |
| Allied III | UMA20GE31I | Computational Methods | 5 | 5 | 75 | 25 | 75 | 100 |
| NME I | UCS20NE31 | Software Development | 2 | 2 | 30 | 15 | 35 | 50 |
| Core Lab 3 | UCS20CL31 | Data structures Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| Core Lab 4 | UCS20CL32 | SQL and PLSQL Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| Total | | | 30 | 23 | | | | 650 |

## IV SEMESTER

| Course | Code No. | Title of the paper | Hrs/ wk | Crd. | Total Hrs | Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | CIA | SE | TOT |
| Core 8 | UCS20C41 | Programming in Java | 6 | 5 | 75 | 25 | 75 | 100 |
| Core 9 | UCS2042 | Computer Graphics | 6 | 5 | 75 | 25 | 75 | 100 |
| Allied IV | UMA20GE41I | Operations Research | 5 | 5 | 75 | 25 | 75 | 100 |
| NME II | UCS20NE41 | Internet Applications | 2 | 2 | 30 | 15 | 35 | 50 |
| Core Lab5 | UCS20CL41 | Java Programming Lab | 6 | 2 | 90 | 40 | 60 | 100 |
| Core Lab6 | UCS20CL42 | Graphics Lab | 5 | 2 | 75 | 40 | 60 | 100 |
| Total | | | 30 | 21 | | | | 600 |

## V SEMESTER

| Course | Code No. | Title of the paper | Hrs/Wk | Crd. | Total Hrs | CIA | SE | TOT |
|---|---|---|---|---|---|---|---|---|
| Core 10 | UCS20C51 | Automata Theory | 5 | 4 | 75 | 25 | 75 | 100 |
| Core 11 | UCS20C52 | Software Engineering | 5 | 4 | 75 | 25 | 75 | 100 |
| Core 12 | UCS20C53 | Programming in Python | 4 | 4 | 60 | 25 | 75 | 100 |
| Core 13 | UCS20C54 | Operating Systems | 5 | 4 | 75 | 25 | 75 | 100 |
| Core Elective-I | UCS20CE51 | Core Elective - I | 5 | 5 | 75 | 25 | 75 | 100 |
| SEC – I | UCS20SE51 | Skill Enhancement Course – I | 2 | 2 | 30 | 15 | 35 | 50 |
| Core Lab7 | UCS20CL51 | Python Programming Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| Total | | | 30 | 25 | | | | 650 |

## VI SEMESTER

| Course | Code No. | Title of the paper | Hrs/wk | Crd. | Total Hrs | CIA | SE | TOT |
|---|---|---|---|---|---|---|---|---|
| Core 14 | UCS20C61 | Computer Networks | 5 | 4 | 75 | 25 | 75 | 100 |
| Core 15 | UCS20C62 | Open Source Technology | 4 | 4 | 60 | 25 | 75 | 100 |
| Core 16 | UCS20C63 | Cloud Computing | 5 | 4 | 75 | 25 | 75 | 100 |
| Core Elective-II | UCS20CE61 | Core Elective- II | 5 | 5 | 75 | 25 | 75 | 100 |
| SEC II | UCS20SE61 | Skill Enhancement Course – II | 2 | 2 | 30 | 15 | 35 | 50 |
| Core Lab 8 | UCS20CL61 | Open Source Technology Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| Project | UCS20PJ61 | Project & Viva Voce | 5 | 4 | 75 | 25 | 75 | 100 |
| Part V | | NCC/NSS/PE | | 1 | | | | |
| Total | | | 30 | 26 | | | | 650 |

**List of Electives**

**Core Electives**

- Data Mining and Warehousing
- Multimedia Systems
- Artificial Intelligence
- E-Commerce Technologies

**Skill Enhancement  Courses**

- Office Automation
- Android Programming
- PHP Programming
- .Net Programming
- Linux Programming
- jQuery Scripting
- XML Programming

# THIAGARAJAR COLLEGE, MADURAI – 9

## (Re-Accredited with "A" Grade by NAAC)

## DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc. Computer Science on or after June 2020)

**Programme Code: UCS**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UCS20C11 | Digital Computer Fundamentals | Core-1 | 4 | 1 | - | 4 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| I | I | 25 | 75 | 100 |

**Preamble**

It aims to train the student to the basic concepts of Digital Computer Fundamentals. To impart the in-depth knowledge of logic gates, Boolean algebra, combinational circuits and sequential circuits.

**Course Outcomes**

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| CO1 | Illustrate the basic idea about number systems and to learn conversion from one number system to another number system. | K3 |
| CO2 | Build simple logic circuits using Basic gates and Universal Logic gates. | K3 |
| CO3 | Analyze various data processing circuits. | K1 |
| CO4 | Explain characteristics of Flip-Flops and Registers | K2 |
| CO5 | Analyze various Types of Counters and Memory | K2 |

**K1-Knowledge          K2-Understand          K3-Apply**

**Mapping of COs with PSOs**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | - | - | - | M |
| CO2 | S | - | - | - | L |
| CO3 | M | - | - | S | - |
| CO4 | S | - | - | M | - |
| CO5 | S | - | - | - | L |

**S-STRONG          M-MEDIUM          L-LOW**

**Mapping of COs with POs**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| CO1 | M | S | - | L | - | L |
| CO2 | M | S | - | - | - | - |
| CO3 | S | M | - | - | - | - |
| CO4 | S | - | - | - | - | M |
| CO5 | S | - | - | - | - | L |

**S-STRONG          M-MEDIUM          L-LOW**

| | CA | | End of Semester |
|---|---|---|---|
| | First | Second | |
| *Knowledge-K1* | 40% | 40% | 40% |
| *Understand-K2* | 40% | 40% | 40% |
| *Apply-K3* | 20% | 20% | 20% |

**Content**

## UNIT - I                                                                                     15 Hours

### Number systems and codes

Binary Number System- Binary to decimal Conversion - Decimal to binary Conversion - Octal Numbers - Hexadecimal Numbers - The ASCII code – The Excess-3 Code - The Gray Code.

### Digital Logic

The Basic gates-NOT, OR, AND - Universal logic gates  NOR, NAND - AND OR Invert Gates- Positive and   Negative logic.

## UNIT – II                                                                                     15 Hours

### Combinational Logic Circuits

Boolean Laws and Theorems - Sum of Products method - Truth table to Karnaugh Map - Pairs, Quads, and Octets –Karnaugh Simplifications - Don't care Conditions- Product of sums Method -     Product of sums Simplification.

### Arithmetic Circuits

Binary Addition - Binary Subtraction - Unsigned Binary Numbers – Sign Magnitude  Numbers - 2's Complement Representation - 2's Complement Arithmetic - Arithmetic Building Blocks - The Adder - subtracter.

## UNIT-III                                                                                     15 Hours

### Data Processing Circuits

Multiplexers - Demultiplexers - 1 of 16 Decoder – BCD to decimal Decoders - Seven segment Decoders - Encoders - Exclusive OR Gates - Parity Generators and Checkers.

## UNIT - IV                                                                                     15 Hours

### Flip-Flops

RS FLIP FLOPs - Gated FLIP-FLOPs - Edge-triggered RS FLIP-FLOPs -Edge-triggered D FLIP-FLOPs - Edge-triggered JK FLIP-FLOPs - FLIP-FLOP Timing.

### Registers

Types of Registers – Serial In – serial Out – Serial In – parallel Out - Parallel In- serial Out – Parallel In – parallel Out.

## UNIT-V                                                                                     15 Hours

### Counters

Asynchronous Counters - Decoding Gates - Synchronous Counters – Changing the  Counter Modulus - Decade Counters.

**Memory:**

Basic Terms and Ideas- Magnetic Memory- Optical Memory- Memory Addressing-  ROMs, PROMs, and  EPROMs- RAMs

## Text Book

1. Donald P.Leach, Albert Paul Malvino, Goutam Saha, 5th reprinted 2013,  **Digital Principlesand application,** 7e, McGraw Hill Edition.

## Refernces

1. M.Morris Mano, 2004, Digital Logic and computer design, Prentice - Hall of India.
2. Ronald J.Tocci, 2007, Digital System Principles and Application, Prentice - Hall of India.
3. T.C.Bartee, Digital Computer Fundamentals, 6th Edition, Tata McGraw Hill,

## Web Resources

1. https://www.tutorialspoint.com/digital_circuits/This tutorial is meant to provide the readers to know how to analyze and implement the combinational circuits and sequential circuits.
2. https://www.electronics-tutorials.ws/sequential/seq_5.htmlThe tutorial about **Sequential Logic Circuits**, we will look at connecting together data latches to produce another type of sequential logic circuit called a *Shift Register* that are used to convert parallel data into serial data and vice versa.

## Chapters

Unit - I :  5.1 to 5.8,  2.1 to 2.4,

Unit – II : 3.1 to 3.8,  6.1 to 6.8

Unit - III : 4.1 to 4.8

Unit – IV : 8.1 to 8.6,  9.1 to 9.5

Unit - V :, 10.1 to 10.5, 13.1 to 13.6

## Course Designer

**Mrs. SM. Valli  ,  Dr.K.Palaniammal**

# THIAGARAJAR COLLEGE, MADURAI – 9

## (Re-Accredited with "A" Grade by NAAC)

## DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc. Computer Science on or after June 2020)

### Programme Code:UCS

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UCS20C12 | Programming in C | Core-2 | 4 | 1 | - | 4 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| I | I | 25 | 75 | 100 |

## Preamble

This course is designed to introduce the power of three decade old programming language and rendering basic programming concepts and leads to learn other language with ease and promotes to be a successful program developer to meet IT needs.

## Course Outcomes

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| CO1 | Illustrate the procedural paradigm with tokens, variables, operators and Library functions. | K2 |
| CO2 | Demonstrate the concept of control statements. | K2 |
| CO3 | Reveal the concept of functions and storage classes. | K2 |
| CO4 | Know the concept of array, strings and structures. | K3 |
| CO5 | Know the importance of pointers and files | K2 |

**K1-Knowledge**          **K2-Understand**          **K3-Apply**

## Mapping of COs with PSOs

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | - | - | - | M |
| CO2 | S | - | - | - | L |
| CO3 | M | - | - | S | - |
| CO4 | S | - | - | M | - |
| CO5 | S | - | - | - | L |

**S-STRONG**          **M-MEDIUM**          **L-LOW**

## Mapping of COs with POs

|      | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|------|-----|-----|-----|-----|-----|-----|
| CO1  | S   | M   | -   | -   | -   | -   |
| CO2  | -   | -   | M   | M   | L   | -   |
| CO3  | -   | S   | -   | M   | M   | -   |
| CO4  | -   | S   | -   | -   | M   | M   |
| CO5  | -   | M   | S   | M   | -   | L   |

**S-STRONG**          **M-MEDIUM**          **L-LOW**

## Blooms taxonomy

|               | CA | | End of Semester |
|---------------|-------|--------|-----------------|
|               | First | Second |                 |
| *Knowledge-K1* | 40%  | 40%   | 40%             |
| *Understand-K2* | 40% | 40%   | 40%             |
| *Apply-K3*     | 20%  | 20%   | 20%             |

## Content

### UNIT - I          Overview of C and Data types                          19 hours

C fundamentals Character set - Identifier and keywords - data types - constants - Variables - Declarations - Expressions - Statements - Arithmetic, Unary, Relational and logical, Assignment and Conditional Operators - Library functions.

### UNIT - II          Decision Making and Branching statements                          21 hours

Data input output functions - Simple C programs - Flow of control - if, if-else, while, do-while, for loop, Nested control structures - Switch, break and continue, go to statements

### UNIT - III          Arrays and String                          12 hours

Functions -Definition - proto-types - Passing arguments - Recursions. Storage Classes - Automatic, External, Static, Register Variables.

### UNIT - IV          Function and Structure                          12 hours

Arrays - Defining and Processing - Passing arrays to functions - Multi-dimension arrays - Arrays and String. Structures - User defined data types - Passing structures to functions – Unions.

### UNIT - V          Pointers and File                          11 hours

Pointers - Declarations - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Structures and Pointers - Files: Creating Processing, Opening and Closing a data file- Input/output operations in file.

## Text Book

E.Balagurusamy, 2012, Programming in ANSI C, 6th edn, McGraw Hill Publishing Company Ltd, New York

## Reference Books

1. B.W. Kernighan and D M.Ritchie,1988 "The C Programming Language", 2nd Edition, PHI,

2. H. Schildt,2000 "C: The Complete Reference", 4th Edition. TMH Edition.

3. Gottfried B.S,1996 "Programming with C", Second Edition, TMH Pub. Co. Ltd., New Delhi.

4. Kanetkar Y.,1999 "Let us C", BPB Pub., New Delhi,.

## Chapters(Relevant Topics Only)

| | |
|---|---|
| Unit -I | : 1.1, 1.2 ,2.2 to 2.8,2.11,2.12, 3.1 to 3.16 |
| Unit –II | : 4.1 to 4.5, 5.1 to 5.9, 6.2 to 6.4 |
| Unit –III | : 9.1to 9.16, 9.18 ,9.19 |
| Unit –IV | : 7.1  to 7.7, 9.17, 8.1 to 8.8,10.1 to 10.5,10.8 to 10.11 |
| Unit –V | : 11.1 to 11.6, 11.10 to 11.16, 12.1 to 12.3 |

## Web Resources

1. https://www.tutorialspoint.com/cprogramming/This site provides better online content regarding Programming in C

2. https://www.programiz.com/c- programming   This site is well organized and easy to understand Programming in Ctutorials with lots of examples

## Course Designer

**Dr.K.Natarajan , Mrs.J.Uma , Mr.R.Chandrasekar**

# THIAGARAJAR COLLEGE, MADURAI - 9.

## (Re-Accredited with „A‟ Grade by NAAC)
## DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc. Computer Science on or after June 2020)

**Programme Code:UCS**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UCS20CL11 | C Programming Lab | Core lab-1 | - | - | 6 | 3 |

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| I | I | 40 | 60 | 100 |

## Preamble

This lab course is designed to understand the power of three decade old programming language concepts and features and leads to learn other language with ease and promotes tosurvive in IT field

## Course Outcomes

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| CO1 | Outline the logic using flowchart for a given problem and develop programs using conditional and looping statements | K3 |
| CO2 | Develop programs with implementation of arrays, functions and parameter passing techniques. | K1 |
| CO3 | Develop programs with string handling functions | K3 |
| CO4 | Construct programs with features of Structure. | K2 |
| CO5 | Gain skills to write file programs and perform various operations | K3 |

**K1-Knowledge**      **K2-Understand**      **K3-Apply**

## Mapping of COs with PSOs

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | M | - | - | - | - |
| CO2 | - | - | M | - | - |
| CO3 | - | - | M | - | - |
| CO4 | - | - | M | M | - |
| CO5 | - | - | M | M | - |

**S-STRONG**      **M-MEDIUM**      **L-LOW**

## Mapping of COs with POs

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|-----|-----|-----|-----|-----|-----|-----|
| CO1 | M   | M   | -   | -   | -   | -   |
| CO2 | -   | M   | -   | M   | -   | -   |
| CO3 | -   | -   | -   | L   | M   | -   |
| CO4 | -   | S   | -   | M   | M   | -   |
| CO5 | -   | -   | -   | -   | M   | L   |

## Content

**Simple programs:**

1. Simple interest
2. Find the biggest from two numbers -ordinary /switch case/conditional operator methods
3. Find the biggest from three given numbers
4. Check a given no is odd or even –ordinary/switch case/conditional operator methods
5. Print all prime numbers between any two given limit
6. Perform various arithmetic operations using switch case
7. Find the sum of digits of a given no
8. Binary to decimal- Decimal to binary conversion

**Arrays:**

1. Arrange "n" strings in alphabetical order
2. Counting the number of vowels, consonants, words, digits in a line of text.
3. Reverse a string and check for palindrome.
4. Substring detection, count and removal.
5. Finding and replacing substrings
6. Matrix addition/ subtraction/multiplication
7. Transpose and trace of a Matrix

**Function and Structure:**

1. Find GCD of two numbers by recursion
2. Print Fibonacci series by recursion
3. Mark list processing- Structure and call by value technique
4. EB bill calculation- Structure and call by reference technique

**Searching and Files:**

1. Linear Search
2. Binary Search
3. Create a data file to store „n‟ numbers and separate odd and even numbers.
4. Create a data file to store „n‟ characters and separate vowel and non-vowels.

## Web Resources

https://www.tutorialspoint.com/cprogramming/

https://www.programiz.com/c-programming

https://www.geeksforgeeks.org/c-language-set-1-introduction/

## Course designer:

**Dr.K.Natarajan,   Mrs.J.Uma,   Mr.R.Chandrasekar**

https://www.tutorialspoint.com/cprogramming/

https://www.programiz.com/c-programming

# THIAGARAJAR COLLEGE, MADURAI – 9

## (Re-Accredited with "A" Grade by NAAC)

## DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.A., B.Sc., B.Com., B.B.A., B.C.A on or after June 2020)

**Programme Code: UCS**

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| U20ES11 | **Environmental Studies** | AECC1 | 2 | - | - | 2 |

| Year | Semester | Int. Marks | Ext.Marks | Total |
|---|---|---|---|---|
| First | First | 15 | 35 | 50 |

## Preamble

Students acquire knowledge on the basic concepts, components and importance of environment.

On the completion of the course the student will be able to

## Course Outcomes

| | Course outcomes | Knowledge Level |
|---|---|---|
| **CO1** | Define the structure and functions of ecosystem | K1 |
| **CO2** | Explain the benefits of biodiversity conservation | K2 |
| **CO3** | Summarise the sources, effects and control measures of various types of Pollutants | K1 |
| **CO4** | Perceive the environment legislations in India for sustainable development. | K3 |
| **CO5** | Elaborate the impact of environmental problems on life systems | K3 |

**K1:Knowledge**　　　　**K2:Understand**　　　　**K3:Apply**

## Mapping of Course Outcomes with Programme SpecificOutcomes

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| **CO1** | L | L | M | L | M |
| **CO2** | --- | M | M | --- | M |
| **CO3** | --- | L | M | L | L |
| **CO4** | --- | --- | L | L | L |
| **CO5** | S | - | L | M | M |

**S-STRONG**　　　　**M- MEDIUM**　　　　**L-LOW**

## Mapping of Course Outcomes with Programme Outcomes

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|-----|-----|-----|-----|-----|-----|-----|
| CO1 | S   | S   | L   | S   | S   | -   |
| CO2 | S   | M   | L   | M   | L   | L   |
| CO3 | S   | S   | L   | S   | M   | L   |
| CO4 | S   | S   | L   | M   | S   | S   |
| CO5 | S   | M   | -   | S   | S   | S   |

## Blooms taxonomy: Assessment Pattern

|            | CA | | End of |
|------------|-------|--------|----------|
|            | First | Second | Semester |
| *Knowledge* | 40% | 40% | 40% |
| *Understand* | 40% | 40% | 40% |
| *Apply* | 20% | 20% | 20% |

## Course Title: Environmental Studies

### Unit I

Definition and Scope of Environmental Studies – Ecology and Ecosystem – Structure of an Ecosystem – Food chains, food webs and ecological pyramids – Causes of Biodiversity Loss – Benefit and Conservation of Biodiversity

### Unit II

Environmental problems and Management: Causes, effects and Control measures of : Air PSOllution – Water Pollution – Noise pollution – Nuclear Hazards. Solid waste management and Waste Disposal methods. Climate change and Global Warming causes and Measures. Waste and Plastics. Urban environmental problems and measures. Environmental Legislations in India. Sustainable development and Inclusive growth.

**Text Book**

1. Kanagasabai, C.S. 2005.Environmental Studies. Rasee publishers. Madurai.

**Reference Books**

1. Yogendra, N. and Srivastava, N. 1998. Environmental PSOllution, Ashish Publishing House. New Delhi.

2. Sapru R.K.2001. Environment Management in India, Vol. I & Vol. II Ashish publishers house, New Delhi.

# THIAGARAJAR COLLEGE, MADURAI – 9.

## (Re-Accredited with „A" Grade by NAAC)
## DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc., Computer Science in 2020 and after)

**Programme Code:UCS**

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UCS20C21 | Web Technology | Core4 | 4 | 1 | - | 4 |

| Year | Semester | Int. Marks | Ext.Marks | Total |
|---|---|---|---|---|
| First | Second | 25 | 75 | 100 |

## Preamble

This course is designed to be familiar with the roles, methodologies, and best practices of designing and developing modern websites. Students will take part in the entire production cycle of websites from information gathering to designing layout to development utilizing HTML, CSS, and JavaScript web applications.

## Course Outcomes

On the completion of the course the student will be able to

| Course | Course Outcome | Knowledge Level |
|---|---|---|
| CO1 | Demonstrate page layout, color schemes, contract, and typography in the designs. | K1 |
| CO2 | Write valid and concise code for webpage. | K3 |
| CO3 | Demonstrate knowledge of artistic and design components that are used in the creation of a web site. | K2 |
| CO4 | Design dynamic websites that meet specified needs andinterests. | K3 |
| CO5 | Select appropriate HTML, CSS, and JavaScript codefrom public repositories that enhances the experience ofweb application design | K3 |

## Mapping of Cos with PSOs

| | PO1 | PO2 | PO3 | PO4 | PO5 |
|---|---|---|---|---|---|
| CO1 | S | M | - | - | - |
| CO2 | - | S | - | - | - |
| CO3 | - | S | M | - | - |
| CO4 | S | - | M | L | - |
| CO5 | - | - | S | M | L |

**S-STRONG**　　　　**M-MEDIUM**　　　　**L-LOW**

## Mapping of Cos with Pos

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|------|------|------|------|------|------|------|
| CO1 | S | M | - | - | - | L |
| CO2 | - | S | M | - | - | - |
| CO3 | - | - | M | - | - | S |
| CO4 | S | - | M | L | - | - |
| CO5 | - | - | S | M | L | S |

**S-STRONG**          **M-MEDIUM**          **L-LOW**

## Blooms taxonomy

|  | CA | | End of |
|------|------|------|------|
|  | First | Second | Semester |
| *Knowledge-K1* | 40% | 40% | 40% |
| *Understand-K2* | 40% | 40% | 40% |
| *Apply-K3* | 20% | 20% | 20% |

## Content

### UNIT – I                                                    15 Hours

Structuring Documents for the Web: Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups. Links and Navigation: Basic Links, Creating Links with the <a> Element, Advanced E- mail Links. Images, Audio, and Video: Adding Images Using the <img> Element, Using Images as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your web pages.

### UNIT – II                                                    15 Hours

Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables.  Forms: Introducing Forms, Form Controls, Sending Form Data to the Server. Frames:  Introducing Frameset, <frame> Element, Creating Links Between Frames, Setting a Default Target Frame Using <base> Element, Nested Framesets, Inline or Floating Frames with <iframe>.

### UNIT – III                                                    15 Hours

Cascading Style Sheets: Introducing CSS, Where you can Add CSS Rules. CSS Properties: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the Box Model. More Cascading Style Sheets: Links, Lists, Tables, Outlines, The :focus and :activate Pseudo classes Generated Content, Miscellaneous Properties, Additional Rules, Positioning and Layout wit, Page Layout CSS , Design Issues.

### UNIT – IV                                                    15 Hours

Java Script: How to Add Script to Your Pages, Variables and Data Types – Statements and Operators, Control Structures, Conditional Statements, Loop Statements – Functions – Message box, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes.

**UNIT – V**                                                                    **15 Hours**

Working with JavaScript: Practical Tips for Writing Scripts, JavaScript Objects: Window Object – Document object – Browser Object – Form Object – Navigator object Screen object – Events, Event Handlers, Forms – Validations, Form Enhancements, JavaScript Libraries.

**Text Book**

Jon Duckett, Beginning HTML, XTML, CSS and Java script ,Wiley Publishing

**Chapters**

| Unit | Chapters / Sections |
|------|---------------------|
| I    | 1,2,3               |
| II   | 4,5,6               |
| III  | 7,8,9,10            |
| IV   | 11                  |
| V    | 12                  |

**Reference Book**

1.Chris Bates, "Web Programming", Wiley Publishing 3d Edition.

2. M. Srinivasan, "Web Technology: Theory and Practice", Pearson Publication

**Web Resources:**

http://www.tutorialspoint.com/html/ This site provides better online content regarding html and serves as best skill developer on webpages.

http://www.w3schools.com/html/This site is well organized and easy to understand web building tutorials with lots of examples

https://www.javatpoint.com/ This tutorial designed for beginners and professionals to learn about javascript.

**Course designers**

 **Mrs.A.M.Hema,    Mr.J.Prakash,  Mrs.G.Nalini**

# THIAGARAJAR COLLEGE, MADURAI – 9.

## (Re-Accredited with „A Grade by NAAC)

## DEPARTMENT OF COMPUTER SCIENCE

(For those joined in 2020 and after)

**Programme Code: UCS**

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UCS20C22 | Computer Organization and Architecture | Core 4 | 4 | 1 | - | 4 |

| Year | Semester | Int. Marks | Ext.Marks | Total |
|---|---|---|---|---|
| First | Second | 25 | 75 | 100 |

## Preamble

This course is to acquire knowledge about computer hardware basics and organization. It helps to understand the function and design of individual units in a computer and interaction among these components.

## Course Outcomes

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| CO1 | Explain the organization of basic computers, its design and the design of control unit. | K1 |
| CO2 | Demonstrate the working of central processing unit. | K2 |
| CO3 | Describe the operators and language of the registers transfer, micro operations and input / output Organization. | K1 |
| CO4 | Explain the organization of memory and memory management hardware. | K2 |
| CO5 | Elaborate advanced concepts of computer architecture parallel processing, inter process communication and synchronization. | K1 |

**K1 – Knowledge**                **K2    - Unerstand**                **K3 – Apply**

## Mapping of Cos with PSOs

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| **CO1** | M | - | - | - | - |
| **CO2** | S | - | - | M | - |
| **CO3** | L | L | L | - | - |
| **CO4** | S | - | - | M | - |
| **CO5** | S | - | - | L | S |

**S-STRONG**                **M-MEDIUM**                **L-LOW**

## Mapping of COs with POs

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| **CO1** | M | M | - | - | - | M |
| **CO2** | S | - | - | M | - | - |
| **CO3** | L | L | L | - | - | - |
| **CO4** | S | - | - | M | - | M |
| **CO5** | S | - | - | L | S | M |

**S-STRONG          M-MEDIUM          L-LOW**

## Blooms taxonomy

|  | CA | | End of |
|---|---|---|---|
|  | **First** | **Second** | **Semester** |
| *Knowledge-K1* | 40% | 40% | 40% |
| *Understand-K2* | 40% | 40% | 40% |
| *Apply-K3* | 20% | 20% | 20% |

## Content

### Unit-I -Basic Computer Organization:                15hrs

Instruction codes -Computer Registers-Computer Instructions -Timing and control -Instruction cycle -Memory reference instructions -Input, Output and Interrupt -Complete Computer Description.

### Unit –II -CPU:                                         15hrs

General register organization -Design of arithmetic logic shift unit -Stack organization –

Instruction formats -Addressing modes -Data transfer and manipulation -Program control.

### Unit-III -Computer Arithmetic:                        15hrs

Hardware implementation and Algorithm for Addition, Subtraction, Multiplication, Division

-Booth multiplication algorithm -Floating point Arithmetic operations -Decimal Arithmetic unit and Operations.

### Unit-IV -I/O and Memory Organisation:                 15hrs

Input-output interface -Direct memory access -Input-Output processor –Memory Hierarchy –

Main memory -Associative memory -Cache memory – Virtual memory.

**Unit-V -Advanced Processing:**                                                        **15hrs**

RISC, CISC characteristics -Parallel Processing -Pipelining -Arithmetic pipeline -Instruction pipeline -Vector Processing -Array processors –Multiprocessors-Interconnection structures.

## Text Book

M.Morris Mano, 2013, Computer System Architecture, 3$^{rd}$ed, PearsonPrintice Hall

| Units | Chapter |
|-------|---------|
| I | 5.1 to 5.8 |
| II | 8.1 to 8.7,4.7 |
| III | 10.1 to 10.7 |
| IV | 11.2 , 11.6, 11.7, 12.1, 12.2, 12.4 to 12.6 |
| V | 8.8, 9.1 to 9.4,9.6, 9.7, 13.1, 13.2 |

## Reference Books

1.V.CarlHamacher, ZvoknoG.Vranesic, SafwatG.Zaky,2008, Computer organization, 4$^{th}$ed, Tata Mc-Graw Hill

.

## Web Resources:

1. https://www.tutorialspoint.com/parallel_computer_architecture/   - This site provides better online content regarding parallel computer architecture, models, multiprocessors and synchronization.

2.  https://lecturenotes.in/subject/9/computer-organisation-and-architecture-coa– This is COA study material and hand written notes by engineering students of various notes.

3.  https://www.computer-pdf.com/tutorials-computer-architecture-textbook  -Textbook for computer architecture in pdf file provides detail description about architecture, processor design etc.

## Course designers

**Dr. U.Jeyasutharsan ,  Mrs.G.Nalini**

# THIAGARAJAR COLLEGE, MADURAI – 9.

## (Re-Accredited with „A" Grade by NAAC)

### DEPARTMENT OF COMPUTER SCIENCE

(For those joined in B.Sc., Computer Science on 2020 and after)

**Programme Code: UCS**

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UCS20CL21 | Web Technology Lab | Core Lab2 | - | - | 3 | 2 |

| Year | Semester | Int. Marks | Ext.Marks | Total |
|---|---|---|---|---|
| First | Second | 40 | 60 | 100 |

## Preamble

This course is designed to introduce computer science students to the roles, methodologies, and best practices of designing and developing modern websites. Students will take part in the entire production cycle of websites from information gathering to designing layout to development utilizing HTML, CSS, and JavaScript web applications.

## Course Outcomes

On the completion of the course the student will be able to develop websites by their own.

| COs | Course Outcome | Knowledge Level |
|---|---|---|
| CO1 | Construct the List tags and its attributes<br>Construct the Table t tags and its attributes | K1 |
| CO2 | Build programs with Form tag and its attributes, transition and transformation. | K2 |
| CO3 | Develop code on CSS embedded style settings ,<br>colors and positioning elements. | K3 |
| CO4 | Experiment programs with box model and layout. | K3 |
| CO5 | Demonstrate the implementation of JavaScript array objects and JavaScript String objects. | K3 |

**K1 - Knowledge          K2 - Understand          K3 – Apply**

## Mapping of COs with PSOs

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | - | M | - | M |
| CO2 | - | M | S | - | - |
| CO3 | - | M | L | - | M |
| CO4 | M | - | L | - | M |
| CO5 | - | - | S | M | M |

**S – STRONG          M – MEDIUM          L - LOW**

## Mapping of COs with POs

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| CO1 | M | M | - | - | - | M |
| CO2 | S | - | - | M | - | - |
| CO3 | L | L | L |  | - | - |
| CO4 | S | - | - | M | - | M |
| CO5 | S | - | - | L | S | M |

## Content

1. Illustrate LIST tag and its attributes.
2. Illustrate TABLE tag and its attributes.
3. Illustrate nested Table.
4. Illustrate FORM tag and its Elements.
5. Illustrate FRAME tag and its attributes.
6. Nested Frame
7. Link , email and submit attributes with form and frame tag.
8. Illustrate inline CSS.
9. Illustrate CSS – Text formatting styles
10. CSS external style setting.
11. Illustrate CSS colors and positing elements.
12. Demonstrate box layout.
13. Demonstrate page layout.
14. Deploy web page for mobile layout.
15. Simple program in JavaScript to illustrate IF and IF..ELSE statement.
16. Simple program in JavaScript to illustrate FOR statement.
17. Simple program in JavaScript to illustrate While statement.
18. Simple program in JavaScript to illustrate function.
19. Simple program in JavaScript to illustrate Array objects.
20. Simple program in JavaScript to illustrate Number objects
21. Simple program in JavaScript to illustrate String objects
22. Simple program in JavaScript to illustrate Date objects
23. Simple program in JavaScript to illustrate Math objects
24. Simple program in JavaScript to illustrate events.
25. Form validation using JavaScript
26. Illustrate JavaScript Library.

## Course designer

**Mrs.A.M.Hema,  Mr.J.Prakash,   Mrs.G.Nalini**

# THIAGARAJAR COLLEGE, MADURAI – 9.

## (Re-Accredited with 'A' Grade by NAAC)

## VALUE EDUCATION

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| U20VE21 | Value Education | AECC2 | 2 | - | - | 1 |

| Year | Semester | Int. Marks | Ext.Marks | Total |
|---|---|---|---|---|
| First | Second | 15 | 35 | 50 |

## Preamble

Students acquire knowledge on the basic concepts, components and importance of environment.

## Course Outcomes

**On the completion of the course the student will be able to**

| | Course outcomes | Knowledge Level |
|---|---|---|
| CO1 | Define the values, Self assessment and values needed for self development | K1 |
| CO2 | Explain about the good character and good relationships | K2 |
| CO3 | Summarize the types of thoughts, developing thought pattern, external influences on thoughts | K1 |
| CO4 | Find out the causes of Illusions, Symptoms and stages of stress | K3 |

**K1: Knowledge    K2: Understand    K3: Apply**

## Mapping of  Course Outcomes with Programme Specific Outcomes

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | L | - | M | - | - |
| CO2 | - | L | M | L | - |
| CO3 | M | M | S | - | - |
| CO4 | - | - | M | L | - |

## Mapping of Course Outcome with Programme Outcomes

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO6 |
|---|---|---|---|---|---|---|
| CO1 | L | - | M | - | - | - |
| CO2 | - | L | M | L | - | L |
| CO3 | M- | M | S | - | - | - |
| CO4 | - | - | M | L | - | M |

## Blooms taxonomy: Assessment Pattern

|  | CA | | End of Semester |
|---|---|---|---|
|  | First | Second |  |
| *Knowledge* | 40% | 40% | 40% |
| *Understand* | 40% | 40% | 40% |
| *Apply* | 20% | 20% | 20% |

## Course Title: Value Education

**Unit I**

**Self Development** – Introduction - Definition and Types of Values – Self Assessment – Values needed for self development - Values needed for family life –Principles of happy living

**Character development**- Good character – Good relationships - Legendary people of highest character – The quest for character –Developing character -The key to good character.

**Unit II:**

**Positive Thinking and Self Esteem -** Types of thoughts - Areas of thinking - Developing thought pattern - External influences on Thoughts - Methods to keep outlook positive – Meaning of Self Esteem – Self empowerment.

**Stress free living** – Illusions and causes - Symptoms and stages of stress – Self confidence– Role models and leadership qualities – Critical thinking - Communication skills – Happy and successful life.

**Reference:**

**Study material / Course material**

1. Values for Excellence in Life Compiled by then Curriculum Development Cell Thiagarajar College, Madurai, in collaboration with the Education wing, Brahma Kumaris, Madurai.

# M.Sc. Computer Science
## Programme Code - PCS

# THIAGARAJAR COLLEGE, MADURAI – 9.
## (Re-Accredited with 'A' Grade by NAAC)
## Curriculum Structure for PG

| Semester | Category | No. of Courses | Credit Distribution |
|---|---|---|---|
| I | Core | --- | 18 |
| | Elective | 1 | 5 |
| II | Core | --- | 18 |
| | Elective | 1 | 5 |
| III | Core | --- | 18 |
| | Elective | 1 | 5 |
| IV | Core | --- | 18 |
| | Project | 1 | 3 |
| Total Credits | | | 90 |

**For Choice Based Credit System (CBCS)**
- **Choices should be offered for Elective Courses**
- **Total Credits for Core Courses 72**
- **Total Credits for Elective Courses 18 (3 Electives + 1 Project)**

# Programme outcome-PO (Aligned with Graduate Attributes)-Master of Science (M.Sc.,)

## Knowledge

Acquire an overview of concepts, fundamentals and advancements of science across a range of fields, with in-depth knowledge in at least one area of study. Develop focused field knowledge and amalgamate knowledge across different disciplines.

## Complementary skills

Students will be able to engage in critical investigation through principle approaches or methods and through effective information search and evaluation strategies. Employ highly developed conceptual, analytical, quantitative and technical skills and are adept with a range of technologies;

## Applied learning

Students will be able to apply disciplinary or interdisciplinary learning across multiple contexts, integrating knowledge and practice. Recognize the need for information; effectively search for, evaluate, manage and apply that information in support of scientific investigation or scholarly debate;

## Communication

Communicate effectively on scientific achievements, basic concepts and recent developments with experts and with society at large. Able to comprehend and write reports, documents, make effective presentation by oral and/or written form.

## Problem solving

Investigate, design and apply appropriate methods to solve problems in science, mathematics, technology and/or engineering.

## Environment and sustainability

Understand the impact of the solutions in ethical, societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

## Teamwork, collaborative and management skills

Recognise the opportunities and contribute positively in collaborative scientific research. Engage in intellectual exchange of ideas with researchers of other disciplines to address important research issues

**THIAGARAJAR COLLEGE – AUTONOMOUS MADURAI – 625 009.**

**(Re-Accredited With 'A' Grade by NAAC)**
**Department of Computer Science**

**M.Sc. Computer Science**

**(For those joined M.Sc. Computer Science on or after June 2020)**

**Vision**

To be frontier in educating Computer Science and to produce globally competent

Post graduates with moral values committed to build a vibrant nation.

**Mission**

- To strengthen the core competence in Computer Science through analytical learning.
- To produce successful post graduates with personal and professional responsibilities and commitment to lifelong learning.
- To uplift innovative research in computer science to serve the needs of industry, government and society.

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

| PEO1 | Graduates are prepared to acquire broad knowledge of Computer Science and a focused understanding of their area of interest. |
|------|--------|
| PEO2 | Graduates will gain the ability to work effectively as a team member and/or leader in dynamic professional environment. |
| PEO3 | Graduates will be capable to take up research programmes. |
| PEO4 | Graduates are prepared to survive in rapidly changing technology and engage in life-long learning. |
| PEO5 | Graduates work effectively in multi-disciplinary and multi-cultural environments by respecting professionalism and ethical practices within organization and society at national and international level. |

## PROGRAMME SPECIFIC OUTCOMES: (PSO)

| PSO1 | Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems. |
|------|--------|
| PSO2 | Assess to understand the structure and development methodologies of software systems. |
| PSO3 | Possess professional skills and knowledge of software design process. |
| PSO4 | Familiarity and practical competence with a broad range of programming language and open source platforms. |
| PSO5 | Be at ease with the contemporary issues, latest trends in technological development and there by innovate new ideas and solutions to existing problems. |

**THIAGARAJAR COLLEGE – AUTONOMOUS MADURAI – 625 009.**
**(Re-Accredited With „A" Grade by NAAC)**
**Department of Computer Science**
**M.Sc. Computer Science**
**(For those joined M.Sc. Computer Science on or after June 2020)**
**Course Structure**

**A)**   **Consolidation of Contact Hours and Credits : PG**

| Semester | Contact Hrs / Week | Credits |
|---|---|---|
| I. | 30 | 23 |
| II. | 30 | 23 |
| III. | 30 | 23 |
| IV. | 30 | 21 |
| Total | 120 | 90 |

**B)**   **Curriculum Credits**

| | |
|---|---|
| Core | 72 Credits |
| Major Electives | 18 Credits |

# THIAGARAJAR COLLEGE – AUTONOMOUS MADURAI – 625 009.
## (Re-Accredited With "A" Grade by NAAC)
## DEPARTMENT OF COMPUTER SCIENCE
## (For those joined M.Sc. Computer Science on or after June 2020)
## M.Sc. Computer Science
## Course Structure

| Code No. | Type of Paper | Title of the paper | Hrs/ wk | Crd . | Total Hrs | Total | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | CA | SE | TOT |
| PCS20C11 | Core 1 | Design and Analysis of Algorithm | 5 | 4 | 75 | 25 | 75 | 100 |
| PCS20C12 | Core 2 | Compiler Design | 5 | 4 | 75 | 25 | 75 | 100 |
| PCS20C13 | Core 3 | Advanced Java Programming | 5 | 4 | 75 | 25 | 75 | 100 |
| PCS20CE11 | Elective | Elective Paper -I | 5 | 5 | 75 | 25 | 75 | 100 |
| PCS20CL11 | Core lab1 | Lab in Algorithm | 5 | 3 | 75 | 40 | 60 | 100 |
| PCS20CL12 | Core lab2 | Lab in Advanced Java Programming | 5 | 3 | 75 | 40 | 60 | 100 |
| | | Total | 30 | 23 | 450 | 180 | 420 | 600 |

**I SEMESTER** (header above first table)

| Code No. | Type of Paper | Title of the paper | Hrs/ wk | Crd . | Total Hrs | Total | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | CA | SE | TOT |
| PCS20C21 | Core 4 | Distributed Operating System | 5 | 4 | 75 | 25 | 75 | 100 |
| PCS20C22 | Core 5 | Advanced DBMS | 5 | 4 | 75 | 25 | 75 | 100 |
| PCS20C23 | Core 6 | Machine Learning | 5 | 4 | 75 | 25 | 75 | 100 |
| PCS20CE21 | Elective | Elective Paper –II | 5 | 5 | 75 | 25 | 75 | 100 |
| PCS20CL21 | Core lab3 | Lab in Advanced DBMS | 5 | 3 | 75 | 40 | 60 | 100 |
| PCS20CL22 | Core lab4 | Lab in Machine Learning | 5 | 3 | 75 | 40 | 60 | 100 |
| | | Total | 30 | 23 | 450 | 180 | 420 | 600 |

**II SEMESTER** (header above second table)

| III SEMESTER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Code No. | Type of Paper | Title of the paper | Hrs/ wk | Crd . | Total Hrs | Total | | |
| | | | | | | CA | SE | TOT |
| PCS20C31 | Core 7 | Data Science with Big Data Analytics | 5 | 4 | 75 | 25 | 75 | 100 |
| PCS20C32 | Core 8 | Cryptography and Network Security | 5 | 4 | 75 | 25 | 75 | 100 |
| PCS20C33 | Core 9 | Advanced Web Technology | 5 | 4 | 75 | 25 | 75 | 100 |
| PCS20CE31 | Elective | Elective Paper -III | 5 | 5 | 75 | 25 | 75 | 100 |
| PCS20CL31 | Core lab5 | Lab in Data Science | 4 | 2 | 60 | 40 | 60 | 100 |
| PCS20CL32 | Core lab6 | Lab in Advanced Web Technology | 4 | 2 | 60 | 40 | 60 | 100 |
| PCS20MP31 | MPJ | Mini Project & Viva Voce | 2 | 2 | 30 | 40 | 60 | 100 |
| | | Total | 30 | 23 | 450 | 220 | 480 | 700 |
| IV SEMESTER | | | | | | | | |
| Code No. | Type of Paper | Title of the paper | Hrs/ wk | Crd . | Total Hrs | Total | | |
| | | | | | | CA | SE | TOT |
| PCS20C41 | Core 10 | Internet of Things | 6 | 6 | 90 | 25 | 75 | 100 |
| PCS20C42 | Core 11 | Object Oriented System Design | 6 | 6 | 90 | 25 | 75 | 100 |
| PCS20C43 | Core 12 | Web Services | 6 | 6 | 90 | 25 | 75 | 100 |
| PCS20PJ41 | PJ | Project & Viva Voce (Elective -IV) | 12 | 3 | - | 40 | 60 | 100 |
| | | Total | 30 | 21 | 270 | 115 | 285 | 400 |

**M.Sc. Computer Science**

**(For those joined M.Sc. Computer Science on or after June 2020)**

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**List of Electives – First Year only**

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1. Wireless Networks

2. Software Project Management

3. Security in Computing

4. Digital Image Processing

5. Cloud Computing

6. Data Mining

(For those joined M.Sc. Computer Science on or after June 2020)

**Programme Code - PCS**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20C11 | Design and Analysis of Algorithm | Core 1 | 5 | | | 4 |

L – Lecture     T – Tutorial     P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | First | 25 | 75 | 100 |

**Preamble**

Learn Problem solving in Computing applications effectively and Analyze the algorithmic procedure to demonstrate the computational complexity of the algorithms

**Prerequisite**

Basic Knowledge about data structure and algorithm

**Course Outcomes**

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| CO1 | Explain Basic Data structure and Analyze the Performance of an Algorithm | K1,K4 |
| CO2 | Divide the problem into small pieces and identify sorting and searching technique for a given problem | K2,K3 |
| CO3 | Solve Optimization based problems | K1,K3 |
| CO4 | Apply dynamic programming technique to solve the problem. | K3,K4 |
| CO5 | Discuss Advanced Tree and Graph Applications | K4,K5 |

**K1-Knowledge     K2-Understand     K3-Apply     K4- Analyze     K5- Evaluate**

**Mapping of Course Outcomes with Programme Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| CO1 | S | M | S | - | M | - | M |
| CO2 | S | M | S | M | - | - | S |
| CO3 | M | S | S | - | S | S | - |
| CO4 | - | M | S | M | M | - | M |
| CO5 | M | - | - | M | M | M | S |

## Mapping of Course Outcomes with Programme Specific Outcomes

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | - | - | - | - |
| CO2 | S | S | - | - | - |
| CO3 | - | M | S | - | - |
| CO4 | - | - | - | M | - |
| CO5 | - | - | - | M | S |

## Bloom's Taxonomy :Assessment Pattern

| Blooms taxonomy | | | |
|---|---|---|---|
|  | CA | | End of Semester |
|  | First | Second | |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | 60 | 60 | 150 |

## Content

**Unit I**                                                                                          15 hrs.

**Introduction:** Algorithm Definition – Algorithm Specification – Performance Analysis- Asymptotic Notations. Elementary Data Structures:  Stacks and Queues – Trees – Dictionaries – Priority Queues – Sets and Disjoint Set Union – Graphs

**Unit II**                                                                                         15 hrs.

**Divide and Conquer:** The General Method – Defective Chessboard –Binary Search – Finding The Maximum and Minimum – Merge Sort – Quick Sort – Selection - Strassen's Matrix Multiplication.

**Unit III**                                                                                        15 hrs.

**The Greedy Method:**  General Method - Container Loading - Knapsack Problem - Tree Vertex Splitting – Job Sequencing with Deadlines  - Minimum Cost Spanning Trees - Optimal Storage On Tapes – Optimal Merge Patterns - Single Source Shortest Paths.

**Unit IV**                                                                                        15 hrs.

**Dynamic Programming:** The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees - String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Cected Components and Spanning Trees
– Biconnected Components and DFS.

**Unit V**                                                                                         15 hrs.

**Backtracking:** The General Method – The 8-Queens Problem – Sum of Subsets –  Graph Coloring –  Hamiltonian Cycles –  Knapsack Problem Branch and Bound: Least Cost search - 0/1 Knapsack Problem.

1. Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition

**Chapters**
Unit I : Chapter 1.1,1.2,1.3.4,2.1,2.2,2.3,2.4,2.5,.6
Unit II : Chapter 3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8
Unit III: Chapter 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9
Unit IV: Chapter 5.1 – 5.10,6.1-6.4
Unit V: Chapter 7.1-7.6,8.1,8.2

## References

1. Data Structures Using C - Langsam, Augenstien, Tenenbaum, PHI
2. Data structures and Algorithms, V.Aho, Hopcropft, Ullman , LPE
3. Introduction to design and Analysis of Algorithms - S.E.Goodman, ST. Hedetniem-TMH.
4. Carlos A.Coello Coello, Gary B.Lamont, David A.Van Veldhuizen, "Evolutionary Algorithms for Solving Multi-Objective Problems",Springer 2nd Edition, 2007.

## Web Resources

1. https://www.programiz.com/dsa/divide-and-conquer
   **(Divide and Conquer)**
2. https://www.youtube.com/watch?v=ARvQcqJ_-NY
   **(Greedy Method)**
3. https://www.youtube.com/watch?v=ewXklhesC-w
   **(Dynamic Programming Technique)**
4. https://www.hackerearth.com/practice/algorithms/dynamic-programming/introduction-to-dynamic-programming-1/tutorial/
   **(Dynamic Programming Problems)**
5. https://medium.com/educative/5-dynamic-programming-problems-and-solutions-for-your-next-coding-interview-ad938bce2351
   **(Problem Solving using Dynamic Programming)**

## Course Designer

**Mrs. T.S. Urmila**

## THIAGARAJAR COLLEGE, MADURAI – 9

### (Re-Accredited with "A" Grade by NAAC)

### DEPARTMENT OF COMPUTER SCIENCE

(For those joined M.Sc. Computer Science on or after June 2020)

**Programme Code - PCS**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20C12 | Compiler Design | Core 2 | 5 | | | 4 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | First | 25 | 75 | 100 |

**Preamble**

Discover Principles, algorithms and techniques that can be used to construct various phases of compiler. Acquire knowledge about finite automata and regular expressions, Learn context free grammars, compiler parsing techniques. Explore knowledge about Syntax directed definitions and translation scheme. Understand intermediate machine representations and actual code generation.

**Prerequisite:**

Basic knowledge about Computer Architecture

**Course Outcomes**

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Explain Lexical Analysis and Finite Automata concepts | K1,K5 |
| **CO2** | Describe the Basics of Syntax Analysis and Methodologies | K1,K3 |
| **CO3** | Analyse Semantic Analysis and applications of syntax directed applications | K3,K4 |
| **CO4** | Explain Intermediate Code Generation Concepts | K2,K4 |
| **CO5** | Describe Code Generation and Code optimization | K3,K4 |

**K1-Knowledge          K2-Understand          K3-Apply          K4- Analyze     K5- Evaluate**

**Mapping of Course Outcomes with Programme Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| **CO1** | S | S | S | M | S | - | M |
| **CO2** | M | M | S | M | S | - | - |
| **CO3** | M | M | S | S | S | M | M |
| **CO4** | M | M | S | - | M | - | M |
| **CO5** | - | M | - | M | M | M | - |

## Mapping of Course Outcomes with Programme Specific Outcomes

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | - | - | M | - |
| CO2 | M | S | - | M | M |
| CO3 | S | M | L | - | - |
| CO4 | S | M | L | - | - |
| CO5 | - | - | - | M | S |

## Bloom's Taxonomy :Assessment Pattern

| Blooms taxonomy | | | |
|---|---|---|---|
|  | CA | | End of Semester |
|  | First | Second | |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | **60** | **60** | **150** |

## Content

**Unit I**                                                                                                    15 hrs.

**Lexical analysis** -   Language Processors, The Structure of a Compiler,Parameter passing mechanism – Symbol table - The role of the lexical analyzer - Input buffering - Specification of tokens - Recognition of tokens – Finite automata - Regular expression to automata.

**Unit II**                                                                                                   15 hrs.

**Syntax Analysis** - The role of the parser - Context-free grammars - Writing a grammar - Top down Parsing - Bottom-up Parsing - LR parsers- LALR parsers.

**Unit III**                                                                                                  15 hrs.

**Semantic Analysis** - Inherited and Synthesized attributes – Dependency graphs – Ordering the evaluation of attributes – S- attributed  definitions – L-attributed  definitions – Applications of Syntax Directed translation – Syntax Directed translations schemes - Storage organization – Stack allocation of space.

**Unit IV**                                                                                                   15 hrs.

**Intermediate Code Generation**    - Variants of Syntax trees – Three Address code – Types and Declarations -  Translation of Expressions – Type checking - Control flow -  Back patching - Switch Statements - Procedure calls.

**Unit V**                                                                                                    15 hrs.

**Code Generation and Code Optimization** - Issues in the design of a code generator - The target language – Address in the Target Code – Basic Block and Flow graphs – Optimization of Basic Blocks  -   A simple code generator – Peephole Optimization.

## Text Book

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi and Jeffrey D. Ullman, "Compilers- Principles, Techniques and Tools", Second Edition, Pearson Education Asia, 2009

**Chapters:**
Unit I : Chapter 1.1,1.2,1.6.6,2.7,3.1,3.,3.3,3.4,3.6,3.7
Unit II : Chapter 4.1.1,4.2,4.3,4.4,4.5,4.6,4.7
Unit III: Chapter 5.1.1,5.2.1,5.2.2,5.2.3,5.2.4,5.3,5.4,7.1,7.2
Unit IV: Chapter 6.1,6.2,6.3,6.4,6.5,6.6,6.7,6.8,6.9
Unit V: Chapter 8.1,8.2,8.3,8.4,8.5,8.6,8.7

## References

1. A.V. Aho, Ravi Sethi, J.D. Ullman, Compilers - Principles, Techniques and Tools, Addison- Wesley, 2003.
2. Fischer Leblanc, Crafting Compiler, Benjamin Cummings, Menlo Park, 1988.
3. Kennath C.Louden, Compiler Construction Principles and Practice, Vikas publishing House, 2004.
4. Allen I. Holub, Compiler Design in C, Prentice Hall of India, 2001.
5. S.Godfrey Winster, S.Aruna Devi, R.Sujatha, "Compiler Design", yesdee Publishers, Third Reprint 2019.

## Web Resources

1. **https://www.tutorialspoint.com/compiler_design/compiler_design_lexical_analysis.htm#:~:text=Lexical%20analysis%20is%20the%20first,comments%20in%20the%20source%20code**. **(Lexical Analysis)**
2. **https://www.geeksforgeeks.org/introduction-to-syntax-analysis-in-compiler-design/ (Syntax Analysis)**
3. **https://www.geeksforgeeks.org/semantic-analysis-in-compiler-design/(Semantic Analysis)**
4. **https://www.slideshare.net/TasifTanzim/intermediate-code-generation-compiler-design (Intermediate Code Generation)**
5. **https://www.tutorialspoint.com/compiler_design/compiler_design_code_generation.htm (Code Generation)**

## Course Designer

**Mrs.T.S. Urmila**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20C13 | Advanced Java Programming | Core 3 | 5 | | | 4 |

| | L – Lecture | T – Tutorial | | P – Practical | |
|---|---|---|---|---|---|

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | First | 25 | 75 | 100 |

## Preample

world problem in a programmer's point of view and implement the concepts in real-time projects. To deepen student's programming skills by analyzing the real

## Prerequisite

Able to develop a Graphical User Interface (GUI) with Applet and Swing. Develop a Client Server Application with Database Maintenance.

## Course Outcome

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Explain the Java Frameworks and Patterns | K1,K2 |
| **CO2** | Build the Application using AWT Components | K2 |
| **CO3** | Describe the Networking in Java and JDBC | K2,K3 |
| **CO4** | Analyze about Server side programming JSP | K2,K3,K4 |
| **CO5** | Describe about Java Lambda and Jshell | K3,K4,K5 |

**K1-Knowledge      K2-Understand  K3-Apply      K4- Analyze      K5- Evaluate**

## Mapping of Course Outcome with Program Outcomes

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| **CO1** | S | S | M | M | S | - | M |
| **CO2** | M | M | S | - | M | M | S |
| **CO3** | S | M | S | M | S | M | S |
| **CO4** | M | M | S | - | M | - | S |
| **CO5** | M | M | M | - | M | - | - |

## Mapping of Course Outcome with Program Specific Outcomes

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | M | - | L | - | - |
| CO2 | - | S | L | M | M |
| CO3 | - | L | - | - | - |
| CO4 | M | S | - | - | - |
| CO5 | - | - | - | M | S |

## Blooms Taxonomy

| Blooms taxonomy | CA | | End of Semester |
|---|---|---|---|
|  | First | Second |  |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | **60** | **60** | **150** |

## Content

**Unit-I**

**Collections Modified:** Java-Collections Framework -The Interfaces in Collections Framework-The Collection Classes-Methods of Collection Interface-The ArrayList Class-The LinkedList Class-List Interface-ListIterator Interface-Java HashSet Class-LinkedHashSet Class-TreeSet Class-Java Queue Interface-PriorityQueue Class-The Array Dequeue Class-Map Interface-HashMap Class-TreeMap Class-Comparable Interface-Comparator Interface.**Patterns:** Design Patterns in Java-Classification of Design Patterns-Patterns Discussed in Detail-Factory Method Pattern-Prototype Design Pattern-Singleton Design Pattern in Java-Adapter Pattern-Proxy Pattern-Decorator Pattern-Command Pattern-Template Pattern-Mediator Pattern.

**Unit-II**

**Applet Basics Layout:** Basics of Applet-Life Cycle of an Applet-Display Methods in Applet-Passing Values Through Parameters-Displaying Images in Applet-Displaying Graphics in Applet-Java Dialog Box-Graphical User Interface-Layout Managers in Java. **AWT Component Class:** AWT Component Classes-Labels-Buttons-Checkboxes-CheckboxGroup- Choice Controls-Lists-Scrollbars-TextField-TextArea-MenuBar. **Event Handling with AWT Components:** Over view of Event Handling-Event Classes-Event Listener Interfaces-Handling MouseEvents-The KeyListener Interface.

**Unit-III**

**Networking in Java**-Java Socket Programming-Socket Class-Java URL Class-Java URL Connection Class-Http URL Connection Class-InetAddress Class. **JDBC:** Introduction to JDBC-JDBC-SQL Syntax-JDBC-Driver types-Steps Involved in JDBC Connection-JDBC-Statments,Prepared Statement and Callable Statement-JDBC-ResultSets-ResultSetMetaData-Transaction Management in JDBC.

**Unit-IV**

      **Servlets:** Introduction to Servlets-Servlet Packages-HttpServlet Class-Servlets-Exception Handling-Session Tracking in Servlets-Cookies in Servlet-Hidden Form Field-URL Rewriting-Servlet Request Interface-The ServletResponse Interface.**Server Side Programming-JSP:** Introduction to JSP-JSP Architecture-JSP Life Cycle-Components of a JSP page-JSP Comments-JSP Implicit Objects-ControlFlow Statements in JSP-JSP-Directives-JSP-Actions-Scope of JSP Variables-JSP-Implicit Objects-JSP-Exception Handling-JSP for Database Connectivity.

**Unit-V**

      **Java Lambda Expressions:** Introduction to Java Lambda-Functional Interface in Java Lambda-Method Reference in Java Lambda-Stream API in Java 8 - Optional Class in Java 8 -Nashorn in Java 8 - Base64 Encode and Decode in java 8. **JShell-(RPEL) in Java 9** - Collection Factory Methods in Java 9 – Private Interface in Java 9 -Dimond Operator for Anonymous Inner Class-Multiresolution Image API in Java 9.

| **Text Book** |
|---|

1. E Ramaraj,P Geetha,S MuthuKumaran, "Advanced Java Programming", YesDee Publishing Pvt Ltd, 2020.

**Chapters**

| Unit-I | - | Chapters-2, 3 |
| Unit-II | - | Chapters-4, 5, 6 |
| Unit-III | - | Chapters-8, 9 |
| Unit-IV | - | Chapters-10, 11 |
| Unit-V | - | Chapters-17, 18 |

| **References** |
|---|

1. Paul Deitel and Harvey Deitel, "Java:HowtoProgram", Prentice Hall Publishers; 9th Edition.

2. JanGraba,"An Introduction to Network Programming with Java-Java 7 Compatible", 3rd Edition, Springer.

| **Web Resources** |
|---|

1. **www.javapoint.com** (Java)

2. www.javacodegeeks.comm **(Java Code)**

3. docs.oracle.com/en/java (Java SE)

| **Course designer** |
|---|

**Mr.M.Muthalagu**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20CL11 | Lab in Algorithm | Core Lab1 | | | 5 | 3 |

L – Lecture  T – Tutorial  P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | First | 40 | 60 | 100 |

**Preamble:**

Different Techniques of Solution to the Problem using Divide and conquer, Dynamic Programming, Greedy Method and Back Propagation.

**Prerequisite**

Basic knowledge of Datastructures like Stack, Queue, Linked List, Sorting and Search Techniques.

**Course Outcomes**

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Analyze the Searching Techniques | K1 |
| **CO2** | Discuss about Sorting Techniques | K2,K3 |
| **CO3** | Analyze the Shortest Path Finding using Different Algorithms | K3,K4 |
| **CO4** | Evaluate Travelling Salesman problems, Minimum Cost Spanning Tree | K4,K5 |
| **CO5** | Build the Graphical Applications | K3,K4 |

**K1-Knowledge    K2-Understand    K3-Apply    K4- Analyze    K5- Evaluate**

**Mapping Course Outcome with Program Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| **CO1** | S | S | S | - | S | - | M |
| **CO2** | S | M | S | M | S | - | S |
| **CO3** | S | M | M | - | S | M | M |
| **CO4** | M | M | S | - | M | M | S |
| **CO5** | M | - | M | M | M | - | M |

## Mapping Course Outcome with Program Specific Outcomes

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | - | M | - | - |
| CO2 | M | S | - | M | M |
| CO3 | S | M | L | - | - |
| CO4 | S | M | L | - | - |
| CO5 | - | - | - | M | S |

## Blooms Taxonomy

|  | CA | | End of Semester |
|---|---|---|---|
|  | First | Second |  |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | **60** | **60** | **150** |

## Content

1. Implement Stack and Queue

2. Find an Element using Binary Search

3. Sort n integers using Quick Sort and Merge Sort

4. Solve Knapsack problem using Dynamic and Greedy Method

5. Finding the shortest path using Dijkstra's, Kruscal, Prim's algorithms

6. Implement Travelling Sales Person Problem using Dynamic Programming

7. Perform various tree traversal algorithms for a given tree

8. Find Minimum Cost Spanning Tree of a given undirected graph

9. Design and Implement the presence of Hamiltonian Cycle in the undirected graph

10. Implement N Queens problem using Back Tracking

## Course designer

**Mrs. T.S. Urmila**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20CL12 | Lab in Advanced Java Programming | Core Lab2 | - | - | 5 | 3 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | First | 40 | 60 | 100 |

<div style="background:blue"></div>

**Preamble:**

To enable the students to learn the ethical, historical, environmental and technological aspects of Advanced Java Programming and how it impacts the social and economic development of society.

**Prerequisite**

Develop a Client-Server Application with Database Maintenance.

**Course Outcomes**

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Demonstrate Array Lists & Linked List. | K1,K2 |
| **CO2** | Construct Priority Queue & Comparable Interface. | K1,K3 |
| **CO3** | Develop Applet and AWT Components. | K4 |
| **CO4** | Build JDBC and Servlets Programming. | K3,K4 |
| **CO5** | Develop client/server Programming with JSP and Java 8. | K3,K4 |

**K1-Knowledge        K2-Understand        K3-Apply        K4- Analyze        K5- Evaluate**

**Mapping Course Outcome with Program Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| **CO1** | S | S | S | - | S | M | M |
| **CO2** | M | M | S | M | S | - | S |
| **CO3** | S | M | M | - | S | M | M |
| **CO4** | M | M | S | S | M | M | S |
| **CO5** | M | - | M | - | M | - | M |

## Mapping Course Outcome with Program Specific Outcomes

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | - | L | - | - |
| CO2 | M | - | - | S | - |
| CO3 | M | L | - | - | S |
| CO4 | - | - | M | - | S |
| CO5 | - | M | - | - | S |

## Bloom's Taxonomy

### Blooms taxonomy

|  | CA | | End of Semester |
|---|---|---|---|
|  | First | Second |  |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | **60** | **60** | **150** |

## Content

1. Program to demonstrate Array List.
2. Program to demonstrate Linked List.
3. Program to demonstrate Priority Queue.
4. Program to demonstrate Comparable Interface.
5. Program to demonstrate Factory Method Pattern.
6. Program to demonstrate Prototype Design Pattern.
7. Program to demonstrate Displaying Graphics in Applet.
8. Program to demonstrate Border Layout Program in Applet.
9. Program to demonstrate Menu bar in AWT Component Class.
10. Program to demonstrate Mouse Events in Event Handling with AWT Components.
11. Program to demonstrate Java Socket Programming.
12. Program to demonstrate Java Datagram Packet.
13. Program to demonstrate JDBC for inserting values into the table student using the stored procedure and callable statement.
14. Program to demonstrate JDBC for updating values into the table student using the stored procedure and callable statement.
15. Program to demonstrate JDBC for deleting values into the table student using the stored procedure and callable statement.
16. Program to demonstrate JDBC for selecting records.
17. Program to demonstrate JDBC for metadata.
18. Program to demonstrate JDBC for Transaction and Rollback.
19. Program to demonstrate the life cycle of Servlet.
20. Program to demonstrate the Exception Handling in Servlet.
21. Program to demonstrate in JSP for Actions.
22. Program to demonstrate in JSP for looping statements.
23. Program to demonstrate in JSP for Scope of Variables.
24. Program to demonstrate the use of intermediate function in Stream API in Java 8.
25. Program to demonstrate the use of terminal function in Stream API in Java 8.

## Course Designer

**Mr.M.Muthalagu**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20C21 | Distributed Operating System | Core 4 | 5 | | | 4 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | Second | 25 | 75 | 100 |

**Preamble**

To provide an in in-depth knowledge in Distributed Operating Systems Concepts

**Prerequisite:**

Students are expected to know and understand the fundamentals of operating system concepts.

**Course Outcomes**

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Acquire the knowledge of process synchronization mechanisms and deadlock concept | K2,K3 |
| **CO2** | Introduce the concept of distributed Operating system and distributed mutual exclusion | K1,K2 |
| **CO3** | Analyze the mechanisms of distributed resource management | K4 |
| **CO4** | Evaluate the fault tolerance issues | K2,K5 |
| **CO5** | Analyse about processor scheduling | K2,k3 |

**K1-Knowledge     K2-Understand     K3-Apply     K4-Analyze   K5-Evaluate**

**Mapping Course Outcome with Program Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| **CO1** | S | M | - | M | - | - | M |
| **CO2** | M | M | M | - | M | M | M |
| **CO3** | S | M | S | M | M | - | - |
| **CO4** | S | M | S | - | M | M | M |
| **CO5** | S | M | M | M | M | - | M |

## Mapping Course Outcome with Program Specific Outcomes

|      | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------|------|------|------|------|------|
| CO1  | S    | M    | -    | S    | S    |
| CO2  | M    | -    | -    | S    | M    |
| CO3  | -    | S    | S    | -    | -    |
| CO4  | S    |      | -    | M    | -    |
| CO5  | -    | S    | -    | M    | M    |

## Bloom's Taxonomy

|                  | CA          |             | End of Semester |
|------------------|-------------|-------------|-----------------|
|                  | First       | Second      |                 |
| Knowledge -K1    | 15%  (9)    | 15%  (9)    | 20% (30)        |
| Understand -K2   | 15%  (9)    | 15%  (9)    | 20% (30)        |
| Apply-K3         | 30% (18)    | 30% ( 18)   | 20% (30)        |
| Analyze-K4       | 20% ( 12)   | 20% ( 12)   | 20% (30)        |
| Evaluate-K5      | 20% ( 12)   | 20% ( 12)   | 20% (30)        |
| Total Marks      | **60**      | **60**      | **150**         |

## Content

### UNIT I                                                                15 hrs

**Introduction** –Functions of a n Operating System –Design Approaches –Why advanced OS-Types of Advanced Operating System – Synchronization Mechanisms – Introduction-concepts of a Process – Concurrent Processes – The Critical Section Problem –Process Deadlocks-Introduction-Preliminaries- Models of Deadlock-Models of resources- A graph theoretic model of a system state-necessary and sufficient Conditions for a Deadlock- System with single-unit requests, Consumable Resources , Reusable Resources.

### UNIT II                                                               15 hrs

**Architectures of Distributed Systems**-Introduction-Motivations-System Architecture Types-Distributed OS- Issues- Communication Networks and Primitives – Theoretical Foundations: Inherent Limitations –Lamport's Logical Clocks, Vector Clock, Casual ordering of messages- Global State-Cuts of a Distributed Computation – Termination Detection – Distributed Mutual Exclusion-Distributed Deadlock Detection- Agreement Protocols

### UNIT III                                                              15 hrs

 **Distributed Resource Management** – Distributed File Systems – Architecture – Mechanisms-Design Issues – Distributed shared Memory – Architecture – Algorithm – memory coherence-Cohenrence Protocols – Design Issues – Distributed Scheduling – Issues – Components –stability-load distributing Algorithms.

**UNIT IV**                                                                                               15 hrs

**Failure    Recovery and Fault Tolerance** -Recovery- Fault Tolerance– Issues-Atomic actions and committing-commit protocols- Nonblocking Commit Protocols-voting protocols- Dynamic voting Protocols

**UNIT V**                                                                                                15 hrs

**Multiprocessor Operating Systems**- Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory management – Reliability/Fault Tolerance – Database Operating Systems – Introduction-  what is different- Requirements of a database operating systems.

| Text Book |
|---|

1.       Mukesh Singhal, N.G.Shivaratri, "Advanced Concepts in Operating Systems", McGraw  Hill 2000.

**Chapters**
Unit-I      : Chapter 1.1 to 1.5, 2.1 to 2.4, 3.1 to 3.9
Unit-II     : Chapter 4.1 to 4.7, 5.1 to 5.8, 6.1 to 6.14, 7.1 to 7.9, 8.1 to 8.5
Unit-III    : Chapter 9.1 to 9.4, 10.1 to 10.6, 11.1 to 11.6
Unit-IV    : Chapter 12.1 to 12.11, 13.1 to 13.7
Unit-V     : Chapter 17.1 to 17.8, 18.1 to 18.3

| References |
|---|

1.   Abraham Silberschatz, Peter B.Galvin, G.Gagne, "Operating Concepts", 6th Edition, Addison Wesley publications, 2003.

2.   Andrew S.Tanenbaum, "Modern Operating Systems",2nd Edition, Addison Wesley, 2001

| Web Resources |
|---|

1.    https://www.w3schools.in/operating-system-tutorial/distributed-system/ **(Distributed System in OS)**
2.   https://docs.oracle.com/cd/E19957-01/820-0699/drmaa-intro/index.html **(Distributed Resource Management Application API)**
3.   https://expolab.org/ecs265-fall-2019/slides/3%20 %20Nonblocking%20commit %20protocols.pdf **(Nonblocking commit protocols)**

| Course Designer |
|---|

**Dr.P.Manickam**

(For those joined M.Sc. Computer Science on or after June 2020)

**Programme Code - PCS**

| Course code | Course Title | | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|---|
| PCS20C22 | Advanced DBMS | | Core 5 | 5 | - | - | 4 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | Second | 25 | 75 | 100 |

**Preamble**

Acquire Knowledge of Database Models, Applications of Database Models and Emerging Trends.

**Prerequisite:**

Students are expected to know and understand the fundamentals of DBMS concepts

**Course Outcomes**

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Demonstrate the Database Design and Relational Database Design | K2,K3 |
| **CO2** | Introduce the Query Processing and Distributed Database | K1,K2 |
| **CO3** | Analyze the Query Optimization and Spatial and Temporal Data and Mobility | K4 |
| **CO4** | Evaluate Structure of XML Data | K2,K5 |
| **CO5** | Explain the Data Warehousing and Mining | K2,k3 |

**K1-Knowledge          K2-Understand          K3-Apply          K4-Analyze     K5-Evaluate**

**Mapping Course Outcome with Program Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| **CO1** | S | S | S | - | S | - | - |
| **CO2** | M | M | S | - | M | - | M |
| **CO3** | S | M | M | M | S | M | S |
| **CO4** | M | M | - | M | M | - | M |
| **CO5** | S | M | - | M | M | M | M |

## Mapping Course Outcome with Program Specific Outcomes

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | M | - | S | S |
| CO2 | M | - | - | S | M |
| CO3 | - | S | S | - | - |
| CO4 | S | - | - | M | - |
| CO5 | - | S | - | M | M |

## Bloom's Taxonomy

| Blooms taxonomy | CA | | End of Semester |
|---|---|---|---|
|  | First | Second | |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | **60** | **60** | **150** |

## Content

**Unit-I**      **15 Hrs**

**Database Design:** Database Design and the E-R Model-overview of the Design Process-The Entity Relationship Model-constraints-Removing Redundant Attributes in Entity Sets-Entity Relationship Diagrams-Reduction to Relational Schemas-Entity Relationship Design Issues-Extended E-R Features-Alternative Notations for Modelling Data-Other Aspects of Database Design.**Relational Database Design:** Features of Good Relational Designs-Atomic Domains and First Normal Form-Decomposition Using Functional Dependencies-Functional-Dependency Theory-Algorithm for Decomposition-Decomposition Using Multivalued Dependencies-More Normal Forms-Database Design Process-Modeling Temporal Data.

**Unit-II**      **15 Hrs**

**Query Processing:** Overview-Measures of Query Cost-Selection Operation-Sorting-Join Operation-Other Operations-Evaluation of Expressions.**Distributed Databases:** Homogenous and Heterogeneous Databases-Distributed Data Storage-Distributed Transactions-Commit Protocols-Concurrency Control in Distributed Databases-Availability-Distributed Query Processing-Heterogeneous Distributed Databases-Cloud-Based Databases-Directory Systems.

**Unit-III**      **15 Hrs**

**Query Optimization:** Overview-Transformation of Relational Expressions-Estimating Statistics of Expression Results-Choice of Evaluation Plans-Materialized Views-Advanced Topics in Query Optimization.**Spatial and Temporal Data and Mobility:** Motivation-Time in Databases-Spatial and Geographic Data –Multimedia Databases-Mobility and Personal Databases.

**Unit-IV**      **15 Hrs**

**XML:** Motivation-Structure of XML Data-XML Document Schema-Querying and Transformation-Application Program Interfaces to XML-Storage of XML Data-XML Applications.

**Unit-V**                                                              **15 Hrs**

**Data Warehousing and Mining:** Decision Support Systems-Data Warehousing-Data Mining Classification-Association Rules-Other Types of Associations-Clustering-Other Forms of Data Mining-Information Retrieval: overview-Relevance Ranking Using Terms-Relevance Using Hyperlinks-Synonyms, Homonyms and Ontologies - Indexing of Documents-Measuring Retrieval Effectiveness.

## Text Book

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2013.

**Chapters**

| Unit | | Chapters |
|------|---|----------|
| Unit-I | - | Chapters-7, 8 |
| Unit-II | - | Chapters-12, 19 |
| Unit-III | - | Chapters-13, 25 |
| Unit-IV | - | Chapters-23 |
| Unit-V | - | Chapters-20 |

## References

1. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

2. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson,2008.

3. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, Tata McGraw Hill, 2010.

4. G.K.Gupta, "Database Management Systems", Tata McGraw Hill, 2011.

## Web Resources

1. https://www.tutorialspoint.com/dbms/ **(DBMS)**
2. https://www.tankonyvtar.hu/...advanced_database_systems/20... **(Advanced DBMS)**

## Course Designer

**Mr.M.Muthalagu**

## THIAGARAJAR COLLEGE, MADURAI – 9

## (Re-Accredited with "A" Grade by NAAC)

## DEPARTMENT OF COMPUTER SCIENCE

(For those joined M.Sc. Computer Science on or after June 2020)

**Programme Code - PCS**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20C23 | Machine Learning | Core 6 | 5 | | | 4 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | Second | 25 | 75 | 100 |

### Preamble

To Learn about Machine Intelligence and Machine Learning applications. To implement and apply machine learning algorithms to real-world applications. To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems. To understand how to perform valuation of learning algorithms and model selection.

### Prerequisite:

Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc. Have an understanding of the strengths and weaknesses of many popular machine learning approaches. Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning. Be able to design and implement various machine learning algorithms in a range of real-world applications.

### Course Outcomes

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Acquire the Learning Problems | K1,K2 |
| **CO2** | Analyze the Neural Network Representation | K1,K2 |
| **CO3** | Describe the Bayes Theorem Concept learning | K2,K3 |
| **CO4** | Analyze the Instance Based Learning | K2,K3,K4 |
| **CO5** | Analyze the Advanced Learning | K3,K4,k5 |

**K1-Knowledge          K2-Understand          K3-Apply          K4-Analyze          K5-Evaluate**

## Mapping Course Outcome with Program Outcomes

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|------|-----|-----|-----|-----|-----|-----|-----|
| CO1 | S | M | S | M | S | - | M |
| CO2 | M | M | S | - | M | M | S |
| CO3 | S | M | - | M | S | M | - |
| CO4 | M | M | S | - | M | - | M |
| CO5 | M | M | - | - | M | - | - |

## Mapping Course Outcome with Program Specific Outcomes

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------|------|------|------|------|------|
| CO1 | M | - | L | - | - |
| CO2 | - | S | L | - | - |
| CO3 | - | L | - | - | - |
| CO4 | - | M | - | S | - |
| CO5 | - | S | - | M | S |

## Bloom's Taxonomy

| Blooms taxonomy | CA | | End of Semester |
|---|---|---|---|
|  | First | Second |  |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | **60** | **60** | **150** |

## Content

### UNIT I                                                                      15 Hrs

**INTRODUCTION:** Learning Problems– Perspectives and Issues– Concept Learning– Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning– Representation– Algorithm –Heuristic Space Search.

### UNIT II                                                                     15 Hrs

**NEURAL NETWORKS AND GENETIC ALGORITHMS**: Neural Network Representation– Problems–Perceptrons–Multilayer Networks and Back Propagation Algorithms–Advanced Topics– Genetic Algorithms– Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

### UNIT III                                                                    15 Hrs

**BAYESIAN AND COMPUTATIONAL LEARNING:** Bayes Theorem – Concept   Learning– Maximum Likelihood–Minimum Description Length Principle–Bayes Optimal Classifier–Gibbs Algorithm–Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning–Sample Complexity–Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

**UNIT IV**                                                                                    **15 Hrs**

**INSTANT BASED LEARNING:** K- Nearest Neighbor Learning– Locally weighted Regression – Radial Basis Functions – Case Based Learning.

**UNIT V**                                                                                     **15 Hrs**

  **ADVANCED LEARNING:** Learning Sets of Rules–Sequential Covering Algorithm–   Learning Rule Set – First Order Rules– Sets of First Order Rules– Induction on Inverted Deduction–Inverting Resolution–Analytical Learning– Perfect Domain Theories– Explanation Base Learning– FOCL Algorithm – Reinforcement Learning– Task – Q-Learning–Temporal Difference Learning.

## Text Book

1.  Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
    **Chapters**
    Unit-I        -        Chapters-1,2, 3
    Unit-II       -        Chapters-4, 5
    Unit-III      -        Chapters-6, 7
    Unit-IV       -        Chapters-8
    Unit-V        -        Chapters-10,11,13

## References

1.  EthemAlpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2.  Stephen  Marsland, Machine  Learning: An  Algorithmic Perspective, CRC Press,  2009.
3.  MichaelAffenzeller,StefanWagner,AndreasBeham,"GeneticAlgorithmsandGeneticProgramming", CRC Press Taylor and Francis Group.

## Web Resources

1.  https://www.cs.ubbcluj.ro/~gabis/ml/ml-books/McGrawHill%20-%20Machine%20Learning%20-Tom%20Mitchell.pdf **(machine learning)**
2.  http://www.cs.cmu.edu/~tom/mlbook.html**(machine learning text book)**
3.  https://cse.iitkgp.ac.in/~pabitra/course/cs674.html**( Machine Learning Course )**

## Course Designer

 **Mr.M.Muthalagu**

# THIAGARAJAR COLLEGE, MADURAI – 9

## (Re-Accredited with "A" Grade by NAAC)

## DEPARTMENT OF COMPUTER SCIENCE

(For those joined M.Sc. Computer Science on or after June 2020)

**Programme Code - PCS**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20CL21 | Lab in Advanced DBMS | Core Lab3 | 5 | | | 3 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | Second | 40 | 60 | 100 |

## Preamble

Acquire Knowledge of various Databases, Applications of Data mining and Emerging Trends.

## Prerequisite:

Students are expected to know and understand the fundamentals of DBMS concepts

## Course Outcomes

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| CO1 | Explain the Distributed Database for Bookstore | K2,K4 |
| CO2 | Illustrate the Object Oriented Database – Extended Entity Relationship | K1,K2 |
| CO3 | Analyze Implementation of an Efficient Query Optimizer | K2 |
| CO4 | Analyze the Designing XML Schema for Company Database | K2.K4 |
| CO5 | Evaluate the Working of WEKA Tool | K3,K5 |

**K1-Knowledge          K2-Understand          K3-Apply          K4-Analyze   K5-Evaluate**

## Mapping Course Outcome with Program Outcomes

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | - | S | M | - |
| CO2 | M | M | S | M | S | - | - |
| CO3 | M | M | M | - | S | M | M |
| CO4 | M | M | S | S | M | M | S |
| CO5 | M | - | - | - | M | - | M |

## Mapping Course Outcome with Program Specific Outcomes

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | - | L | - | - |
| CO2 | - | S | M | - | - |
| CO3 | S | L | - | - | - |
| CO4 | - | M | - | S | - |
| CO5 | - | S | - | M | S |

## Bloom's Taxonomy

| Blooms taxonomy | | | |
|---|---|---|---|
|  | CA | | End of Semester |
|  | First | Second | |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | 60 | 60 | 150 |

## Content

1. Distributed Database for Bookstore.

2. Deadlock Detection Algorithm for distributed database using wait- for graph.

3. Object Oriented Database – Extended Entity Relationship. (EER)

4. Parallel Database – University Counselling for Engineering colleges.

5. Parallel Database – Implementation of Parallel Join & Parallel Sort.

6. Active Database – Implementation of Triggers & Assertions for Bank Database.

7. Deductive Database – Constructing Knowledge Database for Kinship Domain.

   (Family Relations)

8. Study and Working of WEKA Tool.

9. Query Processing – Implementation of an Efficient Query Optimize.

10. Designing XML Schema for Company Database.

## Course Designer

**Mr.M.Muthalagu**

**(Re-Accredited with "A" Grade by NAAC)**

**DEPARTMENT OF COMPUTER SCIENCE**

(For those joined M.Sc. Computer Science on or after June 2020)

**Programme Code - PCS**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20CL22 | Lab in Machine Learning | Core Lab4 | 5 | | | 3 |

| L – Lecture | T – Tutorial | P – Practical |
|---|---|---|

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | Second | 40 | 60 | 100 |

**Preamble**

Make use of Data sets in implementing the machine learning algorithms. Implement the machine learning concepts and algorithms in any suitable language of choice.

.**Prerequisite:**

The programs can be implemented in either JAVA or Python.
For Problems 1 to 6 and 10, programs are to be developed without using the built-in classes or APIs of Java/Python. Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or constructed by the students.

**Course Outcomes**

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Implement and demonstrate the FIND-S algorithm | K2,K4 |
| **CO2** | Demonstrate the working of the decision tree based ID3 algorithm | K1,K2 |
| **CO3** | Construct a Bayesian network considering medical data | K2 |
| **CO4** | Implement *k*-Nearest Neighbour algorithm | K2.K4 |
| **CO5** | Implement the non-parametric Locally Weighted Regression algorithm | K3,K5 |

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**K1-Knowledge      K2-Understand      K3-Apply      K4-Analyze    K5-Evaluate**

| **Mapping Course Outcome with Program Outcomes** | | | | | | |
|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** |
| **CO1** | S | S | S | - | S | M | M |
| **CO2** | M | M | - | M | - | - | - |
| **CO3** | S | M | M | - | S | M | M |
| **CO4** | M | M | S | S | M | M | S |
| **CO5** | M | M | M | - | M | - | M |

## Mapping Course Outcome with Program Specific Outcomes

|      | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------|------|------|------|------|------|
| CO1  | S    | -    | L    | -    | -    |
| CO2  | -    | S    | M    | -    | -    |
| CO3  | S    | L    | -    | -    | -    |
| CO4  | -    | M    | -    | S    | -    |
| CO5  | -    | S    | -    | M    | S    |

## Bloom's Taxonomy

| Blooms taxonomy | CA | | End of Semester |
|---|---|---|---|
| | First | Second | |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | **60** | **60** | **150** |

## Content

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.

5. Write a program to implement the naïve Bayesian classifier for a sample training dataset stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using *k*-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

9. Write a program to implement *k*-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

## Course Designer

**Mr.M.Muthalagu**

(For those joined M.Sc. Computer Science on or after June 2020)

**Programme Code - PCS**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20PCE1 | Wireless Networks | Elective | 5 | - | - | 5 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | I/II | 25 | 75 | 100 |

**Preamble**

To provide an in-depth knowledge in Wireless and mobile communication system, Wireless LAN, Mobile ad hoc network

.**Prerequisite:**

Students are expected to know and understand the concepts of wireless networks and its classification.

**Course Outcomes**

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Explain the wireless transmission | K1 |
| **CO2** | Describe about different Telecommunication Systems | K2,K3 |
| **CO3** | Analyze the wireless LAN Technologies | K4 |
| **CO4** | Evaluate the mobile IP and protocols | K2,K5 |
| **CO5** | Discuss about Mobile Transport layer | K2 |

**K1-Knowledge          K2-Understand          K3-Apply          K4-Analyze     K5-Evaluate**

**Mapping Course Outcome with Program Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| **CO1** | M | M | - | M | M | - | M |
| **CO2** | M | - | S | - | M | M | M |
| **CO3** | S | M | M | M | S | M | S |
| **CO4** | M | M | S | - | M | - | S |
| **CO5** | S | M | M | - | M | M | M |

## Mapping Course Outcome with Program Specific Outcomes

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | M | S | M | S |
| CO2 | M | - | - | - | - |
| CO3 | - | S | S | - | - |
| CO4 | S | - | M | - | - |
| CO5 | - | - | M | M | M |

## Bloom's Taxonomy

| Blooms taxonomy | | | |
|---|---|---|---|
|  | CA | | End of Semester |
|  | First | Second | |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | 60 | 60 | 150 |

## Content

**Unit I**                                                                                          15 hrs.
**Wireless Transmission**- Frequencies for Radio Transmission- Signals-Antennas-Signal Propagation-Multiplexing- Modulation-Spread Spectrum-Cellular Systems-Medium Access Control: Motivation for a specialized MAC- SDMA-FDMA-TDMA-CDMA-Comparison of S/T/F/CDMA

**Unit II**                                                                                         15 hrs.
**Telecommunication Systems**- GSM-DECT-TETRA-UMTS and IMT-2000- Satellite Systems-History-Applications-Basics-Routing-Localization-Handover

**Unit III**                                                                                        15 hrs.
**Wireless LAN** – Infra red vs radio transmission-Infrastructure and ad-hoc networks- IEEE 802.11-HIPER LAN-Historical: HIPERLAN1- WATM, BRAN, HiperLAN2- Bluetooth

**Unit IV**                                                                                         15 hrs.
**Mobile Network Layer** - Mobile IP-IP Packet Delivery, Agent Discovery, Registration-Tunneling and Encapsulation-Optimizations- Reverse tunnelling-IPv6-IP micro-mobility support-Dynamic host configuration protocol- Mobile adhoc networks

**Unit V**                                                                                          15 hrs.
**Mobile Transport Layer** - Traditional TCP: Congestion Control, slow start-Fast Retransmit/Fast Recovery, Implications Of Mobility – Classical TCP Improvements-TCP over 2.5/3G Wireless Networks-Performance enhancing proxies.

## Text Book

1. Jochen H.Schiller, "Mobile  Communications", Second  Edition, Pearson education, 2012.

**Chapters**
    Unit-I      : Chapter 2.1 to 2.8, 3.1 to 3.6
    Unit-II     : Chapter 4.1 to 4.4, 5.1 to 5.6
    Unit-III    : Chapter 7.1 to 7.5
    Unit-IV     : Chapter 8.1 to 8.3
    Unit-V      : Chapter 9.1 to 9.4

## References

1. Erik Dahlman, Stefan Parkvall, Johan Skold And Per Beming, "3G Evolution HSPA and LTE For Mobile Broadband", Second Edition, Academic Press, 2008.

2. Anurag Kumar, D.Manjunath, Joy Kuri, "Wireless Networking", First Edition, Elsevier 2011.

3. Simon Haykin , Michael Moher, David Koilpillai, "Modern Wireless Communications", First  Edition, Pearson  Education, 2013.

4. David  G.  Messerschmitt,  "Understanding  Networked Applications", Elsevier, 2010.

## Web Resources

1. https://www.cse.wustl.edu/~jain/cis788-97/ftp/wireless_atm/index.html **(Wireless ATM)**
2. https://commsbrief.com/difference-between-gsm-umts-lte/ **(GSM,UMTS)**
3. https://medium.com/@sarpkoksal/core-network-evolution-3g-vs-4g-vs-5g-7738267503c7 **(Evolution of Core Network)**

## Course Designer

**Dr.P.Manickam**

**(Re-Accredited with "A" Grade by NAAC)**

**DEPARTMENT OF COMPUTER SCIENCE**

(For those joined M.Sc. Computer Science on or after June 2020)

**Programme Code - PCS**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20PCE2 | Software Project Management | Elective | 5 | | | 5 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | I/II | 25 | 75 | 100 |

**Preamble**

To provide an in-depth knowledge related to demonstrate the Software project management concepts and process models.

**Prerequisite:**

Students are expected to know and understand the project and its basic requirements

**Course Outcomes**

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Explain the relationship among projects | K1,K2 |
| **CO2** | Analyze the process models | K2,K3 |
| **CO3** | Describe the project management knowledge areas | K4 |
| **CO4** | Evaluate the project cost management | K2,K5 |
| **CO5** | Analyze about risk management | K2,k3 |

**K1-Knowledge          K2-Understand          K3-Apply          K4-Analyze     K5-Evaluate**

**Mapping Course Outcome with Program Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| **CO1** | S | M | M | M | S | - | M |
| **CO2** | M | M | S | - | M | M | S |
| **CO3** | S | M | S | M | S | M | S |
| **CO4** | M | - | M | M | M | - | S |
| **CO5** | M | M | M | M | M | M | M |

## Mapping Course Outcome with Program Specific Outcomes

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------|------|------|------|------|------|
| CO1 | S | M | S | - | S |
| CO2 | M | - | - | M | M |
| CO3 | - | S | S | - | - |
| CO4 | S | - | M | - | - |
| CO5 | - | - | M | M | M |

## Bloom's Taxonomy

| Blooms taxonomy | CA | | End of Semester |
|------|------|------|------|
|  | First | Second |  |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | **60** | **60** | **150** |

## Content

**Unit I**                                                                                      15 hrs.

**Project Management Framework:** Introduction: Project - Project management - Relationship among  Project, Program and Portfolio management - Project and operations management-  Role of project manager - Project management body of knowledge - Enterprise Environmental factors. Project life cycle and Organization: Overview of project life cycle - Projects vs Operational Work - Stakeholders - Organizational influences on project management. The Standard for Project Management of a Project: Project management processes for a project:  Common project management process interactions - Projects management process groups - Initiating process group - planning process group - Executing process group - Monitoring and controlling process group - Closing process group.

**Unit II**                                                                                      15 hrs.

**Project Planning:** Step wise project planning- Select Project-Identify Project Scope and objectives-Identify Project Infrastructure- Analyse Project characteristics- Identify Project Products and activities- Estimate effort for each activity- Identify Activity Risks- Allocate Resources-Review/Publicize plan-Execute plan/lower levels of planning-Selection of an appropriate project approach: Build or Buy-choosing methodologies and technologies-software processes and process models- Choice of process models – Structure versus Speed of delivery – The Waterfall model –The Spiral Model- Software prototyping – Other ways of categorizing prototypes – Incremental Delivery-Atern /Dynamic Systems Development method –Rapid Application Development-Agile Methods-Extreme Programming(XP)-Scrum-Managing Iterative Processes- Selecting the most appropriate process model

**Unit III**                                                                                          15 hrs.

**The Project Management Knowledge Areas**: Project integration management: Develop project charter - Develop project management plan - Direct and manage project execution - Monitor and control project work - Perform integrated change control - Close project or phase.  Project scope management:  Collect requirements - Define Scope - Create WBS - Verify Scope - Control Scope. Project time management: Define activities - Sequence activities - Estimate activity resources - Estimate Activity Durations - Develop Schedule - Control Schedule.

**Unit IV**                                                                                           15 hrs.

**Project cost management:** Estimate costs - Determine budget – Control costs.  Project Quality Management:  Plan quality - perform  quality assurance - Perform quality control. Project Human Resource Management: Develop human resource plan - Acquire project team - Develop project team - Manage project team. Project Communications Management:    Identify    stakeholders   -    Plan communications  - Distribute information - Manage stakeholder expectations - report performance.

**Unit V**                                                                                            15 hrs.

**Project Risk Management:** Plan risk management - Identify risks -Perform qualitative risk analysis - Perform quantitative risk analysis - plan risk responses - Monitor and control risks. Project Procurement Management: Plan - Conduct - Administer - Close procurements.

## Text Book

1.  "A guide to the Project management Body of Knowledge (PMBOK Guide)"Fouth    Edition, Project    Management    Institute, Pennsylvania, 2008.
2.  BOB Huges, Mike Cotterell, Rajib Mall "Software Project Management", McGraw Hill, Fifth Edition, 2011.

**Chapters**
   Unit-I: Chapter 1.1 to 1.8, 2.1 to 2.4, 3.1 to 3.7 (Book- I)
   Unit-II: Chapter 3.1 to 3.11, 4.1 to 4.18 (Book- II)
   Unit-III: Chapter 4.1 to 4.6, 5.1 to 5.5, 6.1 to 6.6 (Book-I)
   Unit-IV: Chapter 7.1 to 7.3, 8.1 to 8.3, 9.1 to 9.4, 10.1 to 10.5(Book-I)
   Unit-V: Chapter 11.1 to 11.6, 12.1 to 12.4(Book-I)

## References

1.  Futrell, "Quality Software Project Management",  Pearson Education India.
2.  Royce, "Software Project Management", Pearson Education India.
3.  C.Ravindranath Pandian, "Applied Software Risk Management-A Guide  for  Software  Project Managers",  Auerbach  Publications, 2015.
4.  Benjamin A. Lieberman, "The  Art  of  Software  Modeling", Auerbach Publications, 2010.

## Web Resources

1.  https://www.tutorialspoint.com/management_concepts/project_management_softwares.htm **(Project Management Software)**
2.  https://www.pmi.org/learning/library/risk-analysis-project-management-7070**(Risk     analysis and management)**
3.  https://www.mountaingoatsoftware.com/agile/scrum **(Scrum)**

## Course Designer

   **Dr.P.Manickam**

# THIAGARAJAR COLLEGE, MADURAI – 9

## (Re-Accredited with "A" Grade by NAAC)

## DEPARTMENT OF COMPUTER SCIENCE

(For those joined M.Sc. Computer Science on or after June 2020)

**Programme Code - PCS**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20PCE3 | Security in Computing | Elective | 5 | | | 5 |

L – Lecture  T – Tutorial  P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | I/II | 25 | 75 | 100 |

## Preamble

To provide an in-depth knowledge related to security concepts in computing devices.

## .Prerequisite:

Students are expected to know and understand the basic concepts of security and attacks.

## Course Outcomes

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| CO1 | Explain the security attacks and program security | K1 |
| CO2 | Analyze  security concepts in Operating Systems | K2,K3 |
| CO3 | Describe the Database Security | K4 |
| CO4 | Evaluate the Security in Networks | K2,K5 |
| CO5 | Analyze about Security plan and policies | K2,k3 |

**K1-Knowledge  K2-Understand  K3-Apply  K4-Analyze  K5-Evaluate**

## Mapping Course Outcome with Program Outcomes

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| CO1 | S | S | M | M | S | M | M |
| CO2 | M | M | S | - | M | M | M |
| CO3 | S | M | S | M | S | M | S |
| CO4 | M | M | S | - | M | - | S |
| CO5 | M | M | M | - | M | M | M |

## Mapping Course Outcome with Program Specific Outcomes

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------|------|------|------|------|------|
| CO1 | S | M | S | M | S |
| CO2 | M | - | M | - | - |
| CO3 | - | S | S | - | M |
| CO4 | S | - | - | - | - |
| CO5 | - | M | - | M | M |

## Bloom's Taxonomy

| Blooms taxonomy | | | |
|------|------|------|------|
|  | CA | | End of Semester |
|  | First | Second | |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | 60 | 60 | 150 |

## Content

**Unit I**     15 hrs.
**Security Problem in Computing**: What Does "Secure" Mean- Attacks-The Meaning of Computer Security-Computer Criminals-Methods of Defense-What's Next-Program Security: Secure Programs-Nonmalicious Program Errors-Viruses and Other Malicious Code-Targeted Malicious Code-Controls against Program Threats

**Unit II**     15 hrs.
**Protection in General Purpose Operating Systems:** Protected Objects and Methods of Protection-Memory and Address Protection- Control of Access to General Objects- File Protection Mechanisms-User Authentication-Designing Trusted Operating Systems: What is a Trusted System-Security Policies- Models of Security-Trusted Operating System Design-Assurance in Trusted Operating Systems-Implementation Examples

**Unit III**     15 hrs.
**Database Security:** Introduction to Databases-Concepts of Database-Components of Database-Advantages of using database-Security Requirements-Reliability and Integrity- Sensitive Data-Inference- Multilevel Databases- Proposals for Multilevel Security

**Unit IV**     15 hrs.
**Security in Networks:** Network Concepts-Threats in Networks-Network Security Controls-Firewalls-Intrusion Detection Systems: Types of IDS-Goals for IDS-IDS strengths and limitations-Secure E-Mail: Security for E-Mail-Designs-Example secure E-Mail systems

**Unit V** 15 hrs.

**Administering Security:** Security Planning -Risk Analysis: The nature of Risk-Steps of a Risk Analysis-Arguments for and against Risk Analysis-Organizational Security Policies-Physical Security: Natural disasters-Power loss-Human vandals-Interception of sensitive information-Contingency planning.

## Text Book

1. Charles P. Pfleeger. Shari Lawrence Pfleeger, "Security in computing", Third Edition, Pearson education, 2004.

**Chapters**

Unit-I      : Chapter 1.1 to 1.6, 3.1 to 3.5

Unit-II     : Chapter 4.1 to 4.5, 5.1 to 5.6

Unit-III    : Chapter 6.1 to 6.7

Unit-IV    : Chapter 7.1 to 7.6

Unit-V     : Chapter 8.1 to 8.4

## References

1. Alfred J.Menezes, Paul C.VanOorschot and Scott A.Vanstone ," Handbook of Applied Cryptography", CRC Press.
2. William Stallings, "Cryptography and Network Security Principles and Practices", Fourth Edition, Pearson publications, 2009.
3. Douglas Robert Stinson, Maura Paterson, "Cryptography: Theory and Practice",CRC Press, 2018.

## Web Resources

1. www.cs.uccs.edu/~cs591/chapter8.ppt **(Network Security)**
2. http://wiki.cas.mcmaster.ca/index.php/Operating_Systems_Security **(Operating Systems Security)**
3. https://www.gasystems.com.au/database-security-important **(Database security)**

## Course Designer

**Dr.P.Manickam**

## THIAGARAJAR COLLEGE, MADURAI – 9

### (Re-Accredited with "A" Grade by NAAC)

### DEPARTMENT OF COMPUTER SCIENCE

(For those joined M.Sc. Computer Science on or after June 2020)

**Programme Code - PCS**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20CE4 | Digital Image Processing | Elective | 5 | | | 5 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | I/II | 25 | 75 | 100 |

## Preamble

To provide complete knowledge on Digital Image Processing methods, such as image processing methods in Spatial domain and Frequency domain, Edge detection, Compression, Segmentation, and Morphological concepts, which enable the students to understand the concepts and implement them empirically.

## Prerequisite:

Review the fundamental concepts of a digital image processing system and Analyze images in the frequency domain using various transforms. Evaluate the techniques for image enhancement and image restoration. Categorize various compression techniques. Interpret Image compression standards, and Interpret image segmentation and representation techniques. Gain idea to process various image used in various fields such as weather forecasting, Diagnosis of various disease using image such as tumor, cancer etc.

## Course Outcomes

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Construct the Image Processing and various models | K1, K2 |
| **CO2** | Describe the enhancement in spatial domain and Frequency Domain | K2,K3 |
| **CO3** | Construct a Edge detection | K4 |
| **CO4** | Demonstrate the Various image Compression Techniques | K3,K4 |
| **CO5** | Analyze Image Segmentation & Morphological Image Processing | K3,K4 |

**K1-Knowledge          K2-Understand          K3-Apply          K4-Analyze    K5-Evaluate**

## Mapping Course Outcome with Program Outcomes

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| CO1 | M | S | M | M | S | - | - |
| CO2 | M | M | - | - | M | M | S |
| CO3 | S | M | S | M | S | M | M |
| CO4 | M | M | S | - | M | - | - |
| CO5 | M | M | M | - | M | - | M |

## Mapping Course Outcome with Program Specific Outcomes

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | - | - | - | - |
| CO2 | M | - | - | S | - |
| CO3 | - | - | M | - | S |
| CO4 | - | - | M | - | S |
| CO5 | - | S | - | - | S |

## Bloom's Taxonomy

| Blooms taxonomy | | | |
|---|---|---|---|
|  | CA | | End of Semester |
|  | First | Second | |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | **60** | **60** | **150** |

## Content

### Unit I                                                                        15 hrs.

**Fundamentals:** Image Sensing and Acquisition, Image Sampling and Quantization, relationship between Pixels; Random noise; Gaussian Markov Random Field, σ-field, Linear and Non-linear Operations; Image processing models: Causal, Semi-causal, Non-causal models. **Color Models:** Color Fundamentals, Color Models, Pseudo-color Image Processing, Full Color Image Processing, Color Transformation, Noise in Color Images.

### Unit II                                                                       15 hrs.

**Spatial Domain:** Enhancement in spatial domain: Point processing; Mask processing; Smoothing Spatial Filters; Sharpening Spatial Filters; Combining Spatial Enhancement Methods. **Frequency Domain:** Image transforms: FFT, DCT, Karhunen-Loeve transform, Hotlling's $T^2$ transform, Wavelet transforms and their properties. Image filtering in frequency domain.

### Unit III                                                                      15 hrs.

**Edge Detection:** Types of edges; threshold; zero-crossing; Gradient operators: Roberts, Prewitt, and so be l operators; residual analysis based technique; Canny edge detection. Edge features and their applications.

**Unit IV**                                                      **15 hrs.**

**Image Compression:** Fundamentals, Image Compression Models, Elements of Information Theory. Error Free Compression: Huff-man coding; Arithmetic coding; Wavelet transform based coding; Lossy Compression: FFT; DCT; KLT; DPCM; MRFM based compression; Wavelet transform based; Image Compression standards.

**Unit V**                                                      **15 hrs.**

**Image Segmentation:** Detection and Discontinuities: Edge Linking and Boundary Deduction; Threshold; Region-Based Segmentation. Segmentation by Morphological water sheds.The use of motion in segmentation, Image Segmentation based on Color. **Morphological Image Processing:** Erosion and Dilation, Opening and Closing, Hit-Or-Miss Transformation, Basic Morphological Algorithms, Gray-Scale Morphology.

## Text Book

1. Rafael Gonzalez, Richard E.Woods, "Digital Image Processing", Fourth Edition, PHI/Pearson Education, 2013.

### Chapters

| | | |
|---|---|---|
| Unit-I | - | Chapters-2,6 |
| Unit-II | - | Chapters-3, 4 |
| Unit-III | - | Chapters-5 |
| Unit-IV | - | Chapters-8 |
| Unit-V | - | Chapters-9,10 |

## References

1. A.K.Jain, Fundamentals of Image Processing, Second Ed., PHI, New Delhi, 2015.
2. B.Chanla, D.Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2003.
   Nick Elford, "Digital Image Processing a practical introducing using Java", Pearson Education, 2004.
3. ToddR.Reed, "Digital Image Sequence Processing, Compression, and Analysis", CRC Press, 2015.
4. L.Prasad, S.S.Iyengar, "Wavelet Analysis with Applications to Image Processing", CRC Press, 2015.

## Web Resources

1. https://digitalimagingpic.blogspot.com/2019/08/digital-image-processing-gonzalez-4th.html (***Digital Image Processing*** )
2. https://www.pearson.com/us/higher-education/product/Gonzalez-Instructor-Solutions-Manual-for-Digital-Image-Processing-4th-Edition/9780133356748.html(***Digital Image Processing Material*** )

## Course Designer

**Mr.M.Muthalagu**

# THIAGARAJAR COLLEGE, MADURAI – 9

## (Re-Accredited with "A" Grade by NAAC)

## DEPARTMENT OF COMPUTER SCIENCE

(For those joined M.Sc. Computer Science on or after June 2020)

**Programme Code - PCS**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20CE5 | Cloud Computing | Elective | 5 | | | 5 |

L – Lecture    T – Tutorial    P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | I/II | 25 | 75 | 100 |

## Preamble

Provides Comprehensive and in-depth knowledge of Cloud computing concepts, technologies, architecture and application by introducing and researching state-of-the-art in cloud computing fundamental issues, applications and implementations. Also exposes frontier areas and information systems while providing sufficient foundations to enable further study and research

## .Prerequisite:

Basic knowledge about database and networks

## Course Outcomes

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Explain the characteristics, Challenges, Computing Platforms, Models, Concepts and Technologies | K1,K2 |
| **CO2** | Describe about Virtualization, Cloud Services and Platforms | K1,K3 |
| **CO3** | Analyze the Cloud Application Design and Development | K3,K4 |
| **CO4** | Analyze about Python for Cloud | K4,K5 |
| **CO5** | Describe the Big data analytics, Multimedia Cloud & Cloud Security | K2,K4 |

**K1-Knowledge      K2-Understand      K3-Apply      K4-Analyze   K5-Evaluate**

## Mapping Course Outcome with Program Outcomes

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| **CO1** | S | S | - | M | S | - | M |
| **CO2** | M | M | S | - | M | M | - |
| **CO3** | S | M | S | M | S | M | M |
| **CO4** | S | M | S | - | M | M | S |
| **CO5** | S | M | M | - | M | - | M |

## Mapping Course Outcome with Program Specific Outcomes

|     | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|-----|------|------|------|------|------|
| CO1 | S | - | - | M | - |
| CO2 | M | S | - | M | M |
| CO3 | S | M | L | - | - |
| CO4 | S | M | L | - | - |
| CO5 | - | - | - | M | S |

## Bloom's Taxonomy

| Blooms taxonomy | CA | | End of Semester |
|-----------------|--------|--------|-----------------|
|                 | First | Second | |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | **60** | **60** | **150** |

## Content

**Unit I**          **15 hrs.**

**COMPUTING BASICS**

Introduction to Cloud computing definition- Characteristics of Cloud Computing- Cloud Models- Cloud Service Examples- Cloud based Services and Applications-Cloud concepts and Technologies.

**Unit II**          **15 hrs.**

**CLOUD SERVICES AND PLATFORMS**

Compute Services - Storage Services - Cloud Database Services - Application Services - Content Delivery Services - Analytics Services - Deployment And Management Service - Identity And Access Management Services - Open Source Private Cloud Software.

**Unit III**          **15 hrs.**

**CLOUD APPLICATION DESIGN AND DEVELOPMENT**

Design consideration- Reference Architecture for Cloud Application - Cloud Application Design Methodologies - Data Storage Approaches- Development in Python: Design Approaches – Application: Image Processing - Document Storage - Map Reduce - Social Media Analytics.

**Unit IV**          **15 hrs.**

**PYTHON FOR CLOUD**

Introduction- Installing Python- Data types & Data Structures- Control Flow- Functions- Modules- Packages- File Handling- Date/Time Operations – Classes- Python for Cloud: Amazon Web Services –Google Cloud Platform - Windows Azure –Map Reduced – Packages of Interest – Designing a RESTful Web API.

**Unit V**                                                                                                   **15 hrs.**

**BIG DATA ANALYTICS, MULTIMEDIA CLOUD & CLOUD SECURITY**

Big Data Analytics: Clustering Big data - Classification of Big Data – Recommendation systems. Multimedia Cloud: Case Study: Live Video Stream App - Streaming Protocols – Case Study: Video Transcoding App-Cloud Security: CSA Cloud Security Architecture – Authentication - Authorization - Identity and Access management - Data Security - Key Management- Auditing- Cloud for Industry, Healthcare &Education.

## Text Book

1.      ArshdeepBahga, Vijay Madisetti, "Cloud Computing: A Hands – On Approach" Universities press (India) Pvt. limited 2016.

**Chapters:**

Unit I : Chapter  1.1-1.5,2.1-2.12

Unit II : Chapter 3.1,3.2,3.3,3.4,3.5 to 3.9

Unit III: Chapter 5.2 to 5.5, 8.1 to 8.5

Unit IV: Chapter 6.1 to 6.10, 7.1 to 7.5,7.7

Unit V: Chapter 9.1 to 9.4, 10.1 to 10.4, 12.2 to 12.8, 13

## References

1.      Rittinghouse and Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, 2016.
2.      Michael Miller "Cloud Computing Web based application that change the way you work and  collaborate  online".  Pearson edition, 2008.
3.      Kris Jamsa, Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile,Security and More, Jones & Bartlett Learning, 2012.

## Web Resources

1.   **https://www.ripublication.com/aeee_spl/aeeev4n1spl_15.pdf**
   **(Cloud Computing Services and its Applications)**
2.   **https://cloud.google.com/products/databases**
   **(Google Cloud based Databases)**
3.   **https://www.ibm.com/blogs/cloud-computing/2013/10/15/social-media-analytics-as-saas-whats-in-it-for-a-social-data-analyst/#:~:text=Social%20media%20analytics%20offered%20as,cost%2Deffective%20and%20secure%20way**
   **(Social Media Analytics as SaaS)**
4.   **https://www.ibm.com/blogs/cloud-computing/2013/10/15/social-media-analytics-as-saas-whats-in-it-for-a-social-data-analyst/#:~:text=Social%20media%20analytics%20offered%20as,cost%2Deffective%20and%20secure%20way**
   **(Social Media Analytics - II)**

## Course Designer

**Mrs.T.S. Urmila**

**Programme Code - PCS**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| PCS20CE6 | Data Mining | Elective | 5 | - | - | 5 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | I/II | 25 | 75 | 100 |

**Preamble**

Introducing the fundamental concepts of Data Mining Techniques and various Algorithms used for Information Retrieval from Datasets. Familiarize with basic data mining concepts for solving real world problems.

**.Prerequisite:**

Basic knowledge of Querying Databases with Data Manipulations from the Databases.

**Course Outcomes**

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Explain the Major Issues, Data Preprocessing | K1,K2 |
| **CO2** | Analyze the Implementation of Data Ware House Concepts | K1,K3 |
| **CO3** | Analyzing various Classification Algorithms | K3,K4 |
| **CO4** | Describe the various Clustering Algorithms | K3,K4 |
| **CO5** | Evaluate the Applications of Data Mining in Spatial, Multimedia, Text and Web | K4,K5 |

**K1-Knowledge          K2-Understand          K3-Apply          K4-Analyze    K5-Evaluate**

**Mapping Course Outcome with Program Outcomes**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 |
|---|---|---|---|---|---|---|---|
| **CO1** | S | M | M | M | - | - | - |
| **CO2** | M | M | S | - | M | M | S |
| **CO3** | S | M | M | - | S | M | - |
| **CO4** | M | M | S | - | M | - | S |
| **CO5** | S | M | S | - | M | M | M |

## Mapping Course Outcome with Program Specific Outcomes

|     | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|-----|------|------|------|------|------|
| CO1 | S | - | - | M | - |
| CO2 | M | S | - | M | M |
| CO3 | S | M | L | - | - |
| CO4 | S | M | L | - | - |
| CO5 | - | - | - | M | S |

## Bloom's Taxonomy

| Blooms taxonomy | CA | | End of Semester |
|-----------------|-------|--------|-----------------|
|                 | First | Second | End of Semester |
| Knowledge -K1 | 15%  (9) | 15%  (9) | 20% (30) |
| Understand -K2 | 15%  (9) | 15%  (9) | 20% (30) |
| Apply-K3 | 30% (18) | 30% ( 18) | 20% (30) |
| Analyze-K4 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Evaluate-K5 | 20% ( 12) | 20% ( 12) | 20% (30) |
| Total Marks | **60** | **60** | **150** |

## Content

**Unit I**                                                                                  **15 hrs.**

**Data Mining And Data Preprocessing**: Data Mining – Motivation – Definition – Data Mining on Kind of Data –Functionalities – Classification – Data Mining Task Primitives – Major Issues in Data Mining – Data Preprocessing – Definition – Data Clearing – Integration and Transformation – Data Reduction.

**Unit II**                                                                                 **15 hrs.**

**Data Warehousing:** Multidimensional Data Model –Data Warehouse Architecture – Data Warehouse Implementation –From data Warehousing to Data Mining – On Line Analytical Processing - On Line Analytical Mining.

**Unit III**                                                                                **15 hrs.**

 **Frequent Patterns, Associations And Classification:** The Apriori Algorithm – Definition of Classification and Prediction – Classification by Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Lazy Learners – K-Nearest Neighbor – Other Classification Methods.

**Unit IV**                                                                                 **15 hrs.**

**Cluster Analysis: Definition** – Types of data in Cluster Analysis – Categorization of major Clustering Techniques – Partitioning Methods– Hierarchical Clustering – BIRCH - ROCK – Grid Based Methods –Model Based Clustering Methods – Outlier Analysis.

**Unit V**                                                                                  **15 hrs.**

**Spatial, Multimedia, Text And Web Data: Spatial Data Mining** – Multimedia Data Mining – Text Mining – Mining the World Wide Web – Data Mining Applications – Trends in Data Mining.

## Text Book

1. Jiawei Han and Micheline Kamber, "Data Mining: Concepts and Techniques (The Morgan Kaufmann Series in Data Management Systems) 3rd Edition, July 6, 2011.

**Chapters:**
Unit I : Chapter 1.1 to 1.7,3.1 to 3.4
Unit II : Chapter 2
Unit III: Chapter 6.2, 7.1 to 7.6
Unit IV: Chapter 8
Unit V: Chapter 9.2,9.3,9.5,9.6,10.1,10.5

## References

1. Margret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2003.
2. M. Awad, Latifur Khan, Bhavani Thuraisingham, Lei Wang, "Design and Implementation of Data Mining Tools", CRC Press- Taylor & Francis Group, 2015.
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "Introduction to Data Mining-Instructor's Solution Manual", Pearson Education, First Edition, 2016.
4. Mohammed J.Zaki, Wagner Meira JR, "Data Mining and Analysis: Fundamental Concepts and Algorithms", Cambridge India, 2016.

## Web Resources

1. **https://www.guru99.com/online-analytical-processing.html#:~:text= Online %20 Analytical%20Processing%20(OLAP)%20is,group%2C%20aggregate%20and%20join%20data.**
   **(Cube,Operations and Types in Data Warehouse)**
2. **http://staffwww.itn.liu.se/~aidvi/courses/06/dm/lectures/lec7.pdf**
   **(Apriori Algorithm)**

3. **https://www.slideshare.net/archnaswaminathan/cdm-44314029#:~: text= Partitioning%20Method%20%E2%80%A2%20Suppose%20we,belong%20to%20exactly%20one%20group.**
   **(Clustering in Data Mining)**
4. **https://www.springer.com/gp/book/9780792373490**
   **(Mining World Wide Web)**

## Course Designer

**Mrs.T.S. Urmila**

# B.Sc. Computer Science in Cognitive Systems
## Programme Code - UCG

# Programme outcome-PO (Aligned with Graduate Attributes) - Bachelor of Science(B.Sc.,)

### Scientific Knowledge and Critical Thinking

Apply the knowledge of Life Science, Physical and Chemical Science, Mathematics, statistics, Computer science and humanities for the attainment of solutions to the problems that come across in our day-to-daylife/activities.

### Problem Solving

Identify and analyze the problem and formulate solutions for problems using the principles of mathematics, natural sciences with appropriate consideration for the public health, safety and environmental considerations.,

### Communication and Computer Literacy

Communicate the fundamental and advanced concepts of their discipline in written and oral form.Ableto make appropriate and effective use of information and information technology relevant to their discipline

### 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.

### Ethical, Social and Professional Understanding

Commitment to principles, codes of conduct and social responsibility in order to behave consistently with personal respect. Acquire the responsibility to contribute for the personal development and for the development of the community. Respect the ethical values, social responsibilities anddiversity.

### Innovative, Leadership and Entrepreneur Skill Development

Function as an individual, and as a member or leader in diverse teams and in multidisciplinary settings. Become an entrepreneur by acquiring technical, communicative, problem solving, intellectual skills.

# THIAGARAJAR COLLEGE, MADURAI – 9.

## (Re-Accredited with „A  Grade by NAAC)

## DEPARTMENT OFCOMPUTER SCIENCE

**Vision:**

- To be frontier in educating Computer Science and to produce globally competent   graduates with moral values committed to build a vibrant nation.

**Mission:**

- To strengthen the core competence in Computer Science through analytical learning.
- To produce successful graduates with personal and professional responsibilities and commitment to lifelong learning.
- To uplift innovative research in computer science to serve the needs of industry, government and society.

**Programme Educational Objective (PEO):**

Graduates will be able to

| | |
|---|---|
| PEO1 | Be employed successfully or pursue their higher education. |
| PEO2 | Apply knowledge of computational linguistics, learning and reasoning skills that are relevant and appropriate to the domain. |
| PEO3 | Use and develop skills as required in the field of IT and Infrastructure services. |
| PEO4 | Remain abreast in their profession and be leaders in our technologically vibrant society. |
| PEO5 | Lead a successful technical or professional career including supportive and leadership roles on multidisciplinary teams. |

**Programme Specific Outcome (PSO):-B.Sc., Computer Science with Cognitive Systems**

On the successful completion of B.Sc., Computer Science with Cognitive Systems the students will

| | |
|---|---|
| PSO1 | Gain knowledge in not only the core topics of computer science but also develop an equal appreciation of current industry standards. |
| PSO2 | Understand real time IT infrastructure domains blended with practical lab experience in the area of Computer Network, Operating systems, Programming and Software Testing. |
| PSO3 | Be exposed to industry ready syllabus such as Infrastructure management, DevOps, Virtualization and Cloud Computing. |
| PSO4 | Learn to comprehend and integrate their research practice in computational languages, Machine learning and Artificial Intelligence. |
| PSO5 | Create awareness on the current issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems in society. |

*Thiagarajar College, Madurai. - 39<sup>th</sup> ACM - Dept. of Comp. Sci. - Syllabus 2020*

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DEPARTMENT OF COMPUTER SCIENCE

## B.Sc. Computer Science with Cognitive Systems

### (For those who join in 2020 and after)

| Course | Code No. | Title of the paper | Hrs/wk | Crd. | Total Hrs | CIA | SE | TOT |
|--------|----------|--------------------|--------|------|-----------|-----|-----|-----|
| **I SEMESTER** | | | | | | | | |
| Part 1 | U20P111 | இக்காலத் தமிழும் இடைக்காலத் தமிழும் | 5 | 3 | 75 | 25 | 75 | 100 |
| Part 2 | U20EN11CT | English I – Communication Skills | 3 | 3 | 45 | 25 | 75 | 100 |
| EVS | U20ES11 | Environmental Science | 2 | 2 | 30 | 15 | 35 | 50 |
| Core 1 | UCG20C11 | Operating System | 5 | 4 | 75 | 25 | 75 | 100 |
| Allied-I | UMA20GE11I | Mathematical Foundation for Computer Science | 5 | 5 | 75 | 25 | 75 | 100 |
| Core Lab1 | UCG20CL11 | Practical-Operating System Lab | 5 | 2 | 75 | 40 | 60 | 100 |
| Core Lab 2 | UCG20CL12 | Practical Programming Lab -Introduction to Work Sheets | 5 | 2 | 75 | 15 | 35 | 50 |
| Total | | | 30 | 21 | | | | 600 |

| Course | Code No. | Title of the paper | Hrs/wk | Crd. | Total Hrs | CIA | SE | TOT |
|--------|----------|--------------------|--------|------|-----------|-----|-----|-----|
| **II SEMESTER** | | | | | | | | |
| Part 1 | U20P121 | சமயத் தமிழும் செவ்வியல் தமிழும் | 5 | 3 | 75 | 25 | 75 | 100 |
| Part 2 | U20EN21CT | English II – Campus to Corporate | 3 | 3 | 45 | 25 | 75 | 100 |
| VE | U20VE21 | Value Education | 1 | 1 | 15 | 15 | 35 | 50 |
| Core 2 | UCG20C21 | Python Programming | 4 | 4 | 60 | 25 | 75 | 100 |
| Core 3 | UCG20C22 | Data structures | 4 | 4 | 60 | 25 | 75 | 100 |
| Allied -II | UMA20GE21I | Probability and Statistics | 5 | 5 | 75 | 25 | 75 | 100 |
| Core Lab2 | UCG20CL22 | Practical- Data Structures Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| Core Lab3 | UCG20CL21 | Practical- Python Programming Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| Total | | | 30 | 24 | | | | 750 |

## III SEMESTER

| Course | Code No. | Title of the paper | Hrs/wk | Crd. | Total Hrs | Marks CIA | SE | TOT |
|--------|----------|--------------------|--------|------|-----------|-----------|-----|-----|
| Core 4 | UCG20C31 | Database Management System | 4 | 4 | 60 | 25 | 75 | 100 |
| Core 5 | UCG20C32 | Java Programming | 4 | 4 | 60 | 25 | 75 | 100 |
| Core 6 | UCG20C33 | Computer Networks | 4 | 4 | 60 | 25 | 75 | 100 |
| Allied III | UMA20GE31I | Physics for Computer Science | 5 | 5 | 75 | 25 | 75 | 100 |
| NME I | UCG20NE31 | E-Commerce | 2 | 2 | 30 | 15 | 35 | 50 |
| Core Lab 4 | UCG20CL33 | Practical- Computer Networks Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| Core Lab 5 | UCG20CL32 | Practical- Java Programming Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| Core Lab 6 | UCG20CL31 | Practical- Database Management Lab | 3 | 2 | 45 | 40 | 60 | 100 |
| Total | | | 30 | 25 | | | | 750 |

## IV SEMESTER

| Course | Code No. | Title of the paper | Hrs/wk | Crd. | Total Hrs | Marks CIA | SE | TOT |
|--------|----------|--------------------|--------|------|-----------|-----------|-----|-----|
| Core 7 | UCG20C41 | Virtualization and Cloud | 5 | 4 | 75 | 25 | 75 | 100 |
| Core 8 | UCG20C43 | Process Management | 5 | 4 | 75 | 25 | 75 | 100 |
| Core 9 | UCG20C42 | Infrastructure Management | 5 | 4 | 75 | 25 | 75 | 100 |
| Allied IV | UMA20GE41I | Mathematical Aptitude for competitive examinations | 5 | 5 | 75 | 25 | 75 | 100 |
| NME II | UCG20NE41 | Internet Applications | 2 | 2 | 30 | 15 | 35 | 50 |
| Core Lab7 | UCG20CL41 | Practical- Virtualization and Cloud Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| Core Lab8 | UCG20CL42 | Practical- Infrastructure Management Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| Total | | | 30 | 23 | | | | 650 |

## V SEMESTER

| Course | Code No. | Title of the paper | Hrs/wk | Crd. | Total Hrs | Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | CIA | SE | TOT |
| Core 10 | UCG20C51 | Software Engineering and Testing | 5 | 5 | 75 | 25 | 75 | 100 |
| Core Elective 1 | UCG20CE51 | Core Elective- I | 5 | 5 | 75 | 25 | 75 | 100 |
| Core 11 | UCG20C52 | Digital Technology | 5 | 5 | 75 | 25 | 75 | 100 |
| Core Elective Lab1 | UCG20CL53 | Options given | 4 | 2 | 60 | 15 | 35 | 50 |
| Core Lab11 | UCG20CL51 | Practical - Software Testing Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| Core Lab12 | UCG20CL52 | Practical - Digital Technology Lab | 3 | 2 | 45 | 40 | 60 | 100 |
| SEC I | UCG20SE51 | Practical- DevOps Tools Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| Total | | | 30 | 23 | | | | 650 |

## VI SEMESTER

| Course | Code No. | Title of the paper | Hrs/wk | Crd. | Total Hrs | Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | CIA | SE | TOT |
| Core 12 | UCG20C61 | R- Programming | 4 | 4 | 60 | 25 | 75 | 100 |
| Core 13 | UCG20C62 | *ITIL and Client Relationship Management | 4 | 4 | 60 | 25 | 75 | 100 |
| Core Elective 2 | UCG20CE61 | Core Elective- II | 5 | 5 | 75 | 25 | 75 | 100 |
| Core 14 | UCG20C63 | IT Cognition and Problem Solving | 5 | 4 | 75 | 25 | 75 | 100 |
| Core lab 13 | UCG20CL61 | Practical- R Programming Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| Core Lab14 | UCG20CL62 | Practical- ITIL and Client Relationship Management Lab | 4 | 2 | 60 | 40 | 60 | 100 |
| SEC II | UCG20SE61 | Practical - WEB Technology Lab | 4 | 2 | 60 | 15 | 35 | 50 |
| Part V | | | | 1 | | | | |
| Total | | | 30 | 24 | | | | 650 |

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**List of Electives**

**Core Elective - I**

- Graphics and Visualizations
- Mobile App Development
- Cryptography and network security
- Multimedia and its Applications

**Core Elective – II**

- Data Mining
- Big Data Analytics

**Core Elective Lab - I**
- Practical - Graphics and Visualizations Lab
- Practical - Mobile App Development Lab
- Practical - Cryptography and network security Lab
Practical - Multimedia and its Applications Lab

**Consolidation of contact hours and Credits: UG**

| Semester | Contact Hrs/Week | Credits |
|----------|------------------|---------|
| I | 30 Hrs | 21 |
| II | 30 Hrs | 24 |
| III | 30 Hrs | 25 |
| IV | 30 Hrs | 23 |
| V | 30 Hrs | 23 |
| VI | 30 Hrs | 24 |
| Total | 180 | 140 |

*Thiagarajar College, Madurai. - 39th ACM - Dept. of Comp. Sci. - Syllabus 2020*        K - 101

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DEPARTMENT OF COMPUTER SCIENCE
**B.Sc. Computer Science with Cognitive Systems**
**(For those who join in 2020 and after)**

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| U20EN1 1CT | **English I – Communication Skills** | | 3 | - | - | 3 |

| Year | Semester | Int. Marks | Ext.Marks | Total |
|---|---|---|---|---|
| I | I | 25 | 75 | 100 |

## Course Outcome

| # | Course outcome | Knowledge Level |
|---|---|---|
| **CO1** | Empower their listening and speaking skills | K1 |
| **CO2** | Enrich their vocabulary | K2 |
| **CO3** | Mould their employability skills | K1 |

**K1: Knowledge**        **K2: Understand**        **K3: Apply**

## Content

**Unit-I  Listening skills**

   Listening Effectively - Barriers to communication - Listening to GRE, TOEFL, IELTS  videos

**Unit-II  Speaking Skills**

   Essentials of Spoken English - Situational Conversations - Evaluation- Spoken Practice

**Unit-III  Word Power**

   Choice of Words – Vocabulary

**Unit-IV Comprehension & Composition**

    Comprehension writing from unknown passages - Report Writing - Email Writing

**Unit-V Communication for Carrier Advancement**

    Speaking effectively – The Quick & Easy way - The challenges of Effective Speaking

  Placing mind over matter: Interviews - Shoring up in Group Discussion.

-

## Text Book

1. Communicate or Collapse –A Handbook of Effective Public Speaking, Group Discussion & Interviews. P.Lata and Sanjay Kumar .PHI Learning Pvt ltd.,New Delhi:2007.print

2. English for Success .G.Radhakrishna Pillai.,Emerald publishers.Chennai: 2010.Print
   A Practical Course in Spoken English.J.K.Gangal.,PHI Learning Pvt.ltd. NewDelhi:2012

## Course Designer

**Ms.P.Eswari**

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| U20ES11 | **Environmental Science** | AECC1 | 2 | - | - | 2 |

| Year | Semester | Int. Marks | Ext.Marks | Total |
|---|---|---|---|---|
| I | I | 15 | 35 | 50 |

Students acquire knowledge on the basic concepts, components and importance of environment.

## Preamble

On the completion of the course the student will be able to

## Course Outcome

| | Course outcome | Knowledge Level |
|---|---|---|
| **CO1** | Define the structure and functions of ecosystem | K1 |
| **CO2** | Explain the benefits of biodiversity conservation | K2 |
| **CO3** | Summarise the sources, effects and control measures of various types of Pollutants | K1 |
| **CO4** | Perceive the environment legislations in India for sustainable development. | K3 |
| **CO5** | Elaborate the impact of environmental problems on life systems | K3 |

**K1: Knowledge**          **K2: Understand**          **K3: Apply**

## Mapping of Course Outcomes with Programme Specific  Outcomes

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| **CO1** | L | L | M | L | M |
| **CO2** | --- | M | M | --- | M |
| **CO3** | --- | L | M | L | L |
| **CO4** | --- | --- | L | L | L |
| **CO5** | S | - | L | M | M |

**S-STRONG**          **M- MEDIUM**          **L-LOW**

## Mapping of Course Outcomes with Programme Outcomes

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| **CO1** | S | S | L | S | S | - |
| **CO2** | S | M | L | M | L | L |
| **CO3** | S | S | L | S | M | L |
| **CO4** | S | S | L | M | S | S |
| **CO5** | S | M | - | S | S | S |

**S-STRONG**          **M-MEDIUM**          **L-LOW**

-

**Blooms taxonomy: Assessment Pattern**

|  | CA | | End of Semester |
|---|---|---|---|
|  | First | Second |  |
| *Knowledge* | 40% | 40% | 40% |
| *Understand* | 40% | 40% | 40% |
| *Apply* | 20% | 20% | 20% |

**Course Title: Environmental Studies**

## Unit I

Definition and Scope of Environmental Studies – Ecology and Ecosystem – Structure of an Ecosystem – Food chains, food webs and ecological pyramids – Causes of Biodiversity Loss – Benefit and Conservation of Biodiversity

## Unit II

Environmental problems and Management: Causes, effects and Control measures of : Air PSOllution – Water Pollution – Noise pollution – Nuclear Hazards. Solid waste management and Waste Disposal methods. Climate change and Global Warming causes and Measures. Waste and Plastics. Urban environmental problems and measures. Environmental Legislations in India. Sustainable development and Inclusive growth.

**Text Book**

1**.** Kanagasabai, C.S. 2005.Environmental Studies. Rasee publishers. Madurai.

**Reference Books**

**1.** Yogendra, N. and Srivastava, N. 1998. Environmental PSOllution, Ashish Publishing House. New Delhi.

2. Sapru R.K.2001. Environment Management in India, Vol. I & Vol. II Ashish publishers house, New Delhi.

DEPARTMENT OF COMPUTER SCIENCE
**B.Sc. Computer Science with Cognitive Systems**
**(For those who join in 2020 and after)**
**Programme Code - UCG**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UCG20C11 | Operating System | Core 1 | 5 | - | - | 4 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| I | I | 25 | 75 | 100 |

## Preamble

The course facilitates the students to familiarize the basic concepts of operating systems and its functions, services and management policies with processes, deadlock, and memory, file and windows XP concepts.

## Course Outcomes

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| CO1 | Learn the need of operating system, its components and evolution. | K1, K2 |
| CO2 | Understand the concept of process, operations and scheduling. | K1 |
| CO3 | Acquire the knowledge of process synchronization and deadlock concept. | K2, K3 |
| CO4 | Enrich their knowledge in memory management concept and management techniques. | K1 |
| CO5 | Learn Files systems and Windows XP Concepts. | K2,K3 |

**K1-Knowledge**               **K2-Understand**               **K3-Apply**

## Mapping of COs with PSOs

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | M | S | M | S | S |
| CO2 | M | S | M | S | S |
| CO3 | M | S | M | M | S |
| CO4 | M | S | L | M | S |
| CO5 | M | M | L | S | S |

**S-STRONG**               **M-MEDIUM**               **L-LOW**

## Mapping of COs with POs

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| CO1 | S | M | S | S | S | M |
| CO2 | M | S | S | S | S | S |
| CO3 | M | M | S | S | S | S |
| CO4 | M | S | S | M | M | S |
| CO5 | S | S | S | M | M | S |

**S-STRONG**               **M-MEDIUM**               **L-LOW**

-

**Blooms taxonomy**

|  | CA | | End of Semester |
|  | First | Second |  |
|---|---|---|---|
| Knowledge(K1) | 21 | 21 | 44 |
| Understand(K2) | 21 | 21 | 44 |
| Apply(K3) | 10 | 10 | 22 |
| **Total Marks** | **52** | **52** | **110** |

**Content**

### Unit-I Introduction and Operating System Structure:            15 Hours

Introduction : OS Concepts- Batch Systems- Multi programmed Systems- Time sharing Systems- Desktop systems – Multiprocessor Systems - Distributed Systems.
System Structure: System Components- System Calls.

### Unit-II Process and CPU Scheduling:            15 Hours

Process: Process concept- Process Scheduling- Operations on Process- Co-operating Processes- Interprocess Communication
CPU Scheduling: Basic Concepts- Scheduling Criteria-Scheduling Algorithms.

### Unit-III Process Synchronization and Deadlock:            15 Hours

Process Synchronization: Background- Critical Section Problem
Deadlock: Deadlock characterization-Methods for handling Deadlocks-Deadlock Prevention- Deadlock Avoidance-Deadlock Detection and Recovery.

### Unit-IV Memory Management and Virtual Memory:            15 Hours

Memory Management: Background-Swapping-Contiguous Me m o r y Allocation- Paging- Segmentation.
Virtual Memory: Background- Demand Paging-Page Replacement- Allocation of Frames-Thrashing.

### Unit-V File System and Windows XP:            15 Hours

File System: File Concepts-Access Methods-Allocation Methods- Free Space Management.
Windows XP:  History – Design Principles- System components – Environmental Subsystems- File system- Networking- Programmer interface.

**Text Book**

Silberschatz Galving Gange,2008, Operating System Concepts,6th edn, Wiley India (P) Ltd.,New Delhi

**Chapters (Relevant Topics only)**

| Unit-I | 1.1 to 1.5,3.1,3.3 |
|---|---|
| Unit-II | 4.1 to 4.5, |
| Unit-III | 7.1, 7.2, 8.2 to 8.7 |
| Unit-IV | 9.1 to 9.5, 10.1, 10.2, 10.4 to 10.6 |
| Unit-V | 1.1,11.2,12.4,12.5, 22.1 to 22.7. |

## Reference

1. William Stallings,2000, Operating Systems,2<sup>nd</sup> edn, PHI Prentice Hall,New Delhi

2. Achyut S Godbole, Operating systems, McGraw-Hill, 3<sup>rd</sup> edn

## Web Resources

https://www.tutorialspoint.com/operating_system/operating_system_tutorial.pdf
   * The above web link is designed to learn the fundamental and advanced concepts of Operating with real time examples.
https://lecturenotes.in/subject/56/operating-systems-os
   * The above web link is used to understand the concepts of operating system with case studies.

## Course designer:

**Mr.J.Prakash**

**B.Sc. Computer Science with Cognitive Systems**
**(For those who join in 2020 and after)**

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UMA20GE11I | Mathematical Foundation for Computer Science | Generic Elective | 5 | - | - | 5 |

L - Lecture            T - Tutorial            P–Practical

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | First | 25 | 75 | 100 |

## Preamble

This Course provides hands-on exploration of the relevancy of set theory, logic, basic principles of Boolean Algebra and Graph theory.

## Course Outcomes

**On the completion of the course the student will be able to**

| # | Course Outcome | Knowledge Level |
|---|---|---|
| CO1 | Relate set theoretical concepts and analyze simple algorithms | K1, K2, K3 |
| CO2 | Recall basic matrix operations and solve problems using matrix theory | K1, K3 |
| CO3 | Construct and classify logical sentence in terms of logical connectives and predicates | K2, K3 |
| CO4 | Formulate and interpret Boolean logic principles | K2, K3 |
| CO5 | Find matrices related to graphs and apply graph theoretical ideas in problem solving | K1, K3 |

## Mapping of COs with PSOs

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | - | - | M | - |
| CO2 | - | S | - | M | - |
| CO3 | - | - | S | - | M |
| CO4 | - | - | S | M | - |
| CO5 | - | S | - | - | M |

## Mapping of COs with POs

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| CO1 | S | M | - | - | M | - |
| CO2 | S | S | S | M | - | - |
| CO3 | S | S | S | - | M | M |
| CO4 | M | S | S | M | - | - |
| CO5 | S | M | - | M | - | M |

## Blooms taxonomy

| | CA | | End of Semester |
|---|---|---|---|
| | **First** | **Second** | |
| Knowledge(K1) | **21** | **21** | **44** |
| Understand(K2) | **21** | **21** | **44** |
| Apply(K3) | **10** | **10** | **22** |
| **Total Marks** | **52** | **52** | **110** |

## Contents

### Unit I                                                            (15 Hours)

Relations and Functions :Cartesian Product of Two sets – Relations – Representations of a Relation – Operations on Relations – Equivalence Relations – Closures and Warshall's Algorithm – Partitions and Equivalence Classes. Functions and operators – One – to – one, Onto functions – Special Types of Functions – Invertible Functions – Composition of Functions.(Proofs of the Theorems are not included – Problems only)

### Unit II                                                            (15 Hours)

Matrix Algebra : Introduction **-** Matrix operations – Inverse of a Square Matrix – Elementary operations and Rank of a Matrix – Simultaneous Linear Equations – Inverse by Partitioning **-** Eigen values and Eigen vectors.

### Unit III                                                            (15 Hours)

Logic :Introduction – TF-statements – Connectives – Atomic and compound statements – Well Formed (Statement) Formulae – Truth table of a Formula – Tautology – Tautological Implications and Equivalence of Formulae – Replacement Process – Functionally complete sets of connectives and Duality law – Normal Forms – Principal Normal Forms

### Unit IV                                                            (15 Hours)

Lattices and Boolean Algebra : Lattices – Some properties of Lattices – New Lattices – Modular and Distributive Lattices.

### Unit V                                                            (15 Hours)

Graph Theory : Basic concepts – Matrix Representation of Graphs

**Note : Proof of the Theorems are not included**

## Text Book:

Venkataraman. M.K., Sridharan. N. and Chandrasekaran. N. 2009, Discrete Mathematics, The National Publishing Company, Chennai.

| Unit | Chapter/Section |
|---|---|
| I | II(1 – 7) III(1 – 5) |
| II | VI(1 – 7) |
| III | IX(1 – 12) |
| IV | X(1- 4) |
| V | XI(1 and 2) |

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**References:**

1. Seymour Lipschutz and Marc Lars Lipson, 2002, Discrete Mathematics, Tata McGraw Hill Publishing Company Ltd. New Delhi.
2. Trembley. J.P. and Manohar. R. 2001, Discrete Mathematical Structures with Applications to Compute Science, Tata McGraw –Hill Publishing Company Ltd, New Delhi.

**Course Designers:**

1. Dr. R. Angeline Chella Rajathi

2. Mr. K.V. Janarthanan

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DEPARTMENT OF COMPUTER SCIENCE

**B.Sc. Computer Science with Cognitive Systems**

**(For those who join in 2020 and after)**

**Programme Code - UCG**

| Programme Code - UCTCourse code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UCG20CL11 | Operating System Lab | Core Lab 1 | - | - | 5 | 2 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| I | I | 40 | 60 | 100 |

**Preamble**

This course enables the students to learn and handle windows server administration tasks such as installation, group policies, storage management, DNS and DHCP concepts

**Course Outcomes**

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Learn Installation of Client, Server OS and create server and play roles | K1,K3 |
| **CO2** | Know the concepts of Zone creation and DHCP File and print services | K2,K3 |
| **CO3** | Apply File, print service and Devices, printers | K3 |
| **CO4** | Learn Group policy and server storage management. | K2,K3 |
| **CO5** | Implement ADS Scenario based concepts and DNS, DHCP | K3 |

**K1-Knowledge          K2-Understand          K3-Apply**

**Mapping of COs with PSOs**

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| **CO1** | S | S | S | S | M |
| **CO2** | S | S | S | S | M |
| **CO3** | S | S | S | S | M |
| **CO4** | S | S | S | S | M |
| **CO5** | S | S | S | S | M |

**S-STRONG          M-MEDIUM          L-LOW**

**Mapping of COs with POs**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| **CO1** | S | M | M | S | S | M |
| **CO2** | M | S | S | S | M | M |
| **CO3** | M | M | S | S | S | M |
| **CO4** | M | S | S | L | S | S |
| **CO5** | S | S | M | M | S | S |

**S-STRONG                    M-MEDIUM                    L-LOW**

## Content

1. Installation of client and server OS
2. Create server and play roles
3. Zone creation and DHCP
4. File and print services
5. Devices and printers
6. Group policy
7. Server storage management
8. Server scenario
9. ADS Scenario based
10. DNS and DHCP

## Web Resources

https://ittutorials.net/microsoft/windows-server-2016/

- The above Web link has information about windows server 2016 consist of many new features in computing of server room concepts and it has many top features process in windows server 2016.

https://www.tutorialspoint.com/windows_server_2012/index.htm

- The above Web link has information about Windows server for the professionals to install and use operating system to perform various operations on windows based Microsoft server based managements.

## Course Designer

**Mr.J.Prakash**

THIAGARAJAR COLLEGE (AUTONOMOUS) :: MADURAI – 09
DEPARTMENT OF COMPUTER SCIENCE

# B.Sc. Computer Science with Cognitive Systems

**(For those who join in 2020 and after)**
**Programme Code - UCG**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UCG20CL12 | Practical Programming Lab -Introduction to Work Sheets | Core Lab 2 | - | - | 5 | 2 |

L – ecture          T – Tutorial          P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| I | I | 15 | 35 | 50 |

## Preamble

**This course helps the students to perform all sorts of tasks like budgeting, sales analysis, forecasting, charting, graphing and much more.**

## Course Outcomes

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level (according to Bloom's Taxonomy) |
|---|---|---|
| CO1 | Develop applications using workbook and worksheet object | K3 |
| CO2 | Implement worksheets using control statements and range function. | K3 |
| CO3 | Develop interactive applications using Userform | K3 |
| CO4 | Implement applications using functions and sub procedures. | K3 |
| CO5 | Handle worksheets using mathematical and financial functions. | K3 |

**K1-Knowledge          K2-Understand          K3-Apply**

## Mapping of COs with PSOs

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | M | S | M | M | S |
| CO2 | M | S | S | S | S |
| CO3 | M | S | S | M | S |
| CO4 | S | S | M | M | S |
| CO5 | S | S | M | M | S |

**S-STRONG          M-MEDIUM          L-LOW**

## Mapping of COs with POs

|      | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|------|-----|-----|-----|-----|-----|-----|
| CO1  | S   | S   | M   | M   | S   | S   |
| CO2  | M   | S   | S   | S   | M   | M   |
| CO3  | S   | M   | M   | S   | S   | M   |
| CO4  | M   | M   | S   | S   | S   | M   |
| CO5  | S   | S   | M   | M   | S   | M   |

**S-STRONG**      **M-MEDIUM**      **L-LOW**

## Content

1. Program to demonstrate Built in Dialog boxes.

2. Program to calculate total sales value of each employee over a period of three years in workbook and worksheet object.

3. Program to show print preview of all the possible cricket matches from a list of items using range function.

4. Program to compare randomly selected ranges and highlight cells that are unique using range function.

5. Program to calculate the tax on income

| Income | Tax on this income |
|--------|--------------------|
| 0 to Rs.2,00,000 | Nil |
| Rs.2,00,000 to 4,00,000 | 10% |
| Rs,4,00,000 to 8,00,000 | 20% |
| Above Rs.8,00,000 | 30% |

6. Program to create userform that converts any amount from one currency into another.

7. Program to demonstrate interactive userform.

8. Program to create a sub procedure to generate Fibonacci series up to 1000.

9. Program to demonstrate financial functions.

10. Program to demonstrate mathematical functions.

## Web Resources

https://www.excel-easy.com/vba.html

- The above web link is used to know the basic concepts of VBA. The students will get to know to perform all sorts of data analytics.

https://www.automateexcel.com/learn-vba-tutorial/

- The above web link is used to understand the core concepts of worksheet object which will be used to do financial, mathematical and statistical calculations.

**Course Designer:**

Mr.J.Prakash

*Thiagarajar College, Madurai. - 39<sup>th</sup> ACM - Dept. of Comp. Sci. - Syllabus 2020*

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DEPARTMENT OF COMPUTER SCIENCE
**B.Sc. Computer Science with Cognitive Systems**
**(For those who join in 2020 and after)**

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| U20EN21CT | **English II – Campus to Corporate** | | 3 | - | - | 3 |

| Year | Semester | Int. Marks | Ext.Marks | Total |
|---|---|---|---|---|
| I | II | 25 | 75 | 100 |

## Course Outcomes

| | Course outcomes | Knowledge Level |
|---|---|---|
| **CO1** | Empower their employable skills | K1 |
| **CO2** | Incorporate their technical skills for placement | K2 |
| **CO3** | Enrich their Personality Development | K1 |

**K1: Knowledge        K2: Understand        K3: Apply**

## Content

### Unit-I Introduction
Introduction to Corporate Communication - Transition from Campus to Corporate- Corporate Expectations Scenario.

### Unit-II Personality Development
Personality Development-Definition, Need & Importance -Positive Mindset & Values-     Work-Life Balance - Time & Stress Management

### Unit-III Organisational Behaviour
Professional Skills - Communication Skills - Team Work – Managing Conflicts Power & Politics in Organization

### Unit-IV Technology Skills
How to make a Presentation - Using Audio-Visual Aids - Evaluation- Presentation with an Aid

### Unit-V Placement
Verbal Aptitude - Group Discussion - Drafting a CV- Interview

## Text Book

1. Soft Skills .,Dr.K.Alex.S.Chand &Company Pvt.Ltd. NewDelhi:2009.Print   Business Communication : Technical & Methods.,OM.P.Juneja &Aarati Mujumdar. Orient BlackSwan Pvt.ltd., Hyderabad:2010. Print.

2. Campus to Corporate: Your Roadmap to Employability.Gangadhar Joshi. Sage Publications Pvt Ltd.NewDelhi: 2016.Print

## Course Designer
**Ms.P.Eswari**

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THIAGARAJAR COLLEGE (AUTONOMOUS) :: MADURAI – 09
DEPARTMENT OF COMPUTER SCIENCE
**B.Sc. Computer Science with Cognitive Systems**
**(For those who join in 2020 and after)**
**Programme Code - UCG**

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UCG20C21 | Python Programming | Core 2 | | 4 | 1 | - |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | Int. Marks | Ext.Marks | Total |
|---|---|---|---|---|
| I | II | 25 | 75 | 100 |

## preamble

This course is designed to provide an introduction to the python programming language. The focus of the course is to provide students with an introduction to programming, utilities, multitasking, GUI and network application

## Course Outcomes

On the completion of the course the student will be able to

| | Course outcomes | Knowledge Level |
|---|---|---|
| **CO1** | Learn basic concepts of Python and its overview | K2 |
| **CO2** | Implement application using list, set operation and manage files using python. | K2, K3 |
| **CO3** | Develop programs using the concept of Multithreading | K1,K2 |
| **CO4** | Implement Object Oriented Programming using Python | K1,K2 |
| **CO5** | Develop GUI based applications and implement TCP/IP and UDP network programming using python | K2,K3 |

**K1: Knowledge          K2: Understand          K3: Apply**

### Mapping of COs with PSOs

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| **CO1** | S | M | M | M | S |
| **CO2** | M | S | S | M | S |
| **CO3** | S | M | M | M | M |
| **CO4** | S | S | M | S | S |
| **CO5** | M | S | S | S | S |

**S-STRONG          M-MEDIUM          L-LOW**

## Mapping of COs with POs

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| **CO1** | S | M | S | M | S | - |
| **CO2** | M | S | M | S | M | - |
| **CO3** | S | M | M | S | M | - |
| **CO4** | M | S | S | M | S | - |
| **CO5** | M | S | M | | S | - |

**S-STRONG          M-MEDIUM          L-LOW**

|  | CA | | End of Semester |
|---|---|---|---|
|  | **First** | **Second** | |
| Knowledge(K1) | **21** | **21** | **44** |
| Understand(K2) | **21** | **21** | **44** |
| Apply(K3) | **10** | **10** | **22** |
| **Total Marks** | **52** | **52** | **110** |

## Content

### Unit-I: Introduction to Python:      12 Hours

Introduction-Python Overview--Python Identifiers-Reserved Keywords-Operators-Control Statements.

### Functions:

Introduction-Built-in Functions-User Defined Functions-Function Calls-Python Recursive Function-Writing Python scripts.

### Unit-II:Lists, Tuples and Dictionaries:      10 Hours

Lists, Tuples and Dictionaries-Strings and Lists– Strings-Lists-Tuples and Dictionaries-Tuples-Dictionaries - Files and Exceptions - Text Files-Directories-Exceptions-Exception with Arguments-User Defined Exceptions.

### Unit-III:Classes and Objects:      14 Hours

Overview of OOP-Class Definition-Creating Objects-Built in Class Attributes-Inheritance-Method Overriding-Data Encapsulation-Data Hiding.

### Thread:

Single Tasking-Multitasking-Differences between a process and a Thread-Concurrent programming and GIL-Uses of Threads-Creating Thread in Python-Creating a Thread without using a class-creating a Thread by Creating a sub class to Thread Class- creating a Thread without Creating Sub Class to Thread Class-Thread Class Methods-Single Tasking using a Thread-Multitasking Using Multiple

### Unit-IV: Graphical User Interface:      12 Hours

GUI in python-The Root Window-Fonts and Colors-Working with Containers-Canvas-Frame-Widgets-Button Widget-Arranging Widgets in the Frame-Label Widget-Message Widget-Text Widget-Scrollbar Widget-Check button Widget-Radio button Widget-Entry Widget-Spin box Widget-List box Widget-Spin box widget-List box Widget-Menu Widget-creating Tables-Points to Remember.

### Unit-V:Networking in python:      12 Hours

Protocol-TCP/IP Protocol-User Datagram Protocol(UDP)-Sockets-Knowing IP Address-URL-Reading the Source Code of a Web page-Downloading a Web Page from Internet-Downloading an Image from Internet-A TCP/IP Server-A TCP/IP

Client-A UDP Server-A UDP Client-File Server-File Client-Two-Way Communication Between Server and Client-Sending a Simple mail-points to Remember

## Text Book

1. Title: Problem Solving and Python Programming

   Author: E. Balagurusamy
   Publisher: Mc Graw Hill Education
   Year of Edition: 2018

2. Title: Core Python Programming

   Author: Dr. R.Nageswara Rao
   Publisher: Dreamtech Press
   Edition: second

## Chapters:

| Unit | Chapters |
|------|----------|
| I | 3.1,3.2,3.5,3.6,3.9,3.13,4.1,4.2,4.4,4.6,4.6,4.10 (from book 1) |
| II | 5.1, 5.2, 6.1, 6.2, 7.1 to 7.5 (from book 1) |
| III | 8.1 To 8.3, 8.6 To 8.10, 21(Page no: 537 to 549) from book 2 |
| IV | 22 (Page no: 569 to 620) from book 2 |
| V | 23 (Page no: 623 to 644) from book 2 |

## Reference Book:

1. Chun, J Wesley, Core Python Programming, 2nd Edition, Pearson, reprint 2010.

## Web Resources:

1) https://www.learnpython.org/
- The above web link is used to understand core python concepts and advanced concepts such as networking and GUI applications

2) https://www.tutorialspoint.com/python/
- The above web link is designed to know python concepts and advanced concepts such as networking and GUI applications with suitable examples.

## Course Designer

Mr.J.Prakash

*Thiagarajar College, Madurai. - 39<sup>th</sup> ACM - Dept. of Comp. Sci. - Syllabus 2020*     K - 120

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DEPARTMENT OF COMPUTER SCIENCE
**B.Sc. Computer Science with Cognitive Systems**
**(For those who join in 2020 and after)**
**Programme Code - UCG**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UCG20C22 | Data Structures | Core 3 | 4 | - | - | 4 |

L – Lecture      T – Tutorial      P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| I | II | 25 | 75 | 100 |

## Preamble

The course elaborates on basic data structure concepts with different ways of organizing data and developing algorithms for various operations and applications on data structures.

## Course Outcomes

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| CO1 | Learn the basic data structures and its operations and also calculate time and space complexity | K1 |
| CO2 | Understand stack and queue data structure and their practical application | K2 |
| CO3 | Implement Linked list real time applications like memory management. | K3 |
| CO4 | Represent and manipulate data using nonlinear data structures like trees and graphs to design algorithms for various applications | K3 |
| CO5 | Understand the concepts of search and sort algorithms using data structures given specific user requirements. | K3 |

**K1-Knowledge**      **K2-Understand**      **K3-Apply**

## Mapping of COs with PSOs

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | S | L | - | - |
| CO2 | S | - | - | S | - |
| CO3 | M | S | - | M | - |
| CO4 | - | M | - | - | M |
| CO5 | S | S | M | S | - |

**S-STRONG**      **M-MEDIUM**      **L-LOW**

## Mapping of COs with POs

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| CO1 | S | M | S | M | S | - |
| CO2 | M | S | M | S | M | - |
| CO3 | S | M | M | S | M | - |
| CO4 | M | S | S | M | S | - |
| CO5 | M | S | M | | S | - |

| | S-STRONG | M-MEDIUM | L-LOW |

| | CA | | End of |
|---|---|---|---|
| | **First** | **Second** | **Semester** |
| Knowledge(K1) | **21** | **21** | **44** |
| Understand(K2) | **21** | **21** | **44** |
| Apply(K3) | **10** | **10** | **22** |
| **Total Marks** | **52** | **52** | **110** |

## DATA STRUCTURES

**Unit-I** (12 Hours)

**Introduction and Overview**: Introduction - Basic Terminology; Elementary Data Organization - Data structures - Data structure operations - Algorithms: Complexity, Time-Space Trade-off. Preliminaries: Algorithmic Notation - Control Structures-Variables, Data Types. Arrays, Records and Pointers: Introduction - Linear Arrays - Representation of Linear Arrays in Memory - Traversing Linear array - Inserting and Deleting - Multidimensional Array

**Unit-II** (14 Hours)

**Stack, Queues, Recursion**: Introduction – Stacks - Array Representation of Stacks -Linked Representation of Stacks - Arithmetic Expressions - Polish Notation - Recursion-Towers of Hanoi - Implementation of Recursive Procedures by Stacks – Queues - Linked Representation of Queues – Dequeue - Priority Queues

**Unit-III** (12 Hours)

**Linked Lists**: Introduction - Linked Lists - Representation of Linked Lists in Memory-Traversing a Linked List - Memory Allocation-Garbage Collection –Insertion into a Linked List- Deletion from a Linked List - Header Linked Lists

**Unit-IV** (12 Hours)

**Trees**: Introduction - Binary Trees - Representing Binary Trees in Memory-traversing binary trees-Graphs: Terminology and Representations –Sequential Representation of Graphs- Adjacency Matrix, Path Matrix

**Unit -V** (10 Hours)

**Sorting and Searching:** Introduction – Sorting - Insertion Sort - Selection Sort - Merging -Merge Sort - Radix Sort - Bubble Sort- Quick Sort. Searching and Data Modification – Hashing- Linear Search - Binary Search

**Text Book**

- Seymour Lipschutz, Data Structures, TataMcGraw Hill Company,5<sup>th</sup> Edition 2009, Reprinted, 2014

**Reference**

- E. Horowitz & Sahni,Fundamentals of Data Structure, Galgotia Book Source, 1983.
- A. Tannenbaum, Data Structure Using C, Pearson Education, 2003.

## Chapters: (Relevant Topics only)

| | |
|---|---|
| Unit – I | : 1.1 to 1.5, 2.1,2.3,2.4,2.8, 4.1 to 4.5, 4.9 |
| Unit – II | : 6.1 to 6.5,6.7 to 6.13 |
| Unit-III | : 5.1 to 5.4,5.6 to 5.9 |
| Unit-IV | : 7.1 to 7.4,8.1 to 8.3 |
| Unit-V | : 9.1 to 9.9 |

## Web Resources

1. https://www.javatpoint.com/data-structure-tutorial

- The above web link is designed to understand datastructures concepts with examples.

2. https://www.studytonight.com/data-structures/introduction-to-data-structures

- The above web link is designed to learn data structures and to perform different operations on data.

## Course Designer

**Mrs.J.UMA**

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| **UMA20GE21I** | **Probability and Statistics** | **Generic Elective** | **5** | **-** | **-** | **5** |

| L - Lecture | | T - Tutorial | | P – Practical | |
|---|---|---|---|---|---|

| Year | Semester | Int. Marks | Ext. Marks | Total |
|---|---|---|---|---|
| First | Second | 25 | 75 | 100 |

## Preamble

Statistics is the systematic study of variation in data and the course is a foundation for probability and statistical ideas in exploratory data analysis and provides a concise and clear description of various statistical methods used for analysis.

## Course Outcomes

**On the completion of the course the student will be able to**

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Improve  data handling skills and  summarize statistical computations | K2, K3 |
| **CO2** | Determine the relationship between quantitative variables and extend regression analysis | K2, K3 |
| **CO3** | Recall and apply a comprehensive set of Probability ideas | K1, K3 |
| **CO4** | Find, interpret and analyze  the measure of central tendencies, Moment Generating function and Characteristic function of  random variables | K1, K2, K3 |
| **CO5** | Relate, Analyze and Demonstrate the  knowledge of using  various distributions for statistical analysis | K1, K2, K3 |

## Mapping of COs with PSOs

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| **CO1** | S | - | - | - | M |
| **CO2** | - | - | S | M | - |
| **CO3** | S | - | - | M | - |
| **CO4** | - | S | M | - | M |
| **CO5** | - | S | | - | M |

## Mapping of COs with POs

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| **CO1** | S | M | M | | M | |
| **CO2** | S | S | S | M | | |
| **CO3** | S | S | S | | M | M |
| **CO4** | M | S | S | M | | |
| **CO5** | S | S | S | M | M | M |

-

## Blooms taxonomy

| | CA | | End of Semester |
|---|---|---|---|
| | **First** | **Second** | |
| Knowledge(K1) | **21** | **21** | **44** |
| Understand(K2) | **21** | **21** | **44** |
| Apply(K3) | **10** | **10** | **22** |
| **Total Marks** | **52** | **52** | **110** |

## Contents

### Unit I                                                                      (15 Hours)
Central Tendencies: Introduction – Arithmetic Mean.
Measures of Dispersion: Introduction – Measures of Dispersion.

### Unit II                                                                     (15 Hours)
Correlation and Regression: Introduction – Correlation – Rank Correlation – Regression.

### Unit III                                                                    (12 Hours)
Probability: Introduction- Probability- Conditional Probability.

### Unit IV                                                                     (15 Hours)
Mathematical Expectation of random variables– Moment Generating Function – Characteristic Function.

### Unit V (Formula Derivations are not required. Only problems need be dealt with)    (18 Hours)
Some Special Distributions**:** Introduction – Binomial Distribution – Poisson Distribution -Normal Distribution.

## Text Book:
Arumugam. S. and Thangapandi Isaac. A., 2011, Statistics, New Gamma Publishing House, Palayamkotai.

## Chapters:

| Unit | Chapter/Section |
|---|---|
| I | 2(2.0 - 2.1), 3(3.0, 3.1) |
| II | 6(6.0 – 6.3) |
| III | 11(11.0-11.2) |
| IV | 12(12.4– 12.6) |
| V | 13(13.0 –13.3) |

## References:

1. Vittal. P.R., 2013, Mathematical Statistics, Margham Publications, Chennai.
2. Gupta. S.C. and Kapoor. V.K., 2007, Fundamentals of Mathematical Statistics, Eleventh edition, Sultan Chand & sons, New Delhi.
3. Gupta. S.C. and Kapoor. V.K., 2015, Elements of Mathematical Statistics, Third Edition, Sultan Chand & Sons, Educational Publishers, New Delhi.

## Course Designers:

1. Dr. R. Angeline Chella Rajathi

2. Mr. K.V. Janarthanan

**B.Sc. Computer Science with Cognitive Systems**
**(For those who join in 2020 and after)**
**Programme Code - UCG**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UCG20CL22 | Data structure Lab | Core Lab – 2 | - | - | 4 | 2 |

L – Lecture        T – Tutorial        P – Practical

| Year | Semester | Internal | External | Total |
|---|---|---|---|---|
| I | II | 40 | 60 | 100 |

## Preamble

The course provides the knowledge is to implement various data structure & algorithm methods that impact the performance of program efficiently.

## Course Outcomes

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| **CO1** | Develop programs for stack and queue data structure and its operations. | K2,K3 |
| **CO2** | Develop programs for singly and doubly linked list operations | K2,K3 |
| **CO3** | Implement various traversal Techniques for non linear data structures | K3 |
| **CO4** | Develop program to implement Shortest Path Algorithms and binary search | K3 |
| **CO5** | Develop programs for different types of sorting methods | K2,K3 |

**K1-Knowledge**            **K2-Understand**            **K3-Apply**

## Mapping of COs with PSOs

|  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| **CO1** | S | S | M | M | M |
| **CO2** | S | S | S | S | L |
| **CO3** | S | M | M | M | M |
| **CO4** | S | S | M | M | M |
| **CO5** | S | S | M | M | L |

**S-STRONG**            **M-MEDIUM**            **L-LOW**

## Mapping of COs with POs

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| **CO1** | S | M | M | S | S | M |
| **CO2** | M | S | S | S | M | L |
| **CO3** | M | M | S | S | S | L |
| **CO4** | M | S | S | L | S | M |
| **CO5** | S | S | M | M | S | M |

**S-STRONG**            **M-MEDIUM**            **L-LOW**

## Content

1. Write a program to implement stack operations.
2. Write a program to implement queue operations.
3. Write a program to implement Binary Search.
4. Write a program to implement singly linked list operations.
5. Write a program to implement doubly linked list operations.
6. Write a program to implement Graph Traversals.
7. Write a program to implement Tree traversals.
8. Write a program to implement Shortest Path Algorithms.
9. Write a program to implement Merge Sorting.
10. Write a program to implement Quick Sort-Analysis.
11. Write a program to implement selection sorting.
12. Write a program to implement insertion sorting.

## Web Resources

1. https://www.geeksforgeeks.org/data-structures/
- The above web link is designed to understand data structures concepts with exercises.
2. https://www.programiz.com/dsa
- The above web link is designed to understand data structures concepts with exercises.

## Course Designer:

**Mrs.J.UMA**

**B.Sc. Computer Science with Cognitive Systems**
**(For those who join in 2020 and after)**
**Programme Code - UCG**

| Course code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| UCG20CL21 | Python Programming Lab | Core Lab – 2 | - | - | 4 | 2 |

L – Lecture          T – Tutorial          P – Practical

| Year | Semester | | Internal | External | Total |
|---|---|---|---|---|---|
| I | II | | 40 | 60 | 100 |

## Preamble

The course provides the knowledge is to implement various data structure & algorithm methods that impact the performance of program efficiently.

## Course Outcomes

On the completion of the course the student will be able to

| # | Course Outcome | Knowledge Level |
|---|---|---|
| CO1 | Learn and apply OOPS concepts. | K2,K3 |
| CO2 | Implement exception handling and Multithreading concepts. | K2,K3 |
| CO3 | Develop GUI applications using TKinter. | K2,K3 |
| CO4 | Implement network applications. | K3 |
| CO5 | Develop data science applications using Pandas | K2,K3 |

**K1-Knowledge**          **K2-Understand**          **K3-Apply**

## Mapping of COs with PSOs

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | S | S | M | M | S |
| CO2 | S | S | S | S | S |
| CO3 | S | M | M | M | S |
| CO4 | S | S | M | M | S |
| CO5 | S | S | M | M | S |

**S-STRONG**          **M-MEDIUM**          **L-LOW**

## Mapping of COs with POs

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
|---|---|---|---|---|---|---|
| CO1 | S | M | L | S | S | M |
| CO2 | M | S | S | S | L | L |
| CO3 | M | M | S | S | S | L |
| CO4 | M | S | M | M | S | M |
| CO5 | S | S | M | M | M | M |

**S-STRONG**          **M-MEDIUM**          **L-LOW**

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## Content

1. Python program to find factorial for a given number.
2. Python program to generate Fibonacci series.
3. Python program to implement classes and objects.
4. Python program to implement the concept of constructors.
5. Python program to implement the various types of Inheritance.
6. Python program to demonstrate method overriding.
7. Python program to demonstrate Exception.
8. Python program to demonstrate Multithreading.
9. Python program to demonstrate font and color.
10. Python program to demonstrate GUI widgets.
11. Python program to demonstrate socket programming.
12. Python program to implement DML operations.
13. Python program to demonstrate Dictionary.
14. Python program to demonstrate data frame from dictionary.
15. Python program to demonstrate indexing and selecting data.
16. Python program to demonstrate group by operations.

## Web Resources

1. https://www.programiz.com/python-programming/examples
- The above web link is designed to give idea about core python concepts with suitable programming examples.

2. https://pythonprogramming.net/data-analysis-tutorials/

- The above web link is designed to understand data analytics concepts with examples using python.

## Course Designer:

**Mr.J.Prakash**

*Thiagarajar College, Madurai. - 39th ACM - Dept. of Comp. Sci. - Syllabus 2020*                    K - 129

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# THIAGARAJAR COLLEGE, MADURAI – 9.

## (Re-Accredited with 'A' Grade by NAAC)

## VALUE EDUCATION

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| **U20VE21** | **Value Education** | AECC2 | 2 | - | - | 1 |

| Year | Semester | Int. Marks | Ext.Marks | Total |
|---|---|---|---|---|
| First | Second | 15 | 35 | 50 |

## Preamble

Students acquire knowledge on the basic concepts, components and importance of environment.

## Course Outcomes

**On the completion of the course the student will be able to**

| | Course outcomes | Knowledge Level |
|---|---|---|
| **CO1** | Define the values, Self assessment and values needed for self development | **K1** |
| **CO2** | Explain about the good character and good relationships | **K2** |
| **CO3** | Summarise the types of thoughts, developing thought pattern, external influences on thoughts | **K1** |
| **CO4** | Find out the causes of Illusions, Symptoms and stages of stress | **K3** |

**K1: Knowledge    K2: Understand    K3: Apply**

## Mapping of  Course Outcomes with Programme Specific Outcomes

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| **CO1** | L | - | M | - | - |
| **CO2** | - | L | M | L | - |
| **CO3** | M | M | S | - | - |
| **CO4** | | - | M | L | - |

## Mapping of Course Outcome with Programme Outcomes

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO6 |
|---|---|---|---|---|---|---|
| **CO1** | L | - | M | - | - | - |
| **CO2** | - | L | M | L | - | L |
| **CO3** | M- | M | S | - | - | - |
| **CO4** | - | - | M | L | - | M |

**Blooms taxonomy:  Assessment Pattern**

|  | CA | | End of Semester |
|---|---|---|---|
|  | First | Second | |
| *Knowledge* | 40% | 40% | 40% |
| *Understand* | 40% | 40% | 40% |
| *Apply* | 20% | 20% | 20% |

**Course Title: Value Education**

## Unit I

**Self Development** – Introduction - Definition and Types of Values – Self Assessment – Values needed for self development - Values needed for family life –Principles of happy living

**Character development**- Good character – Good relationships - Legendary people of highest character – The quest for character –Developing character -The key to good character.

## Unit II:

**Positive Thinking and Self Esteem -** Types of thoughts - Areas of thinking - Developing thought pattern - External influences on Thoughts - Methods to keep outlook positive – Meaning of Self Esteem – Self empowerment.

**Stress free living** – Illusions and causes - Symptoms and stages of stress – Self confidence– Role models and leadership qualities – Critical thinking - Communication skills – Happy and successful life.

**Reference:**

**Study material / Course material**

1. Values for Excellence in Life Compiled by then Curriculum Development Cell Thiagarajar College, Madurai, in collaboration with the Education wing, Brahma Kumaris, Madurai.

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