

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 OF COMPUTER 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.

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

I SEMESTER								
Course	Code No.	Title of the paper	Hrs/ wk	Crd.	Total Hrs	Marks		
						CIA	SE	TOT
Part 1	U20P111C	இக்காலத் தமிழும் இடைக்காலத் தமிழும்	5	3	75	25	75	100
Part 2	U20EN11	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

II SEMESTER								
Course	Code No.	Title of the paper	Hrs/ wk	Crd.	Total Hrs	Marks		
						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	UCS20C42	Computer Graphics	6	4	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	3	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	Marks		
						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
	UCS20IN	Internship		2		15	35	50

VI SEMESTER

Course	Code No.	Title of the paper	Hrs/ wk	Crd.	Total Hrs	Marks		
						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

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Programme Code: UCS

Coursecode	CourseTitle	Category	L	T	P	Credit
UCS20C31	Data Structures and Algorithms	Core5	4	1	-	4
			L– Lecture	T–Tutorial	P– Practical	

Year	Semester	Internal	External	Total
II	III	25	75	100

Preamble:

The course elaborates on basic data structure and algorithms for organizing different types of data and perform various operations on data structures.

Course Outcomes

On the successful completion of this course, Students will be able to:

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Elaborate the concepts of algorithms and arrays.	60%	70%
CO2	Explain stack and queue concepts and their application.	60%	70%
CO3	Explain the terminology and application of linked list and its role in dynamic storage management.	60%	70%
CO4	Understand Tree application in sets, games and decision trees.	60%	70%
CO5	Construct Graphs to create network and road map structure to find the shortest paths.	60%	70%

Mapping of COs with PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	M	L	L
CO2	M	M	M	M	M
CO3	M	L	M	S	L
CO4	S	-	M	L	M
CO5	M	M	M	L	S
	S-STRONG	M-MEDIUM		L-LOW	

Mapping of COs with POs

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

S-STRONG M-MEDIUM L-LOW

Bloomstaxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%

Content:

UNIT I

15 Hours

Introduction of algorithms-analyzing algorithms-Arrays:Representation of Arrays-Linear and binary search.

UNIT II

15 Hours

Implementation of Stacks and queues-Application of Stack:Evaluation of Expression-Infix to Postfix Conversion-Multiple Stacks and Queues-Sparse Matrices.

UNIT III

16 Hours

Linked list: Singly Linked list-Linked Stacks and Queues-Polynomial addition-More on Linked Lists-Doubly Linked List and Dynamic Storage Management-Garbage collection and compaction.

UNIT IV

15 Hours

Trees: Basic Terminology-Binary Trees-Binary Tree representations-Binary trees Traversal-More on Binary Trees-Threaded Binary trees-counting Binary trees.

UNIT V

14 Hours

Graphs: Terminology and Representations-Traversals-connected components and Spanning Trees-Shortest path and Transitive closure

Text Book

1. Ellis Horowitz, Sartaj Sahni, Fundamentals of Data Structures, 4th edn, Galgotia Books source

Chapters

Unit I	: 1, 2, 7.2, 7.3
Unit II	: 3
Unit III	: 4
Unit IV	: 5
Unit V	: 6

References

1. Sartaj Sahni, Data Structures, Algorithms and Applications in C++, McGraw Hill International Edition
2. Aaron M. Tenenbaum, Data Structures Using C, Pearson Education India

Web Resources

1. <https://www.slideshare.net/nirajju/fundamentals-of-data-structures-7794245>
2. <http://apachetechnology.in/ati/www/KC/dw/Horowitz%20Sahni%20-%20Data%20Structure.pdf>

Course Designers

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Dr.R. Sandha.

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Coursecode	CourseTitle	Category	L	T	P	Credit
UCS20C32	SystemSoftware	Core6	4	1	-	4
			L- Lecture	T-Tutorial	P-Practical	

Year	Semester	Internal	External	Total
II	III	25	75	100

Preamble

This course is designed to introduce other side of programming. The focus of the course is to understand the role of system program in computing environment and assist students to become system programmer.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Understand Assemblers and their role.	60%	70%
CO2	Know the need of Macros and the role of Macro Preprocessor.	60%	70%
CO3	Realize the importance of Compilers, Interpreters and their strategies in translating and optimizing the source program.	60%	70%
CO4	Infer the role of Linker in (making) binary program.	60%	70%
CO5	Understand the Software tools and their role in Program Development and Program Usage.	60%	70%

Mapping of COs with PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	L	L	M
CO2	S	S	-	M	S
CO3	M	M	L	M	M
CO4	L	M	L	-	L
CO5	S	L	S	M	M
	S-STRONG	M-MEDIUM		L-LOW	

Mapping of COs with POs

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

S-STRONG
M-MEDIUM
L-LOW

Bloomstaxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%

Content

UNIT I: Introduction to Assembly Language - Elements of Assembly language - A Simple Assembly Program Structure - Pass structure of Assemblers - Design of a Two Pass Assembler.	15 Hours
UNIT II: Hours Introduction to Macro - Macro Definition and Call - Macro Expansions - Nested Macro calls - Advanced Macro Facilities - Design of a Macro Preprocessors.	15
UNIT III: Hours Introduction to Compiler - Semantic Gap - Scope Rules - Memory Allocation - Control Structures - Code Optimization - Interpreter - Toy interpreter.	18 Compilation of
UNIT IV: Introduction to Linker - Relocation and linking concepts - Design of a Linker - Self Relocating Program. Introduction to Loader - Types of Loader.	15 Hours
UNIT V: Introduction to Software Tools - Software Tools for Program Development - Editors - Debug Monitors - User Interfaces - Software tools for Program Usage.	12 Hours

Text Books

D.M.Dhamdhere, 2012, Systems Programming and Operating System, 2nd edn, Tata McGraw Hill Education Pvt., Ltd, New Delhi.

Chapters

Unit I : 4.1 to 4.4
 Unit II : 5.1 to 5.5
 Unit III: 6.1, 6.2, 6.4 to 6.6
 Unit IV: 7.1, 7.2, 7.3, 7.6
 Unit V : 8.1, 8.2, 8.3, 8.5

References

1. JohnJDonovan,2009,SystemProgramming,46thedn,TataMcGrawHillEducationPvt.Ltd,NewDelhi
2. LelandL.Beck,1997,SystemSoftware:AnIntroductiontoSystemsProgramming,3rdedn,Addison-Wesley

WebResources

1. https://www.tutorialspoint.com/computer_fundamentals/system_software.asp
2. https://www.technicalsymposium.com/SYSTEM_SOFTWARE_FULL_NOTES.html
3. <https://www.edunotes.in/system-software-noteshttps://www.geeksforgeeks.org/system-software>
4. <https://study.com/academy/topic/systems-software.html>

CourseDesigners

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Programme Code: UCS

Coursecode	CourseTitle	Category	L	T	P	Credit
UCS20C33	Relational Database Management Systems	Core7	4	1	-	4

L–Lecture T –Tutorial P–Practical

Year	Semester	Internal	External	Total
II	III	25	75	100

Preamble

This course is to present an introduction to database management systems, with relational concepts with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a Relational Database Management Systems.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Gain knowledge about database concepts and relational model.	60%	70%
CO2	Acquire and apply knowledge to write simple queries.	60%	70%
CO3	Implement and develop skills to write PL/SQL blocks.	60%	70%
CO4	Incorporate normalization concepts to relational database.	60%	70%
CO5	Familiar to incorporate the concepts of transaction and concurrency control.	60%	70%

Mapping of COs with PSOs

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

S-STRONG M-MEDIUM L-LOW

Mapping of COs with POs

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

S-STRONG

M-MEDIUM

L-LOW

Bloomstaxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%

Content

Unit I:

15 Hours

Introduction to Database Systems and Structure: Database System Applications-Purpose of Database System-View of Data-Database Languages-Database design-Database Engine-Database and Application Architecture-Database users and administrators.

Relational Model: Structure of Relational databases-Database schema-Keys-Schema Diagrams-Relational Query Languages-Relational Algebra.

Unit II:

15 Hours

Introduction to SQL: Overview of the SQL Query language-SQL Data Definition-Basic Structure of SQL Queries-Additional Basic Operations- Set Operations-Null Values-Aggregate Functions-Nested Subqueries-Modification of the Database.

Intermediate SQL: Join Expressions-Views.

Unit III:

15 Hours

Intermediate SQL: Transactions-Integrity Constraints-SQL Data types and Schemas-Index definitions in SQL -Authorization.

Advanced SQL: Accessing SQL from a Programming Language-Functions and Procedures-Triggers-Recursive Queries.

Unit IV:

15 Hours

Database Design Using the ER Model: Overview of the Design process-The Entity Relationship Model-Mapping Cardinalities- Primary Key.

Relational Database Design: Features of Good Relational Designs - Decomposition Using Functional Dependencies -Normal Forms- Functional Dependency Theory - Algorithms for Decomposition Using Functional Dependencies - Decomposition Using Multivalued Dependencies - More Normal Forms - Atomic Domains and First Normal Form-Database Design Process-Modeling Temporal Data.

Unit V:

15 Hours

Transaction Management: Transaction concepts-A Simple Transaction Model- Serializability.

Concurrency Control: Lock based Protocols- Deadlock handling.-Timestamp based protocols.

TextBook:

Abraham Silberschatz, Henry F.Korth, S.Sudarshan, 2020, Database Systems Concepts, 7th Edn, McGrawHillEducation, New Delhi.

Chapters

UNIT I	: 1.1 to 1.8, 2
UNIT II	: 3, 4.1, 4.2
UNIT III	: 4.3 to 4.7, 5.1 to 5.4
UNIT IV	: 6.1, 6.2, 6.4, 6.5, 7
UNIT V	: 17.1, 17.2, 17.6, 18.1, 18.2, 18.5

References

1. Kevin Loney 2004, Oracle Database 10g: The Complete Reference, Oracle Press.
2. Ragu Rama Krishnan, Johannes Gehrke, 3rd Edn, Database Management Systems, McGraw Hill Education, New Delhi.

Web Resources

1. http://www.db-book.com/https://www.tutorialspoint.com/dbms/dbms_tutorial.pdf
2. http://www.tutorialspoint.com/sql/sql_tutorial.pdf
3. <https://mucse44.net/wp-content/uploads/2019/09/Database-System-Concepts-7th-Edition.pdf>

Course Designers

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Coursecode	CourseTitle	Category	L	T	P	Credit
UCS20NE31	WebDevelopment	NME I	1	1	-	2

L–Lecture T –Tutorial P–Practical

Year	Semester	Internal	External	Total
II	III	15	35	50

Preamble

This course is designed to understand and design a web page using HTML and CSS and it facilitates the students to create an interactive web page.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Understand an HTML document	70%	60%
CO2	Create interactive content using HTML forms	70%	60%
CO3	Incorporate CSS, Inheritance, Selector and Pseudo elements in web pages	70%	60%
CO4	Apply filters and transitions for innovative web pages.	70%	60%
CO5			

Mapping of COs with PSOs

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Understand an HTML document	70%	60%
CO2	Create interactive content using HTML forms	70%	60%
CO3	Incorporate CSS, Inheritance.	70%	60%
CO4	Design web pages using selector and Pseudo elements.	70%	60%
CO5	Apply filters and transitions for innovative web pages.	70%	60%

S-STRONG M-MEDIUM L-LOW

Mapping of COs with POs

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

S-STRONG M-MEDIUM L-LOW

Mapping of COs with PSOs

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

S-STRONG

M-MEDIUM

L-LOW

B.A. P.O.**Mapping of COs with POs**

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

S-STRONG

M-MEDIUM

L-LOW

B.B.A. P.O.**Mapping of COs with POs**

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

S-STRONG

M-MEDIUM

L-LOW

B.Com. P.O.

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

S-STRONG

M-MEDIUM

L-LOW

B.C.A. P.O.**Mapping of COs with POs**

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

S-STRONG

M-MEDIUM

L-LOW

Bloomstaxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%

Content

Unit-I: 14 Hrs

HTML: Introduction-SGML-outline of an HTML Document-Head section-Body Section-HTML forms.

Unit-II: 16 Hrs

Dynamic HTML (DHTML): Introduction-Cascading Style Sheets (CSS)-Filters and Transitions.

Text Book

N.P.Gopalan & J.Akilandeswari, 2016, Web Technology A Developer's Perspective, 2nd Edition, PHI Learning Private Limited, Delhi.

Chapters

Unit I : 4

Unit II : 7.1, 7.2, 7.5

References

1. Jon Duckett, 2015, Beginning HTML, XHTML, CSS and Javascript, Wiley India Pvt. Ltd, New Delhi.

Web Resources

1. https://developer.mozilla.org/en-US/docs/Learn/HTML/Introduction_to_HTML
2. <https://careerfoundry.com/en/tutorials/web-development-for-beginners/introduction-to-html/>
3. <https://www.mygreatlearning.com/blog/css-tutorial/>
4. <https://codepen.io/adrianparr/pen/AXdQNY?css-preprocessor=sass>
5. <https://css-tricks.com/almanac/properties/t/transition/>

Course Designers

Mrs. SM. Valli.

Mr. R. Chandrasekar.

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DEPARTMENT OF COMPUTER SCIENCE
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Programme Code: UCS

Coursecode	CourseTitle	Category	L	T	P	Credit
UCS20CL31	DatastructuresLab	CoreLab3	-	-	4	2

L–Lecture T –Tutorial P–Practical

Year	Semester	Internal	External	Total
II	III	40	60	100

Preamble

The course provides the knowledge 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	Expected Proficiency	Expected Attainment
CO1	Build and test program to sort numbers, sequential search and binary search.	75%	75%
CO2	Construct and execute programs of stack data structure and its operations.	75%	75%
CO3	Implement programs for queue data structure and its operations.	75%	75%
CO4	Implement linked list data structure and its operations.	75%	75%
CO5	Apply the concept of traversal methods and its operations.	75%	75%

Mapping of COs with PSOs

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

S-STRONG

M – MEDIUM

L-LOW

Mapping of COs with POs

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

S-STRONG

M – MEDIUM

L-LOW

Content

1. Sorting Techniques: Quicksort, Insertion sort.
2. Binary Search.
3. Matrix multiplication.
4. Operations of STACK using array.
5. Using Stack in infix to postfix conversion.
6. Operations of QUEUE using array.
7. Circular Queue implementation.
8. Linked list representations and the operations using pointers.
(i) To add a new record. (ii) To delete an existing record. (iii) To print the details
9. Count the total nodes of the linked list.
10. Insert an element at the end of the linked list.
11. Stack using Linked List.
12. Queue using Linked List.
13. Doubly linked list and its operations.
14. To traverse the given binary tree using all traversal methods.

Web Resources

1. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
2. <https://www.javatpoint.com/data-structure-tutorialhttps://www.geeksforgeeks.org/data-structures/>

Course Designers

Dr.R. Sandha.
Mrs.K.SuriyaPrabha.

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

Coursecode	CourseTitle	Category	L	T	P	Credit
UCS20CL32	SQL and PL/SQL Lab	Core Lab 4	-	-	4	2
	L – Lecture	T – Tutorial			P – Practical	

Year	Semester	Internal	External	Total
II	III	40	60	100

Preamble

This course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a Data Base Management System.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Illustrate, infer and apply DML operations	75%	75%
CO2	Define, summarize and implement advanced SQL queries	75%	75%
CO3	Illustrate and apply user-defined and predefined exceptions	75%	75%
CO4	Interpret and implement PL/SQL with table	75%	75%
CO5	Incorporate and implement Functions, Packages and Triggers	75%	75%

Mapping of COs with PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	L
CO2	S	M	M	S	M
CO3	S	M	S	M	M
CO4	S	M	S	S	M
CO5	M	-	M	S	S
	S-STRONG	M – MEDIUM		L-LOW	

Mapping of COs with POs

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

S-STRONG

M – MEDIUM

L-LOW

Content

1. Implementation of DDL commands of SQL.
2. DDL commands with Primary key constraints.
3. Implementation of DDL commands of SQL.
4. Implementation of different types of function with suitable examples.
(Mathematical Function, Aggregate Function, Character Function, Conversion Function, Date Function)
5. Performing Join operations.
6. Implementing Set operations.
7. Splitting table values and store them into multiple tables.
8. Creating and dropping views.
9. Simple PL/SQL programs (Non-database problems using conditional/looping statements).
10. Writing procedures and passing values.
11. Setting predefined Exception.
12. Creating User defined Exception.
13. Writing Function.
14. Creating Package.
15. Creating Triggers.

Web Resources

1. <https://www.oracletutorial.com/plsql-tutorial/https://www.plsqltutorial.com/>
2. <https://www.tutorialspoint.com/plsql/index.htmhttps://www.w3schools.com/sql/default.asp>

Course Designers

Mrs.A.M.Hema.

Mrs.K.SuriyaPrabha.

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

Coursecode	CourseTitle	Category	L	T	P	Credit	
UCS20C41	Programming in Java	Core8	5	1	-	5	
	L– Lecture	T–Tutorial	P– Practical				

Year	Semester	Internal	External	Total
II	IV	25	75	100

Preamble

This course enables the students to understand the basics and object oriented concepts of Java, Packages, Interfaces, Exception Handling, Multithreaded Programming, Collections Framework, Applets and AWT controls.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Understand the basics and object oriented concepts of Java.	70%	60%
CO2	Recognize methods, classes and inheritance concepts.	70%	60%
CO3	Illustrate the concepts of Packages, Interfaces and Exception.	70%	60%
CO4	Apply Multithreading concepts and Collections Framework	70%	60%
CO5	Implement programs using Applets and AWT controls.	70%	60%

Mapping of COs with PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	L	L	L
CO2	S	M	M	M	L
CO3	S	S	M	M	M
CO4	S	S	M	S	S
CO5	S	S	M	S	S
	S-STRONG	M-MEDIUM	L-LOW		

Mapping of COs with POs

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

S-STRONG
M-MEDIUM
L-LOW

Bloomstaxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%

Content

Unit I:

18Hours

The History and Evolution of Java: Java's Lineage - The Creation of Java - Java and Internet - Java's Magic: The Byte code - The Java Buzzwords.

An overview of Java: Object Oriented Programming - A First Simple Program.

Arrays: One-Dimensional Arrays - Multidimensional Arrays - Alternative Array Declaration Syntax.

Introducing classes: Class fundamentals - Declaring objects - Assigning object reference variables - Introducing methods - Constructors - The this keyword - Garbage collection - The finalize() method - A Stack class.

Unit II:

18Hours

A Closer look at Methods and Classes: Overloading methods - Using objects as parameters - A Closer look at Argument passing - Returning objects - Recursion - Introducing Access control - Understanding static - Introducing final - Arrays Revisited - Introducing Nested and Inner classes - Exploring the String class - Using command line Arguments.

Inheritance: Inheritance basics - Using super - Creating a Multilevel hierarchy - Method overriding - Dynamic method dispatch - Using Abstract classes - Using final with Inheritance - The Object class.

Unit III:

18Hours

Packages and Interfaces: Packages - Access protection - Importing packages - Interfaces.

Exception Handling: Exception Handling fundamentals - Exception types - Uncaught Exceptions - Using try and catch - Multiple catch clauses - Nested try statements - throw - throws - finally - Java's Built-in Exceptions - Creating your own exception Subclasses.

Unit IV:

18Hours

Multithreaded Programming: The Java Thread Model - The Main Thread - Creating a Thread - Creating Multiple Threads.

The Collections Framework: Collections Overview - The Collection Interfaces : The Collection Interface - The List Interface - The Collection Classes: The ArrayList Class - The LinkedList Class - The HashSet Class - The TreeSet Class - Accessing a Collection via an Iterator - Working with Maps - The Legacy Classes and Interfaces - The Enumeration Interface - Vector - Stack - Dictionary - Hashtable.

Unit V:**18Hours****Applet Fundamentals:** Applet Basics - Applet Architecture - Applet Skeleton - SimpleApplet display method.**Introducing the AWT:** AWT classes - Window Fundamentals - Introducing Graphics - Working with Colors - Working with Fonts.**Using AWT Controls and Layout Managers:** Control fundamentals - Labels - Using buttons - Applying check boxes - CheckBoxGroup - Choice controls - Using Lists - Managing scroll bars - Using a TextField - Using a TextArea - Understanding Layout Managers.**Text Book**Herbert Schildt, 2014, Java The Complete Reference, 9th edition, McGraw Hill Edition**Chapters: (Relevant Topics only)****Relevant Topics only**

UNIT I	: 1, 2, 3, 6
UNIT II	: 7, 8
UNIT III	: 9, 10
UNIT IV	: 11, 18
UNIT V	: 23, 25, 26

References:

1. CAY S. Horstmann Gary Cornell, 2005, Core JAVA 2 Volume-1 Fundamental, 7th edn, Pearson Education
2. E. Balagurusamy, 2010, Programming with JAVA A Primer, 4th edn, Tata McGraw Hill

Web Resources

1. <https://www.javatpoint.com/java-tutorial>
2. <https://www.guru99.com/java-tutorial.html>
3. <https://www.cs.usfca.edu/~parrr/doc/java/JavaBasics-notes.pdf>

Course Designers**Mrs. SM. Valli.****Mrs. K. Sharmila.**

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

Coursecode	CourseTitle	Category	L	T	P	Credit	
UCS20C42	ComputerGraphics	Core9	4	2	-	4	
	L–Lecture	T –Tutorial	P–Practical				

Year	Semester	Internal	External	Total
II	IV	25	75	100

Preamble

This course is designed to facilitate the design and implementation of pictorial data thus makes the students familiar in Graphics program.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Recognize the necessity of pictorial data	60%	70%
CO2	Understand the procedure for generating line segment	60%	70%
CO3	Know the importance of polygon in graphics environment	60%	70%
CO4	Apply the techniques to manipulate pictorial data	60%	70%
CO5	Understand the windowing, clipping concepts and algorithms and incorporate them in graphics problem.	60%	70%

Mapping of COs with PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	-	-	-
CO2	M	M	M	M	-
CO3	L	M	M	M	M
CO4	M	M	M	M	S
CO5	L	L	M	M	S
	S- STRONG		M- MEDIUM		L-LOW

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	L	-	L	-	-
CO2	M	M	-	-	-	-
CO3	M	M	M	L	-	-
CO4	S	S	M	L	-	L
CO5	M	M	M	M	L	L
	S- STRONG		M- MEDIUM		L-LOW	

Bloomstaxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%

Contents

Unit I

15 Hrs

Line Generation: Overview of Graphics concept- Line segment- Vector- Pixels and Frame buffer- Vector Generation algorithm- Bresenham's algorithm- Character Generation.

Graphics Primitives: Introduction to Graphics primitives- Display devices.

Unit II

15 Hrs

Display file: Concept- Display File Structure- Display file primitive operations- Display file interpreter- Normalized device co-ordinates- Display file routines.

Polygon: Introduction- Polygon Representation- Entering Polygon values- Inside Test- Polygon interfacing algorithms

Unit III

18 Hrs

Transformations: Introduction- Scaling- Rotation- Translation- Homogeneous coordinates and Transformation- Rotation about an arbitrary point.

Unit IV

15 Hrs

Segments: Introduction- Segment Table- Creating a Segment- Closing a Segment- Deleting a Segment- Renaming a Segment- Saving and Showing a Segment values - Other Display file structure.

Unit V

12 Hrs

Windowing: Introduction- Multiple Windowing

Clipping: Concepts- Cohen-Sutherland Outcode Line Clipping Algorithm- Sutherland-Hodgman Polygon Clipping Algorithm.

Text Book

Steven Harrington, 2019, Computer Graphics (A Programming approach), 2nd edn, McGraw-Hill International Editions, New Delhi.

Chapters(Relevant TopicsOnly)

UnitI	:1,2
UnitII	:2,3
Unit III	4
UnitIV	5
UnitV	6

References

1. DonaldHearn, M.PaulineBaker,2001, Computer Graphics, 2ndedn,PHIPrenticeHall
2. Foley, VanDam,1997,ComputerGraphics-PrinciplesandPractices,2ndedn,AddisonWesley

WebResources

1. <https://lecturenotes.in/subject/59/computer-graphics-cg>
2. <http://www.svecw.edu.in/Docs%5CCSECGNotes2013.pdf>
3. https://www.tutorialspoint.com/computer_graphics/computer_graphics_tutorial.pdf

CourseDesigners

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THIAGARAJAR COLLEGE, MADURAI –9
(Re-Accredited with “A++” Grade by NAAC)

DEPARTMENT OF COMPUTER SCIENCE
(For those joined other than B.Sc. Computer Science on or after June 2020)
Programme Code: UCS

Coursecode	CourseTitle	Category	L	T	P	Credit	
UCS20NE41	Internet Applications	NME II	2	-	-	2	
	L–Lecture	T –Tutorial	P–Practical				

Year	Semester	Internal	External	Total
II	IV	15	35	50

Preamble

The aim of the course is to familiarize students with the Internet, Intranet technologies, features of emails and web site designing.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Understand the basic internet concepts and protocols.	60%	70%
CO2	Recognize the importance of Email concepts and protocols.	60%	70%
CO3	Infer the basic concepts of Intranet.	60%	70%
CO4	Understand the basic html tags.	60%	70%
CO5	Acquire knowledge to implement web pages.	60%	70%

Mapping of COs with PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	L	L	L
CO2	S	L	S	M	S
CO3	M	L	L	L	L
CO4	S	L	S	M	S
CO5	S	M	M	L	S
	S- STRONG	M- MEDIUM	L-LOW		

Mapping of COs with POs**B.SC., P.O.**

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	L	M	L	M	L
CO2	M	S	M	M	S	L
CO3	L	L	M	L	M	L
CO4	M	L	M	L	M	M
CO5	M	L	M	L	L	S
	S- STRONG		M-MEDIUM		L-LOW	

B.A., P.O.

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	S	S	S
CO2	M	S	M	M	M	M
CO3	L	M	S	L	M	M
CO4	S	M	M	L	M	S
CO5	S	M	M	S	S	S
	S- STRONG		M-MEDIUM		L-LOW	

B.B.A., P.O.

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	M	M	M	S
CO2	S	L	L	M	L	M
CO3	M	L	L	L	M	M
CO4	S	M	M	L	M	S
CO5	S	M	M	S	S	S
	S- STRONG		M-MEDIUM		L-LOW	

B.Com..., P.O.

	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	M	L	L	L	M
CO3	M	L	L	L	M
CO4	S	M	L	M	S
CO5	S	M	M	M	S
	S- STRONG		M-MEDIUM		L-LOW

B.C.A., P.O.

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	M	S	S
CO2	M	M	M	M	S	S
CO3	M	L	L	M	M	M
CO4	M	L	L	M	M	M
CO5	S	S	M	S	S	S
	S- STRONG		M-MEDIUM		L-LOW	

Bloomstaxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%

Content**UNIT1:****InternetandWorld WideWeb:**

Introduction: What is special about Internet –Internet Access – Internet Basics – Internet Protocols –Internet Addressing – The World Wide Web (WWW) – Web Pages and HTML – Web Browsers – SearchingtheWeb –Internet Chat.

OverviewofElectronic Mail:

Introduction: Why use E-MAIL - How E-MAIL Works -- How Private is E-MAIL – E-MAIL Names &Addresses–Mailing Basics . E-MAIL Ethics–InternetCode of Conduct – Spamming–E-MAIL– Advantages&Disadvantages- Tips for Effective E-MAIL use – Smileys (Emoticons) –UsefulE-MAILServices– Mailing Lists–News Groups.

UNITII:**IntroductiontoIntranets:**

Introduction – Characteristics of Intranet – Advantages of Intranets – Business Benefits of Intranets – Drawbacks of Intranets – Why does an Organization need Intranet – Intranet vs Groupware – Intranetvs.Email–Intranetvs.Client/ServerSystems–Extranet–Intranets,ExtranetsandE-Commerce.

IntroductiontoWebDesign:

Introduction–WebDesign–CreatingaWebsite –WebHosting –WebsitePromotion.

TextBook

AlexisLeonandMathewsLeon,FundamentalsofInformationTechnology,SecondEdition,VikasPublishing HousePvt. Ltd.

Chapters

Unit I : 24,25

UnitII:26,28

References

1. Douglas E. Comer, 2009, The Internet Book, Fourth Edition, PHI Learning Pvt. Ltd.
2. Young Kai Seng, 2000, Using the Internet the Easy Way, First Edition, Minerva Publications.
3. Ramesh Bangia, 2011, Internet Technology and Web Design, Third Edition, Firewall Media. (An imprint of Lakshmi Publications Pvt. Ltd.)

Web Resources

1. https://www.tutorialspoint.com/internet_technologies/www_overview.htm
2. <https://www.geeksforgeeks.org/world-wide-web-www>
3. https://www.tutorialspoint.com/internet_technologies/e_mail_overview.htm

Course Designers

Mrs A.M.Hema.

Mrs G.Nalini.

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

Coursecode	CourseTitle	Category	L	T	P	Credit	
UCS20CL41	Java Programming Lab	Core Lab 5	-	-	6	3	
	L–Lecture	T –Tutorial	P–Practicle				

Year	Semester	Internal	External	Total
II	IV	40	60	100

Preamble

This course enables the students to construct object-oriented Java programs using the concept of abstraction, encapsulation, exceptions, thread, packages, interfaces, Collections Framework, Applet and AWT controls.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Implement Object Oriented programming concept.	75%	75%
CO2	Create user defined packages and to demonstrate interfaces.	75%	75%
CO3	Implement exception handling mechanism and multi-threading concepts.	75%	75%
CO4	Demonstrate the Collections Framework.	75%	75%
CO5	Develop programs using Java applets and AWT components.	75%	75%

Mapping of COs with PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	L
CO2	S	S	M	S	M
CO3	S	S	M	S	M
CO4	S	S	M	S	S
CO5	S	S	M	S	S
	S-STRONG	M-MEDIUM	L-LOW		

Mapping of COs with POs

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

S-STRONG M-MEDIUM L-LOW

Content

1. Program to demonstrate Single and Multidimensional arrays.
2. Program to demonstrate Method Overloading.
3. Program to demonstrate Constructor Overloading.
4. Program to demonstrate Single and Multilevel Inheritance.
5. Program to demonstrate Method Overriding.
6. Program to demonstrate Dynamic Method Dispatch.
7. Program to demonstrate Interfaces.
8. Program to demonstrate Packages.
9. Program to demonstrate Built-in exception and User-defined exception.
10. Program to demonstrate Multi-threading concept.
11. Program to demonstrate ArrayList and LinkedList.
12. Program to demonstrate TreeMap and HashMap.
13. Program to demonstrate Vector, Stack and HashTable.
14. Program to demonstrate Animation.
15. Program to demonstrate Graphics class.
16. Program to demonstrate Font and Color class.
17. Applet program to demonstrate basic controls i.e. Button, labels, checkbox etc.
18. Program to demonstrate layout manager.

Web Resources

1. <https://www.javatpoint.com/java-tutorial>
2. <https://www.guru99.com/java-tutorial.html>

Course Designers

Mrs. SM. Valli.
Mrs. K. Sharmila.

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

Coursecode	CourseTitle	Category	L	T	P	Credit	
UCS20CL42	GraphicsLab	CoreLab6	-	-	5	2	
	L– Lecture	T–Tutorial	P– Practical				

Year	Semester	Internal	External	Total
II	IV	40	60	100

Preamble

This lab course is designed to facilitate the design, implementations and the role of pictorial data in graphics field and the acquired knowledge will make the students to be a successful Graphics programmer.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Understand the concepts involved in creation of line segment.	75%	75%
CO2	Construct polygon using Vector generation and Bresenham’s algorithm	75%	75%
CO3	Infer the concepts and techniques behind the basic transformation.	75%	75%
CO4	Create, delete and translate a segment	75%	75%
CO5	Demonstrate and apply clipping strategies	75%	75%

Mapping of COs with PSOs

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

S- STRONG

M-MEDIUM

L-LOW

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

I SEMESTER								
Course	Code No.	Title of the paper	Hrs/ wk	Crd.	Total Hrs	Marks		
						CIA	SE	TOT
Part 1	U20P111	இக்காலத் தமிழும் இடைக்காலத் தமிழும்	5	3	75	25	75	100
Part 2	UCG20EN11	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

II SEMESTER								
Course	Code No.	Title of the paper	Hrs/ wk	Crd.	Total Hrs	Marks		
						CIA	SE	TOT
Part 1	U20P121	சமயத் தமிழும் செவ்வியல் தமிழும்	5	3	75	25	75	100
Part 2	UCG20EN21	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	Computational Methods	5	5	75	25	75	100
Core Lab 4	UCG20CL31	Practical- Database Management Lab	3	2	45	40	60	100
Core Lab 5	UCG20CL32	Practical- Java Programming Lab	4	2	60	40	60	100
Core Lab 6	UCG20CL33	Practical- Computer Networks Lab	4	2	60	40	60	100
NME I	UCG20NE31	E-Commerce	2	2	30	15	35	50
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	UCG20C42	Infrastructure Management	5	4	75	25	75	100
Core 9	UCG20C43	Process Management	5	4	75	25	75	100
Allied IV	UMA20GE41I	Operation Research	5	5	75	25	75	100
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
NME II	UCG20NE41	Internet Applications	2	2	30	15	35	50
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 11	UCG20C52	Digital Technology	5	5	75	25	75	100
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
Core Elective 1	UCG20CE51	Core Elective- I	5	5	75	25	75	100
Core Elective Lab1	UCG20CEL51	Options given	4	2	60	40	60	100
SEC I	UCG20SE51	Practical- DevOps Tools Lab	4	2	60	15	35	50
Total			30	23				650

VI SEMESTER								
Course	Code No.	Title of the paper	Hrs / wk	Crd .	Total Hrs	Marks		
						CI A	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 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
Core Elective 2	UCG20CE61	Core Elective- II	5	5	75	25	75	100
SEC II	UCG20SE61	Practical - WEB Technology Lab	4	2	60	15	35	50
Part V				1				
Total			30	24				650

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 - 09

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DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc., Computer Science in Cognitive Systems on or after June 2020)

Programme Code : UCG

Course code	Course Title	Category	L	T	P	Credits	
UCG20C31	Database Management System	Core 4	4	-	-	4	
			L-Lecture	T-Tutorial	P-Practical		

Year	Semester	Internal	External	Total
II	III	25	75	100

Preamble

This course is to present an introduction to database management concepts, with an emphasis on how to design, organize, maintain and retrieve - efficiently and effectively - data from a Data Base.

Course Outcomes

On the successful completion of the course, Students will be able to :

#	Course Outcome	Expected Proficiency (%)	Expected Attainment (%)
CO1	Outline and Elaborate the database concepts, Relational data model, database design and normalization	65	60
CO2	Infer and Apply the DDL commands in manipulating schema of table.	65	60
CO3	Understand and implement DML commands, function, grouping, join and views.	65	60
CO4	Understand, Interpret and implement the PL/SQL structure and using control structures, embedded SQL in PL/SQL for data manipulation.	65	60
CO5	Illustrate and Apply Cursor, Trigger, Exception and Procedures for database.	65	60

Mapping of COs with PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	L	M	L
CO2	S	L	M	L	L
CO3	S	M	M	M	L
CO4	S	S	M	M	L
CO5	S	S	M	M	M
S - STRONG		M - MEDIUM		L - LOW	

Mapping of COs with POs

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

S - STRONG

M - MEDIUM

L - LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge - K1</i>	40%	40%	40%
<i>Understand - K2</i>	40%	40%	40%
<i>Apply - K3</i>	20%	20%	20%

Content

Unit - I

12 Hours

Database Concepts-A Relational approach: Database - Relationships - DBMS - Relational data model - Integrity rules - Theoretical relational languages.

Database Design: Data modeling-Dependency - Database design - Normal forms - Dependency diagrams - Denormalization.

12 Hours

Structured Query Language (SQL): Introduction - DDL - Naming rules and conventions - Data types- Constraints- Creating a table- Displaying table information - Altering an existing table - Dropping, renaming and truncating table - Table types.

12 Hours

Working with tables: DML - Adding a new Row/Record - Customized prompts - Updating and deleting an existing rows/records - Retrieving data from table - Arithmetic operations - Restricting data with WHERE clause - Sorting - Substitution variables - DEFINE command - CASE structure.

Functions and Grouping: Built-in functions - Grouping data.

Joins and Views: Join - join types-**Views:** Views - Creating a view - Removing a view - Altering a view

Unit - IV

12 Hours

PL/SQL: Fundamentals - Block structure - comments - Data types – Other data types - Variable declaration - Assignment operation - Bind variables - Substitution variables - Printing.

Control Structures and Embedded SQL: Control structures - Nested blocks - SQL in PL/SQL - Data manipulation - Transaction control statements

Unit - V

12 Hours

PL/SQL Cursors and Exceptions: Cursors - Implicit & explicit cursors and attributes - cursor FOR loops - SELECT...FOR UPDATE - WHERE CURRENT OF Clause - cursor with parameters - Cursor variables - Exceptions - Types of exceptions - Records - Tables - Procedures - Functions - Triggers

Text Book

Nilesh Shah, "Database Systems Using ORACLE", PHI, 2nd Edition, 2011

Chapters (Relevant Topics only)

Unit	Chapter
I	1,2
II	4
III	5,6,7,9
IV	10,11
V	12,13,14

References:

1. Database System Concepts, 7/e, AviSilberchartz, Henry F. Korth and S. Sudarshan, McGraw-Hill Higher Education, International Edition, 2019.
2. John Garmany, 2005, Easy oracle PL/SQL programming : Get started fast with working PL/SQL code Example, Easy oracle series.

Web Resources

- <https://www.javatpoint.com/dbms-tutorial> (DBMS concepts)
<https://www.w3schools.com/sql/> (SQL queries)
http://www.tutorialspoint.com/sql/sql_tutorial.pdf (SQL queries)

Course Designers

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Mrs.K.Vennila

THIAGARAJAR COLLEGE, MADURAI - 09

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

DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc., Computer Science in Cognitive Systems on or after June 2020)

Programme Code : UCG

Course code	CourseTitle	Category	L	T	P	Credit
UCG20C32	Java Programming	Core 5	4	-	-	4

L– Lecture

T–Tutorial

P– Practical

Year	Semester	Internal	External	Total
II	III	25	75	100

Preamble

This course enable the students to construct object oriented java programs using the concept of abstraction, encapsulation, exceptions, thread, packages, interfaces, java collections framework, applet and AWT controls.

Course Outcomes

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

#	Course Outcome	Expected Proficiency (%)	Expected Attainment (%)
CO1	Describe the basics and object oriented concepts of Java.	65	60
CO2	Outline methods, classes and inheritance concepts.	65	60
CO3	Illustrate the concepts of Packages, Interfaces and Exception.	65	60
CO4	Develop code using the concept of Multithreading, Collections framework and Illustrate the concepts of Applet	65	60
CO5	Explain various AWT controls.	65	60

Mapping of COs with PSOs

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

S-STRONG

M-MEDIUM

L-LOW

Mapping of COs with POs

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

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%

Content

Unit-I

18 Hours

The History and Evolution of Java: Java's Lineage-The Creation of Java-Java and Internet- Java's Magic: The Byte code-The Java Buzzwords-The Evolution of Java

Introducing classes: Class fundamentals-Declaring objects-Assigning object reference variables- Introducing methods-Constructors-The this Keyword-Garbage collection-The finalize() method-A Stack class.

Unit-II

18 Hours

A Closer look at Methods and Classes: Overloading methods - Using objects as parameters - A Closer look at Argument passing - Returning objects - Recursion - Introducing Access control - Understanding static - Introducing final - Arrays Revisited - Introducing Nested and Inner classes - Exploring the String class-Using command line Arguments.

Inheritance: Inheritance basics - Using super - Creating a Multilevel hierarchy -Method overriding - Dynamic method dispatch -Using Abstract classes -Using final with Inheritance -The Object class.

Unit-III

18 Hours

Packages and Interfaces: Packages-Access protection-Importing packages-Interfaces.

Exception Handling: Exception Handling fundamentals-Exception types - Uncaught Exceptions - Using try and catch - Multiple catch clauses - Nested try statements - throw - throws - finally - Java's Built-in Exceptions -Creating your own exception Subclasses.

Unit-IV

18 Hours

Multithreaded Programming: The Java Thread Model - The Main Thread - Creating a Thread - Creating Multiple Threads-Using isAlive() and join() -Thread priorities.

The Collections Framework: Collections overview- Collection Interfaces-The Collection Classes - Accessing a collection via an Iterator-Working with Maps - The Legacy Classes and Interfaces

Applet fundamentals: Applet Basics: Applet Class-Applet Architecture-Applet Skeleton-Simple Applet display method.

Unit-V

18 Hours

Introducing the AWT: AWT classes-Window Fundamentals - Working with Frame windows -Creating a frame window in an applet - Creating a windowed program - Displaying Information within a window

Using AWT Controls, Layout Managers: Control fundamentals - Labels -Using buttons -Applying check boxes - CheckBoxGroup - choice controls - Using lists - Managing scroll bars - Using a TextField-Using a TextArea-Understanding Layout Managers.

Text Book

Herbert Schildt,2014, Java The Complete Reference,9th edition, McGraw Hill Edition

Chapters:(Relevant Topics only)

Unit	Chapter
I	1,6
II	7,8
III	9,10
IV	11,18
V	25,26

References

1. CAY S.Horstmann Gary Cornell, 2005, Core JAVA 2 Volume-1 Fundamental, 7thedn, Pearson Education
2. E.Balagurusamy,2010,Programming with JAVA A Primer,4thedn,Tata McGraw Hill

Web Resources

<https://www.javatpoint.com/java-tutorial><https://www.guru99.com/java-tutorial.html>

<http://tutorials.jenkov.com/java-collections/index.html>

<https://www.cs.usfca.edu/~parrr/doc/java/JavaBasics-notes.pdf>

Course Designers

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THIAGARAJAR COLLEGE, MADURAI - 09

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

DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc., Computer Science in Cognitive Systems on or after June 2020)

Programme Code : UCG

Course code	Course Title	Category	L	T	P	Credit
UCG20C33	Computer Networks	Core 6	4	-	-	4

L – Lecture**T – Tutorial****P – Practical**

Year	Semester	Internal	External	Total
II	III	25	75	100

Preamble

The course elaborates from the basic of Computer networks to advanced level routing and monitoring. This syllabus gives out the clear knowledge on network communication.

Course Outcomes

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

#	Course Outcome	Expected Proficiency (%)	Expected Attainment (%)
CO1	Define the basic of LAN, MAN and WAN	65	60
CO2	Illustrate guided and unguided transmission medium	65	60
CO3	Demonstrate and Construct IP Addressing and VLAN technology.	65	60
CO4	Identify various protocols and routing algorithms	65	60
CO5	Interpret and apply the monitoring of networking devices	65	60

Mapping of COs with PSOs

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

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

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%

Content

Unit I

12 Hours

Introduction - Applications – LAN – WAN – MAN - Network Hardware - Network Software: Protocol Hierarchies – Connection-oriented and connectionless services. Reference Models: OSI Reference Model – TCP/IP Reference Model – Comparison of OSI and TCP/IP.

Unit II

12 Hours

Network Basics - Protocols, Topology - Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. Wireless Transmission: Electromagnetic Spectrum – Radio Transmission – Microwave Transmission – Communication Satellites: Geostationary, Medium-Earth Orbit, Low Earth-orbit Satellites.

Unit III

12 Hours

IP Addressing Version 4 – IP Addressing Version 6 – Subnetting Advanced VLSM - Switch Basic - VLAN - VTP / CDP - Subnetting Basic Version 4 - Network Quiz - Routing Static

Unit IV

12 Hours

Routing algorithms – Congestion Control Algorithms - CISCO IOS / Managing / Password recovery - Routing Dynamic Routing protocols OSPF RIP EIGRP - Network Advanced Routing Dynamic Routing protocols - OSPF RIP EIGRP

Unit V

12 Hours

Monitoring Network Devices - Overview of ACL\NAT\WAN\Wireless

Text Books

1. David J.Wetherall, Andrew S.Tanenbaum, "Computer Networks", 5th Edition, Pearson Education, 2012.
2. Behrouz A. Forouzan, "Data Communication and Networking", 4th Edition, Tata McGraw Hill, 2007.
3. SilviuAngelescu, "CCNA Certification All-In-One for Dummies", Wiley Publishing. Inc.

Chapters (Relevant Topics only)

Unit	Chapter
I	Text book 1 - (1.1,1.2,1.3,1.4)
II	Text book 1 - (2.2,2.3,2.4)
III	Text book 2 (Chapter 15,19,20,21)
IV	Text book 3 (Book IV Chapter 4,,5,6)
V	Text book 1-(4.4) Text Book 3(Book V & VII)

Web Resources

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

<https://www.javatpoint.com/computer-network-tutorial>

Course Designers

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Mrs. K. SuriyaPrabha

THIAGARAJAR COLLEGE, MADURAI - 09

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DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc., Computer Science in Cognitive Systems on or after June 2020)

Programme Code : UCG

Course code	Course Title	Category	L	T	P	Credits
UCG20CL31	Practical- Database Management Lab	Core Lab 4	-	-	3	2

L-Lecture**T-Tutorial****P-Practical**

Year	Semester	Internal	External	Total
II	III	40	60	100

Preamble

This course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently and effectively - data from a Data Base.

Course Outcomes

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

#	Course Outcome	Expected Proficiency (%)	Expected Attainment (%)
CO1	Illustrate DDL and DML Commands	70	65
CO2	Develop PL/SQL Programs	70	65
CO3	Implement Join & Set operations	70	65
CO4	Demonstrate Functions and Procedures	70	65
CO5	Experiment Cursor, Trigger and Exception.	70	65

Mapping of COs with PSOs

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

S - STRONG**M - MEDIUM****L - LOW****Mapping of COs with POs**

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

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

Content

1. Using Different operators
2. Using Control Structures
3. Implement Built-in functions
4. Implement update and Alter table
5. Implementing PL/SQL Block
6. Implement PL/SQL table and record
7. Performing Join & Set operations
8. Using Functions
9. Using Procedures
10. Using Exception
11. Using Cursors
12. Using Triggers

Web Resources

<https://www.w3schools.com/sql/>

http://www.tutorialspoint.com/sql/sql_tutorial.pdf

Course Designers

Mrs.G.Nalini

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THIAGARAJAR COLLEGE, MADURAI - 09

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DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc., Computer Science in Cognitive Systems on or after June 2020)

Programme Code : UCG

Coursecode	CourseTitle	Category	L	T	P	Credit
UCG20CL32	Practical - JavaProgrammingLab	CoreLab 5	-	-	4	2

L–Lecture**T –Tutorial****P–Practical**

Year	Semester	Internal	External	Total
II	III	40	60	100

Preamble

This course enable the students to construct object oriented java programs using the concept of abstraction, encapsulation, exceptions, thread, packages, interfaces, java collections framework, applet, AWT controls and JDBC.

Course Outcomes

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

#	Course Outcome	Expected Proficiency (%)	Expected Attainment (%)
CO1	Implement Object Oriented programming concept.	70	65
CO2	Create user defined packages and to demonstrate interfaces.	70	65
CO3	Implement exception handling mechanism and multithreading concepts.	70	65
CO4	Implement java collections framework concepts and Develop GUI applications using Java applets.	70	65
CO5	Develop GUI applications using AWT components. Implement database connectivity using JDBC.	70	65

Mapping of COs with PSOs

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

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

Mapping of COs with POs

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

S-STRONG M-MEDIUM L-LOW

Content

1. Program to demonstrate Control statements.
2. Program to demonstrate Single and Multidimensional arrays.
3. Program to demonstrate Method Overloading.
4. Program to demonstrate Constructor Overloading.
5. Program to demonstrate Single and Multilevel Inheritance.
6. Program to demonstrate Method Overriding.
7. Program to demonstrate Dynamic Method Dispatch.
8. Program to demonstrate Interfaces.
9. Program to demonstrate Packages.
10. Program to demonstrate Built-in exception and User-defined exception.
11. Program to demonstrate Multi-threading concept.
12. Program to demonstrate Collection Interfaces.
13. Program to demonstrate Collection Classes
14. Program to demonstrate Legacy Classes and Interface.
15. Applet program to demonstrate basic controls i.e. Button, labels, checkbox etc.
16. Program to demonstrate layout manager.
17. Program to create Menus.
18. Program to demonstrate Dialog Boxes.
19. Program to demonstrate File Dialog.
20. Program to demonstrate database connectivity using JDBC.

Web Resources

<https://www.javatpoint.com/java-tutorial>
<https://www.guru99.com/java-tutorial.html>

Course Designers

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THIAGARAJAR COLLEGE, MADURAI - 09

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DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc., Computer Science in Cognitive Systems on or after June 2020)

Programme Code : UCG

Course code	Course Title	Category	L	T	P	Credit
UCG20CL33	Practical - Computer Networks Lab	Core Lab 4	-	-	4	2

L – Lecture**T – Tutorial****P – Practical**

Year	Semester	Internal	External	Total
II	III	40	60	100

Preamble

This course provides the knowledge to Design and implement Computer network virtually for Local Area network along with routing concepts.

Course Outcomes

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

#	Course Outcome	Expected Proficiency (%)	Expected Attainment (%)
CO1	Infer and apply virtual LAN	70	65
CO2	Explain and Implement Routing Concepts.	70	65
CO3	Illustrate and Develop switch based networks.	70	65
CO4	Implement dynamic routing.	70	65
CO5	Summarize and identify network using routing protocols	70	65

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**

Content

1. Switch basic VLAN
2. Routing Static
3. Switch basic commands
4. Switch basic STP
5. Dynamic Routing protocols OSPF RIP EIGRP

Web Resources

<http://tutorials.ptnetacad.net/tutorials70.htm>

<https://www.packettracernetwork.com/Table/tutorials/>

Course Designer

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THIAGARAJAR COLLEGE, MADURAI - 09

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

DEPARTMENT OF COMPUTER SCIENCE

(For those joined other than B.Sc., Computer Science in Cognitive Systems on or after June 2020)

Programme Code : UCG

Course code	Course Title	Category	L	T	P	Credit
UCG20NE31	E-Commerce	NME-I	2	-	-	2

L-Lecture**T-Tutorial****P-Practical**

Year	Semester	Internal	External	Total
II	III	15	35	50

Preamble

The aim of the course is to familiarize students with basic knowledge of E-Commerce Technologies, Electronic Data Interchange, Electronic payment systems and E-Security.

Course Outcomes

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

#	Course Outcome	Expected Proficiency (%)	Expected Attainment (%)
CO1	Define basic knowledge of E-Commerce Technologies	65	60
CO2	Describe the E-Commerce models	65	60
CO3	Outline the basic concepts of Electronic Data Interchange	65	60
CO4	Illustrate Knowledge on Electronic payment systems and E-Security	65	60
CO5	Discuss the basic concepts of E-Security	65	60

Mapping of COs with POs

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

Mapping of COs with PSOs

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

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

B.A., P.O.

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

S- STRONG M-MEDIUM L-LOW

B.B.A., P.O.

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

S- STRONG M-MEDIUM L-LOW

B.Com..., P.O.

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

S- STRONG M-MEDIUM L-LOW

B.C.A., P.O.

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

S- STRONG M-MEDIUM L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%

Content

Unit – I

15 Hours

Overview of Electronic Commerce: Introduction – Main activities of Electronic Commerce – Definition of Electronic Commerce – Broad goals of Electronic Commerce - Electronic Commerce technical components – Functions of Electronic Commerce – Advantages of Electronic Commerce – Disadvantages of Electronic Commerce – Matrix of E-Commerce Models – Business to Consumer (B2C) – Business to Business (B2B).

Unit – II

15 Hours

Electronic Data Interchange: Introduction – Definition of EDI – EDI would benefit business relationships between organisations – Network enabled Business practices – Applications of EDI – EDI Advantages – Limitations of EDI – Concepts of EDI – Disadvantages of EDI.

Electronic Payment Systems: Introduction – Types of electronic payment systems – Modern payment system.

E-Security : Introduction to Security – Electronic Security – Information useful to intruders – Classification of intruders – Victimised firms – Attacking methods – Incidents occurrence – Security practices.

Text Book

C.S.V.Murthy, 2017, E-Commerce Concepts-Models-Strategies, Himalaya Publishing House.

Chapters(Relevant Topics only)

Unit	Chapter
I	2.1 – 2.6, 2.10, 2.11, 3.6 -3.8
II	20.1 – 20.9, 21.1, 21.2, 21.6, 22.1 – 22.8

References

1. Kamlesh K Bajaj, Debjani Nag 2013, E Commerce – The cutting Edge of Business, Tata McGraw Hill Publishing.
2. David Whiteley, 2012, e-Commerce Strategy, Technologies and Applications, Tata McGraw Hill Publishing.

Web Resources

https://www.gcekbpatna.ac.in/lecture_notes/E_commerce_.pdf

https://www.tutorialspoint.com/e_commerce/e_commerce_edi.htm

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THIAGARAJAR COLLEGE, MADURAI - 09

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

DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc., Computer Science in Cognitive Systems on or after June 2020)

Programme Code : UCG

Course code	Course Title	Category	L	T	P	Credit
UCG20C41	Virtualization and Cloud	Core 7	4	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II	IV	25	75	100

Preamble

This course is designed to understand basic concepts of distributed computing, the principles of Cloud Computing, Virtualization and Data centers.

Course Outcomes

On the successful completion of this course, Students will be able to:

#	Course Outcome	Expected Proficiency (%)	Expected Attainment (%)
CO1	Discuss the principles of Distributed Systems, Distributed Computing, Distributed File Systems, and Parallel & Distributed Computing.	65	60
CO2	Understand Cloud Computing, the components of the cloud infrastructure and their functions and apply deployment models of cloud, AWS.	65	60
CO3	Understand virtualization and apply various ways of using virtualization.	65	60
CO4	Understand and Implement the concept of virtual machines.	65	60
CO5	Acquire knowledge on Datacenter and the concepts related to Data center for cloud computing.	65	60

Mapping of COs with POs

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

S-STRONG M-MEDIUM L-LOW

Mapping of COs with PSOs

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

S-STRONG M-MEDIUM L-LOW

Content

Unit – I

15 Hours

Distributed Systems: Distribute a system - Distributed algorithm - Distributed Data Stores - Distributed Computing - File Systems - Distributed Messaging - Distributed Applications – Distributed Transaction - Parallel and distributed computing - Applications.

Unit – II

15 Hours

Cloud Concepts: Introduction Cloud Computing - Advantages of Cloud - Public Cloud - five essential characteristics - three service models - Four deployment models - Benefits of Cloud Computing - Cloud Vendors - Traditional Infrastructure setup and Challenges – AWS.

Unit – III

15 Hours

Virtualization : Introduction to vSphere and the Software - Defined Data Center Creating Virtual Machines - VCenter Server - Configuring and Managing - Virtual Networks Configuring and Managing Virtual Storage - Virtual Machine Management - Resource Management and Monitoring.

Unit – IV

15 Hours

Virtual Machines: vSphere HA - vSphere Fault Tolerance - Protecting Data vSphere DRS - Network Scalability - vSphere Update Manager and Host Maintenance - Storage Scalability - Securing Virtual Machines.

Unit – V

15 Hours

Datacenter: Data center overview -Components - Provisions - Need of Data Center - Data Center Architecture - Different Racks - Data center architecture for cloud computing - role of data center in cloud computing.

Text Books

1. Jean Dollimore formerly of Queen Mary, Tim Kindberg, “Distributed Systems Concepts and Design”, 5th Edition Cambridge University, University of London
2. VenkataJosyula , Malcolm Orr , Greg Page, “Cloud Computing: Automating the Virtualized Data Center”, 1st Edition.
3. Brian J.S. Chee, Curtis Franklin Jr., “Cloud Computing: Technologies and Strategies of the Ubiquitous Data Center”, 1st Edition.
4. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, “Mastering Cloud Computing: Foundations and Applications Programming”, Elsevier Science, 2013.
5. Kris Jamsa, “Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More”, Jones & Bartlett Publishers, 2012.
6. Nick Marshall, Mike Brown, G. Blair Fritz, Ryan Johnson, “Mastering VMware vSphere 6.7”, Sybex publishers, 2018.
7. Martin Gavanda, Andrea Mauro, Paolo Valsecchi, Karel Novak, “Mastering VMware vSphere 6.7”, Second Edition, Packt Publishing, 2019.

Web Resources

1. <https://docs.vmware.com/en/VMware-vSphere/index.html>
(Introduction to Virtualization)
2. <https://learning.customerconnect.vmware.com/oltpublish/site/cms.do?view=webinars>
(VMWare)
3. <https://www.youtube.com/user/VMwareLearning/videos?view=0&flow=list>
(Virtualization & VMware)
4. <https://www.youtube.com/watch?v=iBI31dmqSX0>
(Introduction to virtualization)
5. https://www.youtube.com/watch?v=_pPlanX5wQY
(Virtualization in Cloud Computing)
6. <https://www.edureka.co/blog/videos/aws-tutorial/>
(AWS)

Course Designers

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THIAGARAJAR COLLEGE, MADURAI - 09

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

DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc., Computer Science in Cognitive Systems on or after June 2020)

Programme Code : UCG

Course code	Course Title	Category	L	T	P	Credit
UCG20C42	Infrastructure Management	Core 8	4	1	-	4

L – Lecture**T – Tutorial****P – Practical**

Year	Semester	Internal	External	Total
II	IV	25	75	100

Preamble

This course is to present an introduction to Microsoft System Center Configuration Manager concepts that enables the management, deployment and security of devices and applications across an enterprise.

Course Outcomes

On the successful completion of the course, Students will be able to :

#	Course Outcome	Expected Proficiency (%)	Expected Attainment (%)
CO1	Illustrate the concepts of windows introduction , deployment and managing apps in window	65	60
CO2	Demonstrate the concepts of SCCM and configuration manager	65	60
CO3	Illustrate operations manager concepts, managing SQL Server configuration, operations console and web console	65	60
CO4	Implement sccm administration, managing and importing packs	65	60
CO5	Explain the concepts of Management Points and Manager reporting	65	60

Mapping of COs with PSOs

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

S - STRONG**M - MEDIUM****L - LOW****Mapping of COs with POs**

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

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

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge - K1</i>	40%	40%	40%
<i>Understand - K2</i>	40%	40%	40%
<i>Apply - K3</i>	20%	20%	20%

Content

Unit I

15 Hours

Introducing Windows 10: Overview of Deploying Windows 10- Configure Devices and Drivers- Perform Post installation Configuration Task- Managing Apps in Window.

Unit II

15 Hours

SCCM Basics- Overview of System Center 2012 R2 Configuration Manager-Planning and Deploying a Stand-Alone Primary Site- Planning and Configuring Role-Based Administration- Planning and Deploying a Multiple-Site Hierarchy- Replicating Data and Managing Content in Configuration Manager 2012-Planning Resource Discovery and Client Deployment- Configuring Internet and Cloud-Based Client Management- Maintaining and Monitoring System Center 2012 Configuration Manager.

Unit III

15 Hours

Overview of System Center 2012 R2 Operations Manager: Operations Manager Introduction and Basic Concepts- Reason to use Operations Manager- What's New in 2012 R2 Operations Manager- System Requirements- Operations Manager Components. Planning & Installation: Deployment Scenarios-Order of Installation- Installation Process- SQL Server Configuration- Operations Console- Web Console.

Unit IV

15 Hours

Administration : Agent Deployment- Security of manual agent- Agent and Agent less managed systems-Role Based Security- Reporting server- Object Discovery. Management Packs: Management Pack Overview- Pre-Installed Management Packs- Importing Management Packs- Overrides.

Unit V

15 Hours

Monitoring Overview- Overriding of MPs- Creating Rules and Monitors- Agentless Monitoring- Demo on Role Based Security- Creating Groups- Configuring Notifications. Operations Manager Reporting: Installing SQL Reporting Services- Installing Operations Manager Reporting- Creating, Viewing and Customizing Reports- Dashboard- Considerations for High Availability and Disaster Recovery.

Web References

<https://www.andersrodland.com/ultimate-sccm-querie-collection-list/>
https://docs.microsoft.com/en-us/mem/configmgr/core/plan-design/configs/site-and-site-system-prerequisites#bkmk_2012SUPreq
<https://docs.microsoft.com/en-us/mem/configmgr/core/servers/deploy/install/installing-sites>
<https://docs.microsoft.com/en-us/mem/configmgr/core/plan-design/hierarchy/design-a-hierarchy-of-sites>
<https://systemscenter.ru/smsv4.en/html/3b6b9f7e-4d2e-4d60-8e98-a8cd524f03df.htm>
<https://www.imab.dk/back-to-basics-troubleshoot-sccm-system-center-configuration-manager-client-push-installation-errors/>
<https://www.microsoft.com/en-us/download/details.aspx?id=30443>
<https://www.youtube.com/watch?v=tSwd9tWeMRU&t=463s>
<https://www.youtube.com/watch?v=Ify47YiVb3A>
<https://www.youtube.com/watch?v=neMDFem4O6g>
<https://www.youtube.com/watch?v=6JHJes1u8Pg>
<https://www.youtube.com/watch?v=uazLOYPCUH4>
<https://www.youtube.com/watch?v=ppX5dbdzzrc>
<https://www.youtube.com/watch?v=6JHJes1u8Pg&t=42s>

https://www.youtube.com/watch?v=G4iyyq_UIDA

[https://docs.microsoft.com/en-us/previous-versions/bb467605\(v=msdn.10\)?redirectedfrom=MSDN](https://docs.microsoft.com/en-us/previous-versions/bb467605(v=msdn.10)?redirectedfrom=MSDN)

https://docs.microsoft.com/en-us/learn/?WT.mc_id=sitertzn_homepage_learn-redirect-handsonlabs#keywords=Windows%2010&page=1&sort=Newest

Course Designers

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THIAGARAJAR COLLEGE, MADURAI - 09

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

DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc., Computer Science in Cognitive Systems on or after June 2020)

Programme Code : UCG

Course code	Course Title	Category	L	T	P	Credit
UCG20C43	Process Management	Core 9	4	1	-	4

L – Lecture**T – Tutorial****P – Practical**

Year	Semester	Internal	External	Total
II	IV	25	75	100

Preamble

The course elaborates from the basic of software development to advanced level of designing of software production. This syllabus gives out the clear knowledge on software industry oriented development process.

Course Outcomes

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

#	Course Outcome	Expected Proficiency (%)	Expected Attainment (%)
CO1	Explain the basic of software engineering	65	60
CO2	Explain agile methodology	65	60
CO3	Devops principle and development.	65	60
CO4	Represent UX patterns and Scrum's	65	60
CO5	Design thinking strategy	65	60

Mapping of COs with PSOs

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

S - STRONG**M - MEDIUM****L - LOW****Mapping of COs with POs**

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

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

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge</i>	40%	40%	40%
<i>Understand</i>	40%	40%	40%
<i>Apply</i>	20%	20%	20%

Content

Unit I

15 Hours

Software and software Engineering: The Nature of Software –The Unique Nature of WebApps-Software Engineering- Software Process-Software Engineering Practice-Software Myths. Software Process Model: A Generic Process Model- Process Assessment and Improvement –Perspective Process Models-Specialized Process Model-The Unified Process.

Unit II

15 Hours

Agile: Agile Methodology-Manifesto-Principles of Agile-Agile Methodologies-Challenges with Agile. Scrum: Overview of Scrum-Scrum Roles-Scrum Ceremonies-Scrum Artifacts-Extreme programming vs Scrum.

Unit III

15 Hours

Devops: Introduction to Devops-Principles-Automation-Performance Measurement through KPIS and Metrics-Agile and Devops-Agile Infrastructure-Velocity-Lean Startup UPS.

Unit IV

15 Hours

Lean UX and Agile Anti-Patterns : Sprint -Staggered sprints -Sprint zero and design sprints- Dual-track Agile-Listening to Scrum's rhythms- Listening to Scrum's rhythms- Participation- Design is a team sport- Coordinating multiple Lean UX teams- Managing up and out – Agile anti-patterns.

Unit V

15 Hours

Design Thinking: Introduction to Design Thinking – Lean thinking - Actionable Strategy- The Problem with Complexity - Vision and Strategy - Defining Actionable Strategy Act to Learn - Leading Teams to Win.

References

1. Jonny Schneider, "Understanding Design Thinking, Lean, and Agile" O'Reilly Media 2017.
2. Roger S Pressman, "Software Engineering A Practioners Approach", 7th Edition 2010
3. <https://www.youtube.com/watch?v=tSwd9tWeMRU&t=463s>
4. <https://www.youtube.com/watch?v=Ify47YiVb3A>
5. <https://www.youtube.com/watch?v=neMDFem4O6g>
6. <https://www.youtube.com/watch?v=6JHJes1u8Pg>
7. <https://www.youtube.com/watch?v=uazLOYPCUH4>
8. <https://www.youtube.com/watch?v=ppX5dbdzzrc>
9. <https://www.youtube.com/watch?v=6JHJes1u8Pg&t=42s>
10. https://www.youtube.com/watch?v=G4iyyq_UIDA
11. [https://docs.microsoft.com/en-us/previous-versions/bb467605\(v=msdn.10\)?redirectedfrom=MSDN](https://docs.microsoft.com/en-us/previous-versions/bb467605(v=msdn.10)?redirectedfrom=MSDN)
12. https://docs.microsoft.com/en-us/learn/?WT.mc_id=sitertzn_homepage_learn-redirect-handsonlabs#keywords=Windows%2010&page=1&sort=Newest

Course Designers

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THIAGARAJAR COLLEGE, MADURAI - 09

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

DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc., Computer Science in Cognitive Systems on or after June 2020)

Programme Code : UCG

Course code	Course Title	Category	L	T	P	Credit
UCG20CL41	Practical- Virtualization and Cloud Lab	Core Lab7	-	-	4	2

L – Lecture**T – Tutorial****P – Practical**

Year	Semester	Internal	External	Total
II	IV	40	60	100

Preamble

This course provides the principles of virtualization technologies and cloud computing. It provides students with hands-on practice experience on how to build secured cloud infrastructure and also information about virtual machines, virtual networking, virtual storage, VM management hypervisors and AWS.

Course Outcomes

On the successful completion of this course, Students will be able to:

#	Course Outcome	Expected Proficiency (%)	Expected Attainment (%)
CO1	Understand Cloud Computing, the components of the cloud infrastructure and their functions and apply deployment models of cloud.	70	65
CO2	Understand virtualization and apply various ways of using virtualization.	70	65
CO3	Understand and Implement the concept of virtual machines.	70	65
CO4	Acquire knowledge on AWS and the concepts related to the AWS platform.	70	65
CO5	Explore the services in the AWS portfolio.	70	65

Mapping of COs with POs

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

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

Mapping of COs with PSOs

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

S-STRONG M-MEDIUM L-LOW

Content :

1. Working with hypervisors.
2. Creating account in AWS.
3. Exploring AWS services like storage, machine image, pricing models, data bases.

Web Resources

1. <https://www.youtube.com/watch?v=iBI31dmqSX0>
(Introduction to virtualization)
2. https://www.youtube.com/watch?v=_pPlanX5wQY
(Virtualization in Cloud Computing)
3. <https://www.youtube.com/watch?v=7m3f-P-WWbg>
(VMWare)
4. <https://www.youtube.com/watch?v=1moAFvcvrd8>
(Virtualization & VMware)
5. <https://www.edureka.co/blog/videos/aws-tutorial/>
(AWS)

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DEPARTMENT OF COMPUTER SCIENCE

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Programme Code : UCG

Course code	Course Title	Category	L	T	P	Credit
UCG20CL42	Practical - Infra Structure Management Lab	Core Lab 8	-	-	4	2

L – Lecture**T – Tutorial****P – Practical**

Year	Semester	Internal	External	Total
II	IV	40	60	100

Preamble

This course provide knowledge of working with SCCM and SCOM

Course Outcomes

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

#	Course Outcome	Expected Proficiency (%)	Expected Attainment (%)
CO1	Describe Windows Management	70	65
CO2	Outline about Device Management	70	65
CO3	Illustrate Virtual Desktop management	70	65
CO4	Explain Compliance and setting management	70	65
CO5	Implementation of software distribution and patches	70	65

Mapping of COs with PSOs

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

S - STRONG**M - MEDIUM****L - LOW****Mapping of COs with POs**

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

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

Content

- Working with SCCM
- Working with SCOM

Course Designer

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THIAGARAJAR COLLEGE, MADURAI - 09

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DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc., Computer Science in Cognitive Systems on or after June 2020)

Programme Code : UCG

Course code	Course Title	Category	L	T	P	Credit
UCG20NE41	Internet Applications	NME II	2	-	-	2

L–Lecture

T –Tutorial

P–Practical

Year	Semester	Internal	External	Total
II	IV	15	35	50

Preamble

The aim of the course is to familiarize students with the Internet, Intranet technologies, features of emails and web site designing.

Course Outcomes

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

#	Course Outcome	Expected Proficiency (%)	Expected Attainment (%)
CO1	Understand the basic internet concepts and protocols.	65	60
CO2	Recognize the importance of Email concepts and protocols.	65	60
CO3	Infer the basic concepts of Intranet.	65	60
CO4	Understand the basic html tags.	65	60
CO5	Acquire knowledge to implement web pages.	65	60

Mapping of COs with PSOs

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

S- STRONG

M- MEDIUM

L-LOW

Mapping of COs with POs**B.SC., P.O.**

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

S- STRONG

M-MEDIUM

L-LOW

B.A., P.O.

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

S- STRONG M-MEDIUM L-LOW

B.B.A., P.O.

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

S- STRONG M-MEDIUM L-LOW

B.Com..., P.O.

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

S- STRONG M-MEDIUM L-LOW

B.C.A., P.O.

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

S- STRONG M-MEDIUM L-LOW

Bloomstaxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%

Content

UNITI:

15 HOURS

Internet and World Wide Web:

Introduction: What is special about Internet –Internet Access – Internet Basics – Internet Protocols –Internet Addressing – The World Wide Web (WWW) – Web Pages and HTML – Web Browsers –Searching the Web –Internet Chat.

Overview of Electronic Mail:

Introduction: Why use E-MAIL - How E-MAIL Works -- How Private is E-MAIL – E-MAIL Names & Addresses–Mailing Basics . E-MAIL Ethics–Internet Code of Conduct – Spamming–E-MAIL– Advantages & Disadvantages- Tips for Effective E-MAIL use – Smileys (Emoticons) – Useful E-MAIL Services– Mailing Lists–News Groups.

UNITII:

15 HOURS

Introduction to Intranets:

Introduction – Characteristics of Intranet – Advantages of Intranets – Business Benefits of Intranets –Drawbacks of Intranets – Why does an Organization need Intranet – Intranet vs Groupware – Intranetvs.Email–Intranetvs.Client/ServerSystems–Extranet–Intranets,ExtranetsandE-Commerce.

Introduction to Web Design:

Introduction–Web Design–Creating a Website –Web Hosting –Website Promotion.

TextBook

AlexisLeonandMathewsLeon,Fundamentals of Information Technology,Second Edition,VikasPublishingHousePvt. Ltd.

Chapters

Unit	Chapter
I	24,25
II	26,28

References

1. DouglasE. Comer,2009, The InternetBook, FourthEdition, PHILearningPvt. Ltd.
2. YoungKaiSeng, 2000,UsingtheInternettheEasyWay,First Edition,, MinervaPublications.
- 3.RameshBangia,2011,InternetTechnologyandWebdesign,ThirdEdition,FirewallMedia.(Animprintof Lakshmi Publications Pvt. Ltd.)

WebResources

https://www.tutorialspoint.com/internet_technologies/www_overvie

[w.htmhttps://www.geeksforgeeks.org/world-wide-web-](https://www.geeksforgeeks.org/world-wide-web-)
[wwwhttps://www.tutorialspoint.com/internet_technologies/e_mail_o](https://www.tutorialspoint.com/internet_technologies/e_mail_o)
[verview.htm](#)

CourseDesigners

Mrs.K.Sharmila.Mrs. G.Nalini.

M.Sc.,
Computer Science
Programme Code: PCS

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

DEPARTMENT OF COMPUTER SCIENCE

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

**M.Sc. Computer Science
Course Structure**

III SEMESTER								
Code No.	Type of Paper	Title of the paper	Hrs/wk	Credit	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 III	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	Credit	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

THIAGARAJAR COLLEGE – AUTONOMOUS MADURAI – 625 009.

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DEPARTMENT OF COMPUTER SCIENCE

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

List of Electives – Second Year only

1. Bioinformatics
2. Cyber Forensics System
3. Software Testing
4. Embedded Systems

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
PCS20C31	Data Science with Big Data Analytics	Core 7	5	-	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Int. marks	Ext. marks	Total
II	III	25	75	100

Preamble:

To provide an in-depth knowledge in Big Data Analytics for mining useful information from large volumes of datasets. It also provides Data Science to make use of learning algorithms and statistical methods to train the system for data prediction.

Pre-requisite:

Students are expected to know the fundamentals of Data Mining concepts or Machine Learning.

Course Outcomes:

On the successful completion of this course, Students will be able to:

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Discuss about the overview of Big Data analytics, Big Data architecture, ecosystem and data analytics life cycle applied for Big Data problems.	60%	70%
CO2	Implement R language for data analysis, Apply statistical methods of data evaluation and visualize the data in the form of graphs.	60%	70%
CO3	Examine the mining techniques such as Association, Clustering and tools for analyzing Big Data.	60%	70%
CO4	Analyze the Big Data with various Classification algorithms, Apply ARIMA model in Big Data for future data prediction and mining various sources of data in text analytics.	60%	70%
CO5	Evaluate various frameworks such as Hadoop, Map reduce, Hbase, Pig and explore the applications of Big Data analytics in social media applications and in other real time applications.	60%	70%

Mapping of COs with POs

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

S-STRONG M-MEDIUM L-LOW

Mapping of COs with PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S
CO2	S	S	M	S	S
CO3	S	S	M	S	M
CO4	S	M	S	S	M
CO5	S	S	M	S	S
	S-STRONG	M-MEDIUM		L-LOW	

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 to Big Data Analytics: Big Data Overview– Data Structures – Analyst Perspective on Data Repositories-State of the Practice in Analytics–BI Versus Data Science-Current Analytical Architecture –Drivers of Big Data–Big Data Ecosystem-Data Analytics Lifecycle: Data Discovery–Data Preparation–Model Planning– Model Building– Communicate Results – Operationalize.

Unit II:

15 Hrs

Basic Data Analytic Methods Using R : Introduction to R programming–R Graphical User Interfaces–Data Import and Export– Attribute and Data Types–Descriptive Statistics Exploratory Data Analysis: Visualization Before Analysis–Dirty Data– Visualizing a Single Variable– Examining Multiple Variables Data Exploration Versus Presentation– Statistical Methods of Evaluation: Hypothesis Testing– Difference of Means– Wilcoxon Rank-Sum Test–Type I and Type II Errors –Power and Sample Size – ANOVA.

Unit III:

15 Hrs

Advanced Analytical Theory and Methods: Clustering– K Means– Use Cases–Overview–Determining number of clusters–Diagnostics – Reasons to choose and cautions – Additional Algorithms – Association Rules: A Priori Algorithm–Evaluation of Candidate Rules – Applications of Association Rules – Validation and Testing – Diagnostics. Regression: Linear Regression and Logistic Regression:– Use cases–Model Description–Diagnostics-Additional Regression Models.

Unit IV:

15 Hrs

Classification: Decision Trees–Overview–Genetic Algorithm– Decision Tree Algorithms–Evaluating Decision Tree–Decision Trees in R - Naive Bayes– Bayes Theorem– Naïve Bayes Classifier–Smoothing – Diagnostics – Naïve Bayes in R – Diagnostics of Classifiers–Additional Classification Methods- Time Series Analysis: Overview–Box–Jenkins Methodology–ARIMA Model–Autocorrelation Function– Autoregressive Models–Moving Average Models – ARMA and ARIMA Models–Building and Evaluating an ARIMA Model-Text Analysis : Text Analysis Steps–Example–

Collecting – Representing Term Frequency – Categorizing – Determining Sentiments – Gaining Insights.

Unit V:

15 Hrs

Advanced Analytics-Technology and Tools: Map Reduce and Hadoop : Analytics for Unstructured Data
.- Use Cases- Map Reduce- Apache Hadoop–The Hadoop Ecosystem–pig –Hive–Hbase– Mahout–
NoSQL- Tools in Database Analytics : SQL Essentials–Joins–Set operations – Grouping Extensions– In
Database Text Analysis- Advanced SQL– Windows Functions– User Defined Functions and Aggregates
– ordered aggregates- MADlib - Analytics Reports Consolidation – Communicating and
operationalizing and Analytics Project–Creating the Final Deliverables: Developing Core Material for
Multiple Audiences–Project Goals–Main Findings– Approach Model Description–Key points support
with Data -Model details – Recommendations – Data Visualization.

Text Book

1. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, EMC Education Services Published by John Wiley & Sons, Inc. 2015.

Chapters

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

Reference Books

1. Noreen Burlingame, “The little book on Big Data”, New Street publishers, 2012.
2. Anil Maheshwari, “ Data Analytics”, McGraw Hill Education, 2017.
3. Norman Matloff, “The Art of R Programming: A Tour of Statistical Software Design”, Starch Press; 1 edition , 2011.

Web Resources:

- http://www.johndcook.com/R_language_for_programmers.html.
- <http://bigdatauniversity.com/>.
- <http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction>.
- <https://www.edureka.co/blog/videos/big-data-tutorial/> (**Introduction to Big Data**)
- <https://www.tutorialspoint.com/r/index.htm> (**R Programming**)
- <https://www.tutorialspoint.com/> (**Hbase, Hive, Pig**)
- <https://www.edureka.co/blog/videos/hadoop-tutorial/> (**Hadoop, MapReduce**)
- <https://www.real-statistics.com/non-parametric-tests/wilcoxon-rank-sum-test/> (**Wilcoxon Rank Sum Test**)

Course Designers:

Mr.G.D.Kesavan and Dr.B.Subashini

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
PCS20C32	Cryptography and Network Security	Core 8	5	-	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Int. Marks	Ext. Marks	Total
II	III	25	75	100

Preamble

To provide an in-depth knowledge in Cryptography Theories, Algorithms and firewalls systems.

Prerequisite:

Basic knowledge about Attackers in Computer Networks.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Recognize the different Encryption Techniques	60%	70%
CO2	Understand the Public Key Cryptography	60%	70%
CO3	Discuss the Hash Algorithms and Kerberos	60%	70%
CO4	Implement the Electronic Mail Security and IP Security	60%	70%
CO5	Evaluate the Web Security and Intruders	60%	70%

Mapping Course Outcome with Program Outcomes

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

S-STRONG

M-MEDIUM

L-LOW

Mapping of Course Outcomes with Programme Specific Outcomes

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

S-STRONG

M-MEDIUM

L-LOW

Bloom's Taxonomy : Assessment Pattern

Blooms taxonomy	CA		End of Semester
	First	Second	
	Knowledge –K1	15% (9)	15% (9)
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.

Overview: Services, Mechanisms and Attacks -The OSI Security Architecture- A Model for Network Security. Classical Encryption Techniques: Symmetric Cipher Model- Substitution Techniques - Transposition Techniques. Block Cipher Principles and the Data Encryption Standard- Simplified DES - Block Cipher Principles - The Data Encryption Standard- The Strength of DES- Differential and Linear Cryptanalysis - Block Cipher Design Principles - Block Cipher Modes of Operations.

Unit II

15 Hrs.

Public Key Cryptography and RSA: Principles of Public Key Cryptosystem - The RSA Algorithm- Key Management and other public key cryptosystems - Key Management- Diffie - Hellman Key Exchange - Elliptic Curve Arithmetic - Elliptic Curve Cryptography.

Unit III

15 Hrs.

Message Authentication and Hash Function-Authentication Requirements - Authentication Functions - Message Authentication Codes - Hash Function - Security of Hash Function and MACS-Hash Algorithms: MD5 Message Digest Algorithm - Secure Hash Algorithm - RIPEMD-1, HMAC.- Authentication Applications- Kerberos - X.509 Authentication Service.

Unit IV

15 Hrs.

Electronic Mail Security: Pretty Good Privacy - S/MIME- IP Security: Introduction - Architecture - Authentication Header - Encapsulating Security Payload - Combining Security Association - Key Management - Internetworking and Internet Protocols.

Unit V

15 Hrs.

Web Security: Web Security Consideration - Secure Sockets Layer and Transport Layer Security - Secure Electronic Transaction. System Security: Intruders - Intrusion Detection - Password Management.

Text Book

1. William Stallings, "Cryptography and Network Security: Principles and Practices", Third Edition, Pearson Education, 2002.

Chapters

Unit I	: 1,2,3
Unit II	: 9,10
Unit III	: 11,12, 14
Unit IV	: 15,16
Unit V	: 17,18

References

1. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.

2. Charles Pfleeger, "Security In Computing", 4th Edition, Prentice Hall Of India, 2006.
3. Charlie Kaufman And Radia Perlman, Mike Speciner, "Network Security, Second Edition, Private Communication in Public World", PHI 2002.

Web Resources

1. <https://www.youtube.com/watch?v=L2NAQbZeRXo> (**Substitution techniques**)
2. <https://www.youtube.com/watch?v=gAtBM06xwaw> (**Elliptic Curve Cryptography**)
3. https://www.youtube.com/watch?v=Qvk9Bptdh_U (**Secure Hash Algorithm**)
4. <https://www.youtube.com/watch?v=hExRDVZHhig> (**Secure Sockets Layer**)

Course Designer

Dr.P.Manickam and Dr.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
PCS20C33	Advanced Web Technology	Core 9	5	-	-	4

L – Lecture

T – Tutorial

P – Practical

Year	Semester	Int. marks	Ext. marks	Total
II	III	25	75	100

Preamble:

This course is designed to understand about *ASP.NET* which is one of the most leading web application development frameworks and which is specially used to create dynamic and interactive websites. With this course the Students will gain the ability to develop web sites using ASP.net for real time applications.

Pre-requisite:

Programming experience of any web based technologies.

Course Outcomes

On the successful completion of this course, Students will be able to:

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Explore the overview of ASP .NET and its Framework.	60%	70%
CO2	Apply Web form fundamentals and web control classes to design a web application.	60%	70%
CO3	Use validation control, cookies and session for the implementation of page level validity in a web application development.	60%	70%
CO4	Examine the working of data in ADO .Net, use of ADO .NET data access with SQL to develop a client server model and to access data using Data list and Data grid controls.	60%	70%
CO5	Connecting XML with ADO.NET to build an application.	60%	70%

Mapping of COs with POs

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

S-STRONG

M-MEDIUM

L-LOW

Mapping of COs with PSOs

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

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

Overview of ASP.NET – The .NET framework–Learning the .NET languages Data types–Declaring variables-Scope and Accessibility-Variable operations- Object Based manipulation- Conditional Structures-Loop Structures-Functions and Subroutines. Types, Objects and Namespaces : The Basics about Classes- Value types and Reference types- Advanced class programming- Understanding name spaces and assemblies. Setting Up ASP .NET and IIS.

Unit – II

15 Hrs

Developing ASP.NET Applications - ASP.NET Applications: ASP.NET applications– Code behind-The Global.asax application file- Understanding ASP.NET Classes- ASP.NET configuration - Web Form fundamentals: A simple page applet- Improving the currency converter- HTML control classes-The page class- Accessing HTML server controls - Web controls: Web Control Classes – AutoPostBack and Web Control events- Accessing web controls.

Unit – III

15 Hrs

Visual Studio.NET: Using Visual Studio .NET - Starting a Visual Studio.NET Project- Web form Designer- Writing code- Visual studio.NET debugging - Validation and Rich Controls: Validation- A simple Validation example- Understanding regular expressions- A validated customer form - State Management: Custom Cookies – Session State -Tracing, Logging, and Error Handling – Handling Exceptions – Throwing – Logging – Error Page – Page Tracing.

Unit – IV

15 Hrs

Working with Data – Overview of ADO.NET – ADO .NET and data management-Characteristics of ADO .NET-ADO .NET object model- ADO.NET data access: SQL basics– Select, Update, Insert, Delete statements- Accessing data- Creating a connection- Using a command with a Data Reader-Accessing Disconnected data-Selecting multiple tables –Updating Disconnected data- Data binding: Single value Data Binding - Repeated value data binding- Data binding with databases.

Unit – V

15 Hrs

Data list – Data grid– Repeater – Data Binding with Multiple templates, Comparing the Template Controls, Selecting Items, Editing Items- Files, Streams and Email – Files and Web Applications – Reading and Writing with streams -Allowing file uploads – sending Email - Using XML – XML classes – XML validation – XML in ADO . NET

Text Book

1. Mathew MacDonald, “ASP.NET Complete Reference”, TMH 2005.

Chapters:

- Unit I : 1,2,3,4
- Unit II : 5, 6, 7
- Unit III : 8, 9, 10, 11
- Unit IV : 12, 13, 14
- Unit V : 15, 16, 17

References

1. Crouch MattJ, “ASP.NET and VB.NET Web Programming”, Addison Wesley 2002.
2. J.Liberty, D.Hurwitz, “Programming ASP.NET”, Third Edition, O’REILLY, 2006.

Web Resources

1. <https://www.w3schools.com/asp/default.ASP>
(Introduction to Asp .Net)
2. <https://www.javatpoint.com/asp-net-tutorial>
(Web Form Controls & Validation)
3. <https://www.tutorialspoint.com/asp.net/index.htm>
(ADO .Net)
4. <https://www.dotnettricks.com/learn/aspnet/difference-between-repeater-and-datalist-and-gridview>
(Data-Repeater and Grid View)

Course Designers:

Dr.T.S.Urmila and Dr.B.Subashini

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
PCS20CL31	Lab in Data Science	Core lab 5	-	-	4	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Int. marks	Ext. marks	Total
II	III	40	60	100

Preamble:

This course is designed to understand about Data Science Analytics tool. With this course the Students will gain the ability to analyze and visualize Data Analytics and Data Science for real time applications.

Pre-requisite:

Students should know about Design and Analysis of Algorithms, Machine Learning or any programming language.

Course Outcomes

On the successful completion of this course, Students will be able to:

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Implement data analysis using tools and visualize the data.	75%	75%
CO2	Apply tools on Statistical data and various functionalities.	75%	75%
CO3	Illustrate data manipulation tools on data science	75%	75%
CO4	Analyze database activity with programming.	75%	75%
CO5	Design the datasets using modelling techniques	75%	75%

Mapping of COs with POs

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

S-STRONG

M-MEDIUM

L-LOW

Mapping of COs with PSOs

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

S-STRONG

M-MEDIUM

L-LOW

Content

1. Implement some simple data manipulation programs on R.
2. Implement bar chart, Histogram, graphics and coloring using R programming. (Data Visualization)
3. Implement basic statistical computation on data. (Basic Statistic computation)
4. Implement some R programming functions. (Functions and Programming in R)
5. Implement List Management, Data frames, Outlier Analysis (Data manipulation in R)
6. Implement programs that queries database. (Performing queries using R)
7. Applying data modelling techniques to large data sets (Statistical Modelling in R)

Course Designers

Mr.G.D.Kesavan and Mr. J.Prakash

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
PCS20CL32	Lab in Advanced Web Technology	Core lab 6	-	-	4	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Int. marks	Ext. marks	Total
II	III	40	60	100

Preamble:

This course is designed to understand about ASP.NET which is one of the most leading web application development frameworks and which is specially used to create dynamic and interactive websites. With this course the Students will gain the ability to develop web sites using ASP.net for real time applications.

Pre-requisite:

Programming experience of any web based technologies.

Course Outcomes

On the successful completion of this course, Students will be able to:

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Acquire knowledge on C#, Design and Implement console application in .Net framework.	75%	75%
CO2	Apply web controls to develop a simple Web Application.	75%	75%
CO3	Create a web application and apply validation control, cookies and session in the web page.	75%	75%
CO4	Apply the knowledge of ASP .NET object, ADO.NET data access and SQL to develop a client server model and to access data using Data grid controls.	75%	75%
CO5	Develop a Web site for real time application.	75%	75%

Mapping of COs with POs

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

S-STRONG

M-MEDIUM

L-LOW

Mapping of COs with PSOs

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

S-STRONG

M-MEDIUM

L-LOW

Content

Console Application

1. Manipulate Student details and print in neat format using C# .Net.
2. Implement Conditional and Looping statements in C# .Net.
3. Implement in-built Array functions in C# .Net.
4. Apply Inheritance and abstract class in C# .Net.
5. Manipulate Interface and Exception handling in C# .Net

Windows Application

6. Create a Simple application using web controls.
7. Create an online application using ASP.NET without validation controls.
8. Develop an ASP.NET Application to validate the form.
9. Create an online application using in-built validation controls available in ASP.NET.
10. Develop an application using ADO.NET.
11. Develop an ASP.NET Application to implement data binding in data grid using ADO .Net.

12. Develop an ASP.NET Application to implement data binding in data grid using XML.
13. Develop an ASP.NET Application to handle session tracking.
14. Develop an ASP.NET Application to implement the cookies.
15. Develop a site for simple online reservation.

Course Designers:

Dr.T.S.Urmila and Dr.B.Subashini.

THIAGARAJAR COLLEGE, MADURAI - 9.
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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
PCS20MP31	Mini Project & Viva Voce	MPJ	-	-	2	2

L – Lecture

T – Tutorial

P – Practical

Year	Semester	Int. marks	Ext. marks	Total
II	III	40	60	100

Preamble:

This mini project gives out hands on experience to the students from the core and elective programming and Application oriented language.

Pre-requisite:

Programming experience from any programming and Application oriented language.

Contents:

General Guidelines to be followed.

- Every student should develop project individually.
- Internship projects may be preferred.
- Real time projects will be appreciated.
- Two reviews will be conducted during project period.
- Project report should be submitted before Final viva voce.

Course designer

Dr.R.Sandha and Dr.Rakesh

THIAGARAJAR COLLEGE, MADURAI - 9.
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DEPARTMENT OF COMPUTER SCIENCE
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Programme Code – PCS

Course code	Course Title	Category	L	T	P	Credit
PCS20C41	Internet of Things	Core 10	6	-	-	6

L – Lecture T – Tutorial P – Practical

Year	Semester	Int. Marks	Ext. Marks	Total
II	IV	25	75	100

Preamble

To provide an in-depth knowledge about concepts, Architecture, the Protocols and the applications of Internet of Things (IoT).

Prerequisite:

Basic knowledge about Wireless Network, Network Protocols.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Recognize the four Pillars of IoT and its impacts	60%	70%
CO2	Understand the importance of DNA of IoT	60%	70%
CO3	Discuss the Web of Things and Internet of Things	60%	70%
CO4	Evaluate the security challenges of IoT	60%	70%
CO5	Implement IoT in Manufacturing Industry	60%	70%

Mapping Course Outcome with Program Outcomes

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

S-STRONG M-MEDIUM L-LOW

Mapping of Course Outcomes with Programme Specific Outcomes

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

S-STRONG M-MEDIUM L-LOW

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

18 Hrs.

Internet of Things Introduction: The Third ICT Wave-Rise of the Machines-The IoT Kaleidoscope-Defining Internet of Things-IoT: A Web 3.0 View. Four Pillars of IoT-The Horizontal, Verticals, and Four Pillars-M2M: The Internet of Devices-RFID: The Internet of Objects-WSN: The Internet of Transducers-SCADA: The Internet of Controllers.

Unit II

18 Hrs.

DNA of IoT- DCM: Device, Connect, and Manage- Device: Things That Talk- Connect: Via Pervasive Networks- Satellite IoT-Manage: To Create New Business Value. Middleware and IoT-An Overview of Middleware-Communication Middleware for IoT- LBS and Surveillance Middleware.

Unit III

18 Hrs.

Protocol Standardization for IoT- Web of Things versus Internet of Things- IoT Protocol Standardization Efforts- Unified Data Standards: A Challenging Task. Architecture Standardization for WoT- Platform Middleware for WoT- Unified Multitier WoT Architecture - WoT Portals and Business Intelligence- Challenges of IoT Information Security.

Unit IV

18 Hrs.

Securing IoT -A Brief History of OT Security - Common Challenges in OT Security-Erosion of Network Architecture-Pervasive Legacy Systems -Insecure Operational Protocols - Modbus-DNP3-ICCP -OPC- IEC Protocols - Other Protocols-Device Insecurity -Dependence on External Vendors -Security Knowledge-How IT and OT Security Practices and Systems Vary - Formal Risk Analysis Structures: OCTAVE and FAIR-The Phased Application of Security in an Operational Environment.

Unit V

18 Hrs.

IoT in Industry: Manufacturing -An Introduction to Connected Manufacturing - An IoT Strategy for Connected Manufacturing-Business Improvements Driven Through IoT -An Architecture for the Connected Factory -Industrial Automation Control Protocols -Connected Factory Security- Edge Computing in the Connected Factory.

Text Book

1. Honbo Zhou , “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press, 2013.
2. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, “IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, Cisco Press, 2017.

Chapters

Unit I	: Chapter 1, 3 (Book-1)Unit
II	: Chapter 4, 5 (Book-1)Unit
III	: Chapter 6, 7 (Book-1)Unit
IV	: Chapter 8 (Book-2) Unit
V	: Chapter 9 (Book-2)

References

1. Arshdeep Bahga, Vijay Madiseti, “Internet of Things – A hands-on approach”, Universities Press, 2015.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet of Things”, Springer, 2011.
3. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012.

Web Resources

1. <https://www.open.edu/openlearn/ocw/mod/oucontent/view.php?id=48819§ion=1> (**Four Pillars of IoT**).
2. https://www.oreilly.com/library/view/the-internetof/9781439893029/K14173_C004.xhtml.(**The DNA of IoT**).
3. <https://webofthings.org/2016/01/23/wot-vs-iot-12/> (**Web of Things vs. Internet of Things**)
4. <https://www.epicor.com/en-in/resource-center/articles/what-is-industry-4-0/> (**IoT in Industry**)
5. <https://www.wipro.com/engineeringNXT/iot-in-the-manufacturing-industry-enabling-industry-4-0/> (**Industry IoT**)

Course Designer

Dr.P.Manickam and Dr.T.S.Urmila

THIAGARAJAR COLLEGE, MADURAI - 9.
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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
PCS20C42	Object Oriented System Design	Core 11	6	-	-	6

L – Lecture T – Tutorial P – Practical

Year	Semester	Int. Marks	Ext. Marks	Total
II	IV	25	75	100

Preamble

To provide an in-depth knowledge about Object Oriented Systems Development life cycle.

Prerequisite

Basic knowledge about Software System Development.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Recognize the Object Oriented Philosophy Concepts	60%	70%
CO2	Understand the different Object Oriented Methodologies	60%	70%
CO3	Discuss the Object Oriented Analysis process	60%	70%
CO4	Implement the Object Oriented Design Process	60%	70%
CO5	Evaluate the View Layer and Software Quality Assurance	60%	70%

Mapping Course Outcome with Program Outcomes

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

S-STRONG

M-MEDIUM

L-LOW

Mapping of Course Outcomes with Programme Specific Outcomes

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

S-STRONG

M-MEDIUM

L-LOW

Bloom's Taxonomy: Assessment Pattern

Blooms taxonomy			
	CA		
	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

Contents

Unit I

18 Hrs.

An Overview of Object-Oriented Systems Development: Two orthogonal view of the software- Object-Oriented Systems development methodology- Why an object orientation-Object basics: An Object-Oriented Philosophy- Objects – Attributes – Object respond to messages – Encapsulation and information hiding– class hierarchy– Polymorphism–Object relationships and associations-Aggregations and object containment OOSD Life cycle: Software development process– OOSD: A Use case Driven Approach–Reusability.

Unit II

18 Hrs.

Object Oriented Methodologies: Rumbaugh et al.'s object modeling technique – The Booch methodology-The Jacobson et al. methodology–Patterns– Frameworks- The Unified approach-Unified Modeling Language: Static and dynamic models– Why modelling - UML diagrams– UML class diagram –Use case diagram - UML dynamic modelling – packages and model organization-UML Extensibility.

Unit III

18 Hrs.

Object Oriented Analysis process: Identifying Use Cases-Business Object Analysis- Use case driven object-oriented analysis: The Unified Approach– Business process modelling – Use-Case model– Developing effective documentation-Object Analysis: Classification-Classification's theory– Approaches for identifying classes– Noun phrase approach– Common class patterns approach–Use-Case Driven approach–Classes, Responsibilities, and Collaborators- Naming classes-Identifying object relationships, attributes, and methods: Association– Super-Sub class relationships–A Part of Relationships-Aggregation –Class responsibility–Object responsibility.

Unit IV

18 Hrs.

Object Oriented Design: Object Oriented Design Process and Design Axioms- OOD process- OOD axioms – Corollaries – Design patterns. Designing classes: Designing classes–Class visibility –Refining attributes – Designing methods and protocols–Packages and managing classes-Access layer : Object Store and persistence–DBMS–Logical and physical Database Organization and access control– Distributed Databases and Client Server Computing – Multi database Systems – Designing Access layer classes.

Unit V

18 Hrs.

View Layer: Designing view layer classes –Macro level process– Micro level process– The purpose of view layer interface– Prototyping the user interface-Software Quality -Software Quality Assurance: Quality assurance tests – Testing strategies – Impact of Object Orientation on Testing - Test Cases-

Text Book

1. Ali Bahrami, “Object Oriented Systems Development using UML”, TataMcGraw-Hill Edition 2008.

Chapters

Unit I	: 1, 2, 3
Unit II	: 4, 5
Unit III	: 6, 7, 8
Unit IV	: 9, 10, 11
Unit V	: 12, 13

References

1. Booch Grady, Rumbaugh James, Jacobson Ivar, “The Unified modeling Language – User Guide, Pearson Education, 2006
2. Brahma Dathan, Sarnath Ramnath, “Object Oriented Analysis, Design and Implementation”, Universities Press, 2010.
3. Mahesh P.Matha, “Object-Oriented Analysis and Design UsingUML”, PHI Learning Private Limited, 2012.

Web Resources

1. <https://www.youtube.com/watch?v=jII8kTINyds> (**Object Oriented Systems Development**)
2. http://www.dba-oracle.com/t_object_oriented_analysis_models.htm (**Object OrientedMethodologies**)
3. <https://www.cs.fsu.edu/~myers/cop3331/notes/analysis1.html> (**Classes, Responsibilities and Collaborators**)
4. https://www.tutorialspoint.com/object_oriented_analysis_design/ood_object_oriented_design.htm (**Identifying Patterns**)
5. https://www.tutorialspoint.com/system_analysis_and_design/system_analysis_and_design_testing_quality_assurance.htm (**Quality assurance tests**)

Course Designer

Dr. P. Manickam and Mrs. K. Suriya Prabha

THIAGARAJAR COLLEGE, MADURAI - 9.
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DEPARTMENT OF COMPUTER SCIENCE
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Programme Code – PCS

Course code	Course Title	Category	L	T	P	Credit
PCS20C43	Web Services	Core 12	6	-	-	6

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II	IV	40	60	100

Preamble:

Enable the students to familiar with XML and Web Services. Understand the design principles and application of SOAP. Design collaborating web services according to a specification. Use industry standard open source tool Apache to execute web services.

Pre-requisite:

Prior knowledge about web technology and its programming concepts

Course Outcomes

On the successful completion of this course, Students will be able to:

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Recognize the Web Services and the basic principles of XML,WSDL and UDDI	60%	70%
CO2	Understand the Advanced Web Technologies and its standards	60%	70%
CO3	Exploring the Web services clients and resource-oriented architecture to design basic web services	60%	70%
CO4	Designing a Web Service based application and Implement it using programs.	60%	70%
CO5	Analyze the various frameworks and the building blocks of web services	60%	70%

Mapping of COs with POs

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

S-STRONG M-MEDIUM L-LOW

Mapping of COs with PSOs

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

S-STRONG M-MEDIUM L-LOW

Bloom's Taxonomy: Assessment Pattern

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

18 Hrs

Introduction to Web Services – Introduction- What are Web Services? – Why Web services are important-- XML Fundamentals - XML Documents – XML Name spaces – XML Schema – Processing XML.WSDL – Using WSDL and SOAP- UDDI – UDDI at a Glance-The UDDI Business Registry – UDDI under the covers – Accessing UDDI- How UDDI is playing out.

Unit – II

18 Hrs

Advanced Web Service Technologies and Standards – Conversations: Overview - Conversation Languages - WSCL Interface Components - Relationship between WSCL and WSDL. Workflow: - Business Process Management - Workflows and Workflow Management Systems –BPEL. Security - Everyday security basics-Security is an End-to-End process -Web service security issues - Types of security attacks and threats -Roadmap- WS security. Quality of Service: QoS Metrics for web services-Where are the holes - Design pattern and best practices - QoS enabled web services -QoS enabled applications.

Unit –III

18 Hrs

RESTful Web Services - Writing Web Service Clients – What Makes Restful Services different? – The Resource Oriented Architecture

Unit –IV

18 Hrs

Designing Web Services- Designing Read only Resource Oriented Architecture – Designing Read/Write oriented Design Architecture – A Service Implementation

Unit –V

18 Hrs

Building Blocks and Frameworks-REST and ROA best practices – The Building Blocks of Services – Ajax Applications as Rest Client – Frameworks for Restful Services.

Text Book

1. Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services : An Architects Guide, Prentice Hall, 2003.
2. Leonard Richardson & Sam Ruby “RESTful Web Services”, O’Reilly publications, 2007.

Chapters

- Unit I : 1, 2, 3(excluding SOAP), 4 (Book -1)
- Unit II : 5, 6, 8, 9(Book -1)
- Unit III : 2, 3, 4 (Book – 2)
- Unit IV : 5, 6, 7 (Book -2)
- Unit V : 8, 9, 11, 12 (Book – 2)

References

1. Martin Kalin, “Java Web Services: Up and Running”, O’Reilly Publishers, 2009.

Web Resources

1. https://www.tutorialspoint.com/xml-rpc/xml_rpc_quick_guide.htm (**XML**)
2. https://docs.oracle.com/cd/E13224_01/wlw/docs103/guide/webservices/conBasicWebServiceTechnologies.html (**Introduction to Web Service Technologies**)
3. https://www.tutorialspoint.com/restful/restful_introduction.htm (**Restful Web services**)

Course Designers:

Dr.T.S.Urmila and Mr.R.Chandrasekar

THIAGARAJAR COLLEGE, MADURAI - 9.
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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
PCS20PJ41	Project & Viva Voce	PJ	-	-	12	3

L – Lecture

T – Tutorial

P – Practical

Year	Semester	Internal	External	Total
II	IV	40	60	100

Preamble

The main objective of the Project work for the final semester is to show case the student's academic understanding about their programming skills that they studied in the first 5 semesters and to develop an effective unique and innovative project work using the latest trending technology which will be ultimately useful for the social community as well to the students young minds.

Pre-requisite

Knowledge in Front and Back end programming and basic Project/Research Ideas.

Contents

General Guidelines to be followed.

- Every student should develop project individually.
- Internship projects are preferred.
- Real time projects or Research projects will be appreciated.
- Two reviews will be conducted during project period.
- Project report should be submitted before Final viva voce.

Course Designers:

Dr. N. Gnanasankaran and Dr.P. Manickam

THIAGARAJAR COLLEGE, MADURAI - 9.
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DEPARTMENT OF COMPUTER SCIENCE
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Programme Code – PCS

Course code	Course Title	Category	L	T	P	Credit
PCS20CE31 A	Bioinformatics	Elective	5	-	-	5

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II	III	25	75	100

Preamble:

The course provides an understanding of Bio Informatics concepts and applications.

Pre-requisite:

Fundamental Knowledge in Mathematics, Computer Science and Biology.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Explain the Molecular Biology and bioinformatics approaches and its applications	60%	60%
CO2	Outline about the information molecules & information flow	60%	60%
CO3	Use Perl programming in implementing Bioinformatics applications.	60%	60%
CO4	Analyze the Alignment of Pairs of Sequence with the use of sequence tools	60%	60%
CO5	Demonstrate the Phylogenetic Analysis and Proteomics	60%	60%

Mapping of COs with POs

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

S-STRONG

M-MEDIUM

L-LOW

Mapping of COs with PSOs

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

Blooms taxonomy: Assessment Pattern

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: Objectives – Kinds of Data – Multiplicity of Data & Redundancy – Databases – Data Integration & Analysis. Molecular Biology & Bioinformatics: Molecular Biology – Systems Approach in Biology – Central Dogma of Molecular Biology – Definitions – Problems in Molecular & Bioinformatics Approach – Applications.

Unit – II:**15 Hrs**

Information Molecules & Information Flow: Basic Components – Basic Chemistry of Nucleic Acids – Structure of DNA – Structure of RNA – DNA Replication is Semi-Conservative – Denaturation & Renaturation of DNA – Functional Elements in DNA – Eukaryotic Chromosomes – Structure of Bacterial Chromosome – Analysis DNA – Cloning Methodology – DNA Sequencing & PCR. Proteins – Profiles & Properties: Amino Acids – Protein Structure – Secondary Structure Elements – Tertiary Structure – Quaternary Structure – Protein Folding – Protein function – Purification and Characteristics.

Unit – III:**15 Hrs**

Programming with Perl: Introduction – Programming – Illustrations – Associative Arrays – File Input and Output – Applications for Bioinformatics – Bioperl. Understanding & Using Biological Databases: Introduction – Types of Databases – Networks and Databases – Introduction to Java Clients – CORBA – Using MYSQL – Introduction to Biostatistics.

Unit – IV:**15 Hrs**

Alignment of Pairs of Sequence: Sequence Analysis of Biological Data – Model & Biological Motivation – Methods of Alignment – Application of Dot Matrices – Methods of Optical Alignments – Using Gap Penalties and Scoring Matrices – Sensitivity and Specificity. Tools for Sequence Alignment: FASTA – BLAST - Filtering and Gapped Blast – PSI – Blast – Comparison. Alignment of Multiple Sequences: Tools for MSA – Considerations – Applications – Viewing MSA.

Unit – V:**15 Hrs**

Phylogenetic Analysis: Concepts of Trees – Phylogenetic Trees & Multiple Alignments – Distance Matrix Methods – Character Based Methods – Evaluating Phylogenies. Proteomics: Proteome Analysis – Tools – Metabolic Pathways – Genetic Networks – Network Properties & Analysis – Complete Pathway Simulation: E-Cell.

Text Book

1. Bioinformatics Methods & Applications -- S. C. Rastogi, Namita Mendiratta, Parag Rastogi (PHI Learning) 2008 & 2013.
2. Beginning Perl for Bioinformatics—James tisdall – Oreilly publications-2016

Chapters:

Unit I	: 1, 2, 3	(Book1)
Unit II	: 11, 12, 13	(Book 1)
Unit III	: 1, 2, 3	(Book 2)
Unit IV	: 6	(Book 2)
Unit V	: 7, 8, 9	(Book 2)

Reference Books

1. Intelligent Bioinformatics - Edward Keedwell, Ajit Narayanan (Wiley), 2005.

Web Resources

<https://www.cl.cam.ac.uk/teaching/1213/Bioinfo/Bioinformatics2012.pdf>
http://www.iasri.res.in/ebook/CAFT_sd/Concepts%20of%20Bioinformatics.pdf
https://www.iscb.org/cms_addon/online_courses/index.php

Course Designers:

Dr. N. Gnanasankaran and Mrs.K. Vennila

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DEPARTMENT OF COMPUTER SCIENCE
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Programme Code – PCS

Course code	Course Title	Category	L	T	P	Credit
PCS20CE31 B	Cyber Forensics System	Elective	5	-	-	5

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II	III	25	75	100

Preamble

The course demonstrates about basics of computer forensics learning, analyze and validate forensics data and tools used in computer forensics, to identify the vulnerabilities in computer network architecture, to analyze the hacking techniques according to the real world scenario.

Pre-requisite:

Fundamental Knowledge in Cryptography and Network Security.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Understand the basics of computer forensics	60%	60%
CO2	Apply a number of different computer forensic tools to a given scenario	60%	60%
CO3	Analyze and validate forensics data	60%	60%
CO4	Discuss the vulnerabilities in a given network infrastructure	60%	60%
CO5	Describe the real-world hacking techniques to test system security	60%	60%

Mapping of COs with POs

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

S-STRONG

M-MEDIUM

L-LOW

Mapping of COs with PSOs

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

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy: Assessment Pattern

Bloom's Taxonomy	CA		End of Semester
	First	Second	
	Knowledge –K1	15% (9)	15% (9)
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 to Computer Forensics: Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques – Incident and incident response methodology – Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. – Forensics Technology and Systems – Understanding Computer Investigation – Data Acquisition.

UNIT II

15 Hrs

Evidence Collection and Forensics Tools: Processing Crime and Incident Scenes – Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.

UNIT III

15 Hrs

Analysis and Validation: Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics

UNIT IV

15 Hrs

Ethical Hacking: Introduction to Ethical Hacking – Foot printing and Reconnaissance – Scanning Networks – Enumeration – System Hacking – Malware Threats – Sniffing.

UNIT V

15 Hrs

Ethical Hacking in Web: Social Engineering – Denial of Service – Session Hijacking – Hacking Web servers – Hacking Web Applications – SQL Injection – Hacking Wireless Networks – Hacking Mobile Platforms.

Text Book

1. Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, —Computer Forensics and Investigations, Cengage Learning, India Edition, 2016.
2. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2015.

Chapters:

Unit I	: 1, 2, 3	(Book1)
Unit II	: 3, 4	(Book1)
Unit III	: 6, 12, 13	(Book 1)
Unit IV	: 1, 2	(Book2)
Unit V	: 4, 5, 6	(Book 2)

Reference Books

1. John R.Vacca, —Computer Forensics, Cengage Learning, 2005
2. MarjieT.Britz, —Computer Forensics and Cyber Crime: An Introduction, 3rd Edition, Prentice Hall, 2013.
3. AnkitFadia — Ethical Hacking Second Edition, Macmillan India Ltd, 2006

Web Resources:

1. www.udemy.com
2. www.edx.org
3. www.classcentral.com

Course Designers:

Dr. N. Gnanasankaran and 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
PCS20CE31 C	Software Testing	Elective	5	-	-	5

L – Lecture

T – Tutorial

P – Practical

Year	Semester	Internal	External	Total
II	III	25	75	100

Preamble

The course demonstrates about the basic testing techniques and test strategies used in software engineering. This course also elaborates the various levels of testing and how to generate test case design and test automation skills.

Pre-requisite:

Fundamental Knowledge in Software Engineering.

Course Outcomes

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

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Explain about testing process and test principles	60%	60%
CO2	Illustrates about random and requirements based on testing, test design and adequacy criteria	60%	60%
CO3	Analyze testing strategies and testing methods	60%	60%
CO4	Understand Test metrics and measurements	60%	60%
CO5	Be familiar with test management and test automation techniques	60%	60%

Mapping of COs with POs

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

S-STRONG

M-MEDIUM

L-LOW

Mapping of COs with PSOs

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

S-

STRONG

M-MEDIUM

L-LOW

Blooms 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: Testing as an Engineering Activity – Testing as a Process – Testing axioms – Basic definitions – Software Testing Principles – The Tester’s Role in a Software Development Organization – Origins of Defects – Cost of defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support of Developing a Defect Repository – Defect Prevention strategies.

UNIT II

15 Hrs

Test case Design: Test case Design Strategies – Using Black Box Approach to Test Case Design – Random Testing – Requirements based testing – Boundary Value Analysis – Equivalence Class Partitioning – State based testing – Cause-effect graphing – Compatibility testing – user documentation testing – domain testing – Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths – code complexity testing – Evaluating Test Adequacy Criteria.

UNIT III

15 Hrs

Levels of Testing: The need for Levers of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests – Testing OO systems – Usability and Accessibility testing – Configuration testing – Compatibility testing – Testing the documentation – Website testing.

UNIT IV

15 Hrs

Test Management: People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process – Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

UNIT V

15 Hrs

Test Automation: Software test automation – skill needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements – project, progress and productivity metrics.

Text Book

1. Srinivasan Desikan and Gopalaswamy Ramesh, “Software Testing – Principles and Practices”, Pearson Education, 2006.
2. Ron Patton, “Software Testing”, Second Edition, Sams Publishing, Pearson Education, 2007.

Chapters

Unit I	: 3, 4	(Book1)
Unit II	: 18	(Book1)
Unit III	: 6, 7, 8	(Book1), 5.5, 5.6, 7 (Book2)
Unit IV	: 17	(Book 1) 14 (Book2)
Unit V	: 15, 16	(Book1) 16, 17, 18 (Book2)

Reference Books

1. Ilene Burnstein, Practical Software Testing, Springer International Edition, 2003.
2. Edward Kit, Software Testing in the Real World – Improving the Process, Pearson Education.
3. Boris Beizer, Software Testing Techniques – 2nd Edition, Van Nostrand Reinhold, New York.

Web Resources:

1. www.javapoint.com
2. www.toolssqa.com
3. www.w3schools.com

Course Designers:

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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
PCS20CE31 D	Embedded Systems	Elective	5	-	-	5

L – Lecture T – Tutorial P – Practical

Year	Semester	Int. marks	Ext. marks	Total
II	III	25	75	100

Preamble:

This Embedded System course focuses on embedded system design and embedded processors, learn applications using Embedded/Real-Time Operating Systems and testing hardware

Pre-requisite:

Basic knowledge of software functionality, hardware use and programming language.

Course Outcomes

On the successful completion of this course, Students will be able to:

#	Course Outcome	Expected Proficiency	Expected Attainment
CO1	Understand the concept of Embedded systems and its purpose	60%	70%
CO2	Discuss about elements of embedded system, Actuators and processors.	60%	70%
CO3	Describe embedded system communication inter face and its applications.	60%	70%
CO4	Explain RTOS based embedded system design ,scheduling and multi-tasking	60%	70%
CO5	Build application specific, domain specific Embedded Software design and testing	60%	70%

Mapping of COs with POs

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

S-STRONG

M-MEDIUM

L-LOW

Mapping of COs with PSOs

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

S-STRONG

M-MEDIUM

L-LOW

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 to Embedded system - Embedded system vs General computing systems - History - Classification - Major Application Areas - Purpose of Embedded systems - Smart running shoes: The innovative bonding of lifestyle with embedded technology.

Unit II: 15 Hrs

Elements of an embedded system - core of the embedded system: General purpose and domain specific processors, ASICs, PLDs, COTS - Memory - Sensors and Actuators.

Unit III: 15 Hrs

Communication Interface: Onboard and External Communication Interfaces - Embedded Firmware - Reset circuit, Brown-out protection circuit, Oscillator unit, Real-time clock, and Watchdog timer - PCB and Passive Components

Unit-IV: 15 Hrs

RTOS based Embedded System Design: Operating System Basics - Types of operating Systems - Tasks, process and Threads - Multiprocessing and Multitasking - Task Scheduling- Task Communication - Task Synchronization - Device Drivers - choosing an RTOS.

Unit V: 15 Hrs

Embedded Systems - Washing machine: Application-specific - Automotive: Domain specific. Hardware Software Co-Design - Computational Models – Embedded Firmware Design Approaches - Embedded Firmware Development Languages - Integration and testing of Embedded Hardware and firmware.

Text Book

1. K. V. Shibu, "Introduction to embedded systems", TMH education Pvt. Ltd. 2009.

Chapters

Unit 1: 1
Unit 2: 2

Unit 3: 2
Unit 4: 10
Unit 5: 4, 9 & 12

Reference Books

1. Raj Kamal, 'Embedded Systems Architecture, Programming and Design', Tata Mc-Graw-Hill.
2. R.J.A.Buhr, D.L.Bailey, "An Introduction to Real Time Systems: Design to Networking with C/C++", Prentice- Hall, International.

Web Resources:

1. <https://lecturenotes.in/subject/456/embedded-and-real-time-systems-erts>
2. <https://nptel.ac.in/downloads/108105057/>
3. <https://www.iitg.ac.in/pbhaduri/cs522-13/>

Course Designers:

Dr. R.Sandha and Mr.G.D.Kesavan