E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re –accredited (3rd cycle) with Grade A+ and CGPA 3.51 by NAAC)

TANSCHE - CBCS with OBE

DEPARTMENT OF COMPUTER SCIENCE (Data Science and Analytics) – UG

(w.e.f. 2023 – 2024 Batch onwards)

Vision

To prepare students to become globally competent Data analytic experts & researchers and expand their capacity to contribute in the field of data science by providing total solution in societal aspects.

Mission

- To develop industry conducive environment by providing state-of-art infrastructure to compete in data-driven world.
- To empower students to provide innovative and cognitive solutions with the help of data analytical skillset and new advancements in high performance computing.
- To impart quality and value based education and contribute towards the innovation of computing, expert system, Data Science to raise satisfaction level of all stakeholders.

Programme Educational Objectives(PEOs): B.Sc. Computer Science (Data Science and Analytics)

Sl.No.	Programme Educational Objective
PEO1	To acquire the knowledge in the field of computer Science.
PEO2	To exhibit inspired and innovative ideas with good logical and entrepreneur skills in the field of computer science.
PEO3	To make the students to effectively utilizing their knowledge to find the solutions of the current and future computing problems.
PEO4	To provide the practical training, hands-on training and project experience to meet the industrial needs.
PEO5	To motivate the students to pursue a higher education or continue their professional education.
PEO6	To accomplish any tasks with ethical values and commitment to meet the needs of the Society.

Programme Outcomes for Science Graduates

On completion of B.Sc., Programmes students will be able to

SL.No.	Programme Outcomes
PO1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study.
PO2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
PO3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.
PO5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
PO6	A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.

Programme Specific Outcomes (PSOs):

PSOs	Graduate Attributes	After completion of B.Sc Computer Science(Data Science and Analytics) the students will be able to	PO Addressed
PSO-1	Knowledge & Proficiency	Know the programming concepts and methodology & the functionality of hardware and software aspects of computer systems.	PO1
PSO-2	Problem analysis	An ability to analyze a problem and identify and define the project requirements appropriate to its solution.	PO2
PSO-3	Problem Solving	The knowledge of computer science to solve real world problems.	PO2
PSO-4	Modern tool usage	Use software development tools, software systems, and modern computing platforms.	PO4
PSO-5	Social responsibility	Ability to become software professionals with social responsibilities and ethical values.	PO6
PSO-6	Lifelong learning	Ability to engage in independent and life-long learning in the broadest context of technological change.	PO5
PSO-7	Ethical & Moral and Spiritual Values	Apply ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.	PO6
PSO-8	Leadership, Team work & Communication	Ability to develop communication team work and leadership skills necessary to build their career.	PO3

Qualification for Admission

Candidates should have passed the Higher Secondary Examination, Mathematics as one of the subject conducted by the Board of Higher Education, Government of Tamilnadu, CBSE & ICSE or any other examination approved by Madurai Kamaraj University as equivalent.

Duration of the Course

The students shall undergo this prescribed course of study for the period of three academic years under Choice Based Credit System(CBCS) semester pattern with Outcome Based Education (OBE).

Medium of Instruction: English

System: Choice Based Credit System with Outcome Based Education Model

Nature of the Course
Courses are classified according to the following nature

1. Knowledge and skill oriented
2. Employability oriented
3. Entrepreneurship oriented

Outcome Based Education(OBE)&Assessment

Students understanding must be built on and assessed or wide range of learning activities, which includes different approaches and are classified along several basis , such as

1. **Based on purpose:**
   - Continuous Assessment (internal tests, Assignment, seminar, quiz,Documentation, Case lets, ICT based Assignment, Mini projects administered during the learning process)
   - External Assessment (Evaluation of students' learning at the end of instructiona lunit)
2. **Based on Domain Knowledge:(for UG UptoK4levels)**
   Assessment through K1,K2,K3& K4

Annexure –10a

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TANSCHE - CBCS with OBE

(w.e.f. 2023– 2024 Batch onwards)

(PART I / PART II / PART III)

Internal (Formative) : 25 marks

External (Summative) : 75 marks

Total : 100 marks

Formative Test (CIA-Continuous Internal Assessment) : 25 Marks

Components	Marks
Test (Average of two tests) (Conducted for 100 marks and converted into 10 marks)	**10**
Assignment	**5**
Seminar	**5**
Quiz/ Documentation/Case lets/ ICT based Assignment/ Mini Project	**5**
Total	**25**

- ✓ **Centralized system** of Internal Assessment Tests.
- ✓ There will be **Two Internal Assessment** Tests.
- ✓ Duration of Internal assessment test will be **2 hours for Test I and II**.
- ✓ Students shall write retest with the approval of HOD on genuine grounds if they are absent.

Question Paper Pattern for Continuous Internal Assessment –Test I and II

Multiple choice for Section	Marks
A-Multiple Choice Question(7 x 1 mark)	7
B-Short Answer(4 x 2 marks)	8
C-Either Or Type(3/6 x 5 marks)	15
D-Open Choice Type (2/3 x 10 marks)	20
Total	**50**

Conducted for 100 marks and converted into10 marks

Question Paper Pattern for Summative Examination

Section	Marks
A-Multiple choice Questions without Choice(10 x 1 mark)	10
B-Short Answer without choice(5 x 2 marks)	10
C-Either Or type(5/10 x 5marks)	25
D-Open Choice type (3/5 x 10 marks)	30
Total	**75**

In respect of Summative Examinations passing minimum is **36% for UG.**

Latest amendments and revision as per **UGC** and **TANSCHE** norms is taken into consideration in curriculum preparation.

BLUE PRINT FOR INTERNAL ASSESSMENT – I

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Upto K3	3	(K1/K2)	3	(K1/K2)	2(K2) / 2 (K3)/ 2 (K4) (Each set of questions must be in the same level)	2 (K3) & 1 (K4)	
2	CLO 2	Upto K3	2	(K1/K2)					
3	CLO 3	Upto K4	2	(K1/K2)	1	(K1/K2)			
No. of Questions to be asked			7		4		6	3	20
No. of Questions to be answered			7		4		3	2	16
Marks for each question			1		2		5	10	-
Total Marks for each section			7		8		15	20	50

BLUE PRINT FOR INTERNAL ASSESSMENT – II

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 3	Upto K4	2	(K1/K2)	1	(K1/K2)	2 (K2) / 2 (K3)/ 2 (K4) (Each set of questions must be in the same level)	2 (K3) & 1 (K4)	
2	CLO 4	Upto K3	2	(K1/K2)	3	(K1/K2)			
3	CLO 5	Upto K4	3	(K1/K2)					
No. of Questions to be asked			7		4		6	3	20
No. of Questions to be answered			7		4		3	2	16
Marks for each question			1		2		5	10	-
Total Marks for each section			7		8		15	20	50

Distribution of Marks with K-Levels CIA I and CIA II

CIA	K Levels	Section -A MCQ (No choice)	Section -B Short Answer (No choice)	Section -C (Either or Type)	Section –D (Open choice)	Total Marks	% of Marks
I & II	K1	4	4	-	-	8	10
	K2	3	4	10	-	17	23
	K3	-	-	10	20	30	40
	K4	-	-	10	10	20	27
	Marks	**7**	**8**	**30**	**30**	**75**	**100**

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Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for External Assessment

Sl. No	CLOs	K- Level	Section A		Section B		Section C (Either/ or Type)	Section D (open choice)	Total
			MCQs (No choice)		Short Answers (No choice)				
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 1	Up to K3	2	K1/K2	1	K1/K2	2 (K3 & K3)	1(K2)	
2	CLO 2	Up to K3	2	K1/K2	1	K1/K2	2(K2 & K2)	1(K3)	
3	CLO 3	Up to K4	2	K1/K2	1	K1/K2	2 (K4 &K4)	1(K4)	
4	CLO 4	Up to K 3	2	K1/K2	1	K1/K2	2 (K3 & K3)	1(K3)	
5	CLO 5	Up to K 4	2	K1/K2	1	K1/K2	2 (K4 & K4)	1(K4)	
No. of Questions to be asked			10		5		10	5	30
No. of Questions to be answered			10		5		5	3	23
Marks for each question			1		2		5	10	
Total Marks for each section			10		10		25	30	75

Distribution of Section-wise Marks with K Levels for External Assessment

K Levels	Section A (MCQ'S) (No choice)	Section B (Short Answer) (No choice)	Section C (Either or Type)	Section D (Open Choice)	**Total Marks**	% of Marks
K1	9	6	-	--	**15**	13
K2	1	4	10	10	**25**	21
K3	-	-	20	20	**40**	33
K4	-	-	20	20	**40**	33
Total Marks	10	10	50	50	**120**	100

K1- Remembering and recalling facts with specific answers.

K2- Basic understanding of facts and stating main ideas with general answers.

K3- Application oriented- Solving Problems, Justifying the statement and deriving Inferences.

K4- Examining, analyzing, presentation and make inferences with evidences.

EVALUATION (THEORY)

(PART IV - SEC / DSEC)

Internal (Formative) : 25 marks

External (Summative) : 75 marks

Total :100 marks

Formative Test (CIA-Continuous Internal Assessment) : 25 Marks

Components	Marks
Test (Average of two Tests) (Conducted for 60 marks and converted into 20 marks)	**20**
Assignment/ Seminar/ Quiz/Documentation (from Unit 5)	**5**
Total	**25**

- ✓ There will be Two Internal Assessment Test
- ✓ Duration of Internal assessment test will be 1 hour for Test
- ✓ Students shall write retest with the approval of HOD on genuine grounds if they are absent.

Question Paper Pattern for Continuous Internal Assessment Test I & II

Section	Marks
A-Multiple Choice Question(4x1mark)	4
B-Short Answer(3x2marks)	6
C-Either Or type(2/4 x5marks)	10
D-Open choice type(1/2 x10marks)	10
Total	30

Conducted for 60marks and converted into 20 marks

Question Paper Pattern for External Examination

Section	Marks
A-Multiple Choice Question(10x1mark)	10
B-Short Answer(5x2marks)	10
C-Either Or type(5/5 x 5marks)	25
D-Open choice type(3/5 x 10marks)	30
Total	75

Annexure –10a

BLUE PRINT FOR INTERNAL ASSESSMENT - I
Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Upto K3	2	K1	3	K1	1(K2) / 1(K3) (Each set of questions must be in the same level)	1 (K2) & 1(K3)	
2	CLO 2	Upto K3	2						
No. of Questions to be asked			4		3		4	2	13
No. of Questions to be answered			4		3		2	1	10
Marks for each question			1		2		5	10	-
Total Marks for each section			4		6		10	10	30

BLUE PRINT FOR INTERNAL ASSESSMENT - II
Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 3	Upto K3	2	K1	3	K1	1 (K2) / 1(K3) (Each set of questions must be in the same level)	1 (K2) & 1(K3)	
2	CLO 4	Upto K3	2						
No. of Questions to be asked			4		3		4	2	13
No. of Questions to be answered			4		3		2	1	10
Marks for each question			1		2		5	10	-
Total Marks for each section			4		6		10	10	30

Annexure –10a

Distribution of Marks with K Levels CIA I & II

CIA	K Levels	Section A MCQ	Section B (Short Answers)	Section C (Either/ Or Type)	Section D (Open Choice)	Total Marks	% of Marks
I & II	K1	4	6	-	-	10	20
	K2	-	-	10	10	20	40
	K3	-	-	10	10	20	40
	Marks	**4**	**6**	**20**	**20**	**50**	**100**

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for External Assessment

Sl. No	CLOs	K-Level	Section A		Section B		Section C (Either/or Type)	Section D (Open Choice)	Total
			MCQs		Short Answers				
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Up to K3	2	K1	1	K1	6 (K2) & 4 (K3) (Each set of questions must be in the same level)	2 (K2) & 3 (K3)	
2	CLO 2	Up to K3	2		1				
3	CLO 3	Up to K3	2		1				
4	CLO 4	Up to K 3	2		1				
5	CLO 5	Up to K 3	2		1				
No. of Questions to be asked			10		5		10	5	30
No. of Questions to be answered			10		5		5	3	23
Marks for each question			1		2		5	10	
Total Marks for each section			10		10		25	30	75

Distribution of Section-wise Marks with K Levels for External Assessment

K Levels	Section A (MCQ'S)	Section B (Short Answer)	Section C (Either or Type)	Section D (Open Choice)	**Total Marks**	% of Marks without choice
K1	10	10	-	--	**20**	16
K2	-	-	30	20	**50**	42
K3	-	-	20	30	**50**	42
Total Marks	10	10	50	50	**120**	100

Annexure –10a

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DEPARTMENT OF COMPUTER SCIENCE (Data Science and Analytics) - UG

TANSCHE - CBCS with OBE

COURSE STRUCTURE

(w.e.f. 2023 – 2024 Batch onwards)

Semester	Part	Course Code	Course Type	Title of the Course	Teaching hrs (per week)	Duration of Exam (hrs.)	Marks Allotted			
							CIA	SE	Total	Credits
I	**Part I**	**23OU1TA1**	**Language**	Tamil	6	3	25	75	100	3
	Part II	**23OU2EN1**	**English**	General English -I	6	3	25	75	100	3
	Part III	**23OUCSD11**	**Core Course 1**	Python Programming	5	3	25	75	100	5
		23OUCSD1P	**Core Course 2**	Python Programming Lab	5	3	40	60	100	5
		23OUCSDGEMA1	**Generic Elective Course -1**	Mathematics – I Statistics – I	4	3	25	75	100	3
	Part IV	**23OUCSDSECN1**	**Skill Enhancement Course: SEC1(NME)**	Fundamentals of Information Technology	2	3	25	75	100	2
		23OUCSDFC1	**Foundation Course**	Problem Solving Techniques	2	3	25	75	100	2
II					**30**					**23**
	Part I	**23OU1TA2**	**Language**	Tamil	6	3	25	75	100	3
	Part II	**23OU2EN2**	**English**	General English -II	6	3	25	75	100	3
	Part III	**23OUCSD21**	**Core Course 3**	Data Structures and Algorithms	5	3	25	75	100	5
		23OUCSD2P	**Core Course 4**	Data Structures and Algorithms Lab	5	3	40	60	100	5
		23OUCSDGEMA2	**Generic Elective Course -2**	Mathematics – II Statistics – II	4	3	25	75	100	3
	Part IV	**23OUCSDSECN2**	**Skill Enhancement Course: SEC2 (NME)**	Computer Fundamentals	2	3	25	75	100	2
		23OUCSDSEC3P	**Skill Enhancement Course :SEC3**	Open Source Software Technologies Lab	2	3	40	60	100	2
				Total	**30**					**23**

GEC- Generic Elective Course **EC-** Skill Enhancement Course

FC - Foundation Course

NOTE:
The students are permitted to obtain additional credits (Optional)

- MOOCs / SWAYAM / NPTEL Course (Online)

Department of Computer Science (Data Science and Analytics)				Class: I B.Sc CS (DS)				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hours/ Week**	**CIA**	**External Exam**	**Total**
I	Core	23OUCSD11	Python Programming	5	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	**Employability Oriented**	**Entrepreneurship oriented**
✔	✔	

Course Objectives:

1. To make students understand the concepts of Python programming.
2. To apply the OOPs concept in Python programming.
3. To impart knowledge on demand and supply concepts.
4. To make the students learn best practices in Python programming.
5. To know the Python File Handling.

Course Content:

Unit – I

Basics of Python Programming: History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. **Python Arrays**: Defining and Processing Arrays – Array methods.

Unit – II

Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. **Iterative Statements**: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.

Unit – III

Functions: Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. **Function Arguments**: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. **Python Strings:** String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. **Modules**: import statement-The Python module – dir() function – Modules and Namespace – Defining our own modules.

Unit – IV

Lists: Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list Operations-List Methods. **Tuples**: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. **Dictionaries**: Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.

Unit – V

Python File Handling: Types of files in Python - Opening and Closing Files-Reading and Writing files: write () and writelines () methods- append () method – read () and readlines () methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.

Book for Study:

1. Reema Thareja, "*Python Programming using problem solving approach*", Oxford University Press, First Edition, 2017.

Chapters:

Unit I **:** 3.1, 3.2, 3.5 - 3.13, 3.16.

Unit II **:** 4.2 - 4.8.

Unit III **:** 5.2 - 5.6, 5.11, 6.1, 6.2, 6.4, 6.8.

Unit IV **:** 8.2.1 - 8.2.6, 8.4.1 - 8.4.5, 8.4.9, 8.6.1 - 8.6.4, 8.6.8, 8.6.9, 8.6.12.

Unit V **:** 7.3 -7.7.

Books for Reference:

1. Dr. R. Nageswara Rao, "*Core Python Programming*", Dream tech Publishers, First Edition, 2017.
2. Sheetal Taneja & Naveen kumar, Python Programming a Modular approach – A Modular approach with Graphics, Database, Mobile and Web applications, Pearson, Second Edition, 2017.
3. Martin C. Brown, Python: The Complete Reference, Osborne/McHraw Hill, Fourth Edition, 2018.

Web Resources / E.Books:

1. https://www.programiz.com/python-programming
2. https://www.guru99.com/python-tutorials.html
3. https://www.w3schools.com/python/python_intro.asp

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: To make the students to know the basic concepts of Python programming language.

Activities to be given: students shall be practiced with different Python programming concepts.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.	K1 to K3
CLO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	K1 to K3
CLO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	K1 to K4
CLO4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	K1 to K3
CLO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	3	3	3	3	3
CLO2	3	3	3	2	3	3
CLO3	2	3	2	3	3	2
CLO4	3	3	3	3	3	3
CLO5	3	3	3	3	3	2

1-Basic Level 2- Intermediate Level 3- Advanced Level

LESSON PLAN: TOTAL HOURS (70HRS)

UNIT	DESCRIPTION	HRS	MODE
I	**Basics of Python Programming:** History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. **Python Arrays:** Defining and Processing Arrays – Array methods.	14	Chalk and Talk, PPT, quiz, on the spot test
II	**Control Statements:** Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. **Jump Statements:** break, continue and pass statements**.**	14	Chalk and Talk, quiz, on the spot test
III	**Functions:** Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. **Function Arguments**: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments-Recursion. **Python Strings:** String operations-Immutable Strings - Built-in String Methods and Functions - String Comparison. **Modules**: import statement- The Python module – dir() function – Modules and Namespace – Defining our own modules.	14	Chalk and Talk, PPT, group discussion and You tube Links
IV	**Lists:** Creating a list -Access values in List-Updating values in Lists-Nested lists -Basic list Operations-List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. **Dictionaries:** Creating, Accessing,	14	Chalk and Talk, PPT, quiz

	Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.		
V	**Python File Handling:** Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods- append() method – read() and readlines() methods – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.	14	Chalk and Talk, PPT, group discussion, quiz, open book test

Course Designer

Mrs.R.Keerthana

Annexure –10a

Department of Computer Science (Data Science and Analytics)				Class: I B.Sc CS (DS)				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hours/ Week**	**CIA**	**External Exam**	**Total**
I	Core	23OUCSD1P	Python Programming Lab	5	5	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	**Employability Oriented**	**Entrepreneurship Oriented**
✔	✔	

PROGRAM LIST

Course Objectives:

1. Be able to design and program Python applications.
2. Be able to create loops and decision statements in Python.
3. Be able to work with functions and pass arguments in Python.
4. Be able to build and package Python modules for reusability.
5. Be able to read and write files in Python.

List of Exercises:

1. Program using variables, constants, I/O statements in Python.
2. Program using Operators in Python.
3. Program using Conditional Statements.
4. Program using Loops.
5. Program using Jump Statements.
6. Program using Functions.
7. Program using Recursion.
8. Program using Arrays.
9. Program using Strings.
10. Program using Modules.
11. Program using Lists.
12. Program using Tuples.
13. Program using Dictionaries.
14. Program for File Handling.

Books for Reference:

1. Mark Lutz, "*Learning Python Powerful Object Oriented Programming*", O'reillyMedia 2018, 5thEdition.
2. Timothy A. Budd, "*Exploring Python*", Tata MCGraw Hill Education PrivateLimited 2011, 1st Edition.
3. John Zelle, "*Python Programming: An Introduction to Computer Science*", Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1590282410

4. Michel Dawson, "*Python Programming for Absolute Beginners*", Third Edition,Course Technology Cengage Learning Publications, 2013, ISBN 978- 1435455009

Web Resources / E.Books:

https://www.tutorialspoint.com/python programming

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

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

Pedagogy

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Up to K level)
CLO1	Demonstrate the understanding of syntax and semantics of	K1 to K3
CLO2	Identify the problem and solve using PYTHON programming techniques.	K1 to K3
CLO3	Identify suitable programming constructs for problem solving.	K1 to K4
CLO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.	K1 to K3
CLO5	Develop a PYTHON program for a given problem and test for its correctness.	K1 to K4

LESSON PLAN FOR PRACTICAL: TOTAL HOURS (75HRS)

Cycle	Description	Hrs	Mode
1	Program using variables, constants, I/O statements in Python. Program using Operators in Python. Program using Conditional Statements.	15	Writing and executing the program in a system
2	Program using Loops. Program using Jump Statements. Program using Functions.	15	Writing and executing the program in a system
3	Program using Recursion. Program using Arrays. Program using Strings.	15	Writing and executing the program in a system
4	Program using Modules. Program using Lists. Program using Tuples.	15	Writing and executing the program in a system

5	Program using Dictionaries. Program for File Handling.	15	Writing and executing the program in a system

Course Designer

Mrs.R.Keerthana

Annexure –10a

EVALUATION (PRACTICAL)

Core Lab / Skill Enhancement Course Lab

Internal (Formative) : 40 marks

External (Summative) : 60 marks

Total :100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

- ✓ There will be Two Internal Practical Examination.
- ✓ Duration of Internal Examination will be 2 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x8)	16
2.	II – Test and Debug the Program (2x4)	08
3.	III - Printing the Correct Output (2x4)	08
4.	IV- Viva	03
5.	V –Record book	05
	Total	**40**

Question Paper Pattern for External Practical Examination: 60 Marks

- ✓ Duration of External Examination will be 3 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x10)	20
2.	II – Test and Debug the Program (2x10)	20
3.	III- Printing the Correct Output (2x5)	10
4.	IV – Viva	5
5.	V - Record book	5
	Total	**60**

Annexure –10a

Department of Computer Science (Data Science and Analytics)				Class: I B.Sc CS (DS)				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hours/ Week**	**CIA**	**SE**	**Total**
I	Skill Enhancement Course SEC1(NME)	23OUCSDSECN1	Fundamentals of Information Technology	2	2	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	**Employability Oriented**	**Entrepreneurship Oriented**
✓	✔	

Course Objectives:

1. Understand basic concepts and terminology of information technology.
2. Have a basic understanding of personal computers and their operation.
3. Be able to identify data storage and its usage.
4. Get great knowledge of software and its functionalities.
5. Understand about operating system and their uses.

Course Content:

Unit –I

Introduction to Computers: Introduction, Definition, Characteristics of computer, Evolution of Computer, Block Diagram of a computer, Generations of Computer, Classification of Computers, Applications of Computer, Capabilities and limitations of computer.

Unit –II

Basic Computer Organization: Role of I/O devices in a computer system

. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.

Unit – III

Storage Fundamentals: Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives.

Unit – IV

Software: Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w.

Unit – V

Operating System: Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, MultiTasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.

Book for Study:

1. Anoop Mathew, S. Kavitha Murugeshan , "*Fundamental of Information Technology*", Majestic Books, 2009.
2. Alexis Leon, Mathews Leon, "*Fundamental of Information Technology*", 2nd Edition.
3. S. K Bansal, "*Fundamental of Information Technology*".

Chapters:

Unit I : 1.1 -1.6

Unit II : 8.1-8.4, 8.7, 9.1-9.10

Unit III : 6.1-6.3,7.2-7.5

Unit IV : 10.1-10.4,12.2-12.4

Unit V : 11.3-11.5

Books for Reference:

1. Bhardwaj Sushil Puneet Kumar, "*Fundamental of Information Technology*".
2. GG WILKINSON, "*Fundamentals of Information Technology*", Wiley-Blackwellz.
3. A Ravichandran , "*Fundamentals of Information Technology*", Khanna Book Publishing.

Web Resources / E.Books:

https://testbook.com/learn/computer-fundamentals

Pedagogy

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill:

- Acquire the knowledge of basic components of computer.
- Able to use the basic technology in Computers required for the job.

Activities to be given:

To practice the students with word processing exercises.

Course learning Outcomes (CLOs):

CLO	Course Outcomes Statement	Knowledge (According to Bloom's Taxonomy)
CLO1	Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.	K1 to K3
CLO2	Develop organizational structure using for the devices present currently under input or output unit.	K1 to K3
CLO3	Concept of storing data in computer using two header namely RAM and ROM with different types of ROM with advancement in storage basis.	K1 to K3
CLO4	Work with different software, Write program in the software and applications of software.	K1 to K3
CLO5	Usage of Operating system in information technology which really acts as a interpreter between software and hardware.	K1 to K3

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) (SCIENCE)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	1	3	1	2	1
CLO2	2	3	3	1	2	1
CLO3	2	3	3	2	1	1
CLO4	2	1	3	2	1	1
CLO5	3	3	1	2	1	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) (ARTS)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	3	1	2	3	2
CLO2	3	3	2	3	3	2
CLO3	3	3	1	2	2	1
CLO4	3	2	2	1	1	2
CLO5	3	3	1	2	3	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

Annexure –10a

LESSON PLAN FOR PRACTICAL: TOTAL HOURS (30HRS)

UNIT	DESCRIPTION	HRS	MODE
I	**Introduction to Computers:** Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications Computer, Capabilities and limitations of computer.	6	Chalk and Talk, PPT, quiz, on the spot test
II	**Basic Computer Organization:** Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.	6	Chalk and Talk, quiz, on the spot test
III	**Storage Fundamentals:** Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives.	6	Chalk and Talk, PPT, group discussion and You tube Links
IV	**Software:** Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w	6	Chalk and Talk, PPT, quiz
V	**Operating System:** Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.	6	Chalk and Talk, PPT, group discussion, quiz, open book test

Course Designer

Mrs.R.Chinthamani

Annexure –10a

Department of Computer Science (Data Science and Analytics)				Class: I B.Sc CS (DS)				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hours/ Week**	**CIA**	**SE**	**Total**
I	Foundation Course	23OUCSDFC1	Problem Solving Techniques	2	2	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	**Employability Oriented**	**Entrepreneurship Oriented**
✓	✔	

Course Objectives:

1. Familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving.
2. Implement different programming constructs and decomposition of problems into functions.
3. Use data flow diagram, Pseudo code to implement solutions.
4. Define and use of arrays with simple applications
5. Understand about operating system and their uses

Course Content:

Unit –I

Introduction: History, characteristics and limitations of Computer. Hardware/Anatomy of Computer: CPU, Memory, Secondary storage devices, Input Devices and Output devices. Types of Computers: PC, Workstation, Minicomputer, Main frame and Supercomputer. Software: System software and Application software**. Programming Languages:** Machine language, Assembly language, High-level language,4 GL and 5GL-Features of good programming language. Translators: Interpreters and Compilers.

Unit –II

Data: Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC).**Structured Programming: Algorithm:** Features of good algorithm, Benefits and drawbacks of algorithm. Flowcharts: Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts**. Pseudocode:** Writing a pseudocode. Coding, documenting and testing a program: Comment lines and types of errors. **Program design:** Modular Programming.

Unit – III

Selection Structures: Relational and Logical Operators -Selecting from Several Alternatives – Applications of Selection Structures. **Repetition Structures:** Counter Controlled Loops –Nested Loops– Applications of Repetition Structures.

Unit – IV

Data: Numeric Data and Character Based Data. **Arrays:** One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters.

Unit – V

Data Flow Diagrams: Definition, DFD symbols and types of DFDs. **Program Modules:** Subprograms-Value and Reference parameters- Scope of a variable - Functions – Recursion. **Files:** File Basics-Creating and reading a sequential file- Modifying Sequential Files.

Book for Study:

Stewart Venit, "*Introduction to Programming: Concepts and Design*", Dream Tech Publishers, Fourth Edition,2010.

Chapters:

Unit – I : 1.1 to 1.3

Unit – II : 1.4, 1.5. 2.1 to 2.4

Unit – III : 3.2 to 3.4, 4.2 to 4.4

Unit – IV : 5.1, 5.2, 6.1, 6.3, 6.4

Unit – V : 5.3, 5.4, 7.1 to 7.4

Books for Reference:

1. Dr. R. Deepalakshmi (2019), *Computer Fundamentals & Office Automation*, Charulatha Publications, 2nd Edition.

2. Dr. R. K. Chopra Priyanka Gauri (2021), *Office Management*, Himalaya Publishing House, 17th Revised & Updated Edition.

3. YatendraKumar(2018), *Office Automation Tools*, Nageen Prakashan Publication, 4th Edition.

Web Resources / E.Books:

https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm

http://www.nptel.iitm.ac.in/video.php?subjectId=106102067

Pedagogy

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill:

- Acquire the knowledge of basic components of computer.
- **A**ble to use the basic technology in Computers required for the job.

Activities to be given:

To practice the students with word processing exercises.

Course learning Outcomes (CLOs):

CLO	Course Outcomes Statement	Knowledge (According to Bloom's Taxonomy)
CLO1	Study the basic knowledge of Computers. Analyze the programming languages.	K1 to K3
CLO2	Study the data types and arithmetic operations. Know about the algorithms. Develop program using flow chart and pseudocode.	K1 to K3
CLO3	Determine the various operators. Explain about the structures. Illustrate the concept of Loops	K1 to K3
CLO4	Study about Numeric data and character-based data. Analyze about Arrays.	K1 to K3
CLO5	Explain about DFD Illustrate program modules. Creating and reading Files	K1 to K3

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) (SCIENCE)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	1	3	1	2	1
CLO2	2	3	3	1	2	1
CLO3	2	3	3	2	1	1
CLO4	2	1	3	2	1	1
CLO5	3	3	1	2	1	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) (ARTS)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	3	1	2	3	2
CLO2	3	3	2	3	3	2
CLO3	3	3	1	2	2	1
CLO4	3	2	2	1	1	2
CLO5	3	3	1	2	3	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

Annexure –10a

LESSON PLAN FOR PRACTICAL: TOTAL HOURS (30HRS)

UNIT	DESCRIPTION	HRS	MODE
I	**Introduction:** History, characteristics and limitations of Computer. Hardware/Anatomy of Computer: CPU, Memory, Secondary storage devices, Input Devices and Output devices. Types of Computers: PC, Workstation, Minicomputer, Main frame and Supercomputer. Software: System software and Application software. **Programming Languages:** Machine language, Assembly language, High-level language,4 GL and 5GL-Features of good programming language. Translators: Interpreters and Compilers.	6	Chalk and Talk, PPT, quiz, on the spot test
II	**Data:** Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC). **Structured Programming: Algorithm:** Features of good algorithm, Benefits and drawbacks of algorithm. **Flowcharts:** Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts. **Pseudocode:** Writing a pseudocode. Coding, documenting and testing a program: Comment lines and types of errors. **Program design:** Modular Programming.	6	Chalk and Talk, quiz, on the spot test
III	**Selection Structures:** Relational and Logical Operators - Selecting from Several Alternatives – Applications of Selection Structures. **Repetition Structures:** Counter Controlled Loops –Nested Loops– Applications of Repetition Structures.	6	Chalk and Talk, PPT, group discussion and You tube Links
IV	**Data:** Numeric Data and Character Based Data. **Arrays:** One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters.	6	Chalk and Talk, PPT, quiz
V	**Data Flow Diagrams:** Definition, DFD symbols and types of DFDs. **Program Modules:** Subprograms-Value and Reference parameters- Scope of a variable - Functions – Recursion. **Files:** File Basics-Creating and reading a sequential file- Modifying Sequential Files.	6	Chalk and Talk, PPT, group discussion, quiz, open book test

Course Designer
Mrs.N.Kavitha

Annexure –10a

Department of Computer Science (Data Science and Analytics)				Class: I B.Sc CS (DS)				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hours/ Week**	**CIA**	**SE**	**Total**
II	Core	23OUCSD21	Data Structures & Algorithms	5	5	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	**Employability Oriented**	**Entrepreneurship Oriented**
✓	✔	

Course Objectives:

1. Understand the meaning asymptotic time complexity analysis and various data structures
2. To enhancing the problem solving skills and thinking skills
3. To write efficient algorithms and Programs
4. To make the students learn best practices in PYTHON programming
5. To understand how to handle the files in Data Structure

Course Content:

Unit- I

Arrays and ordered Lists: Abstract data types – asymptotic notations – complexity analysis- Linked lists: Singly linked list – doubly linked lists - Circular linked list, General lists- stacks – Queues – Circular Queues – Evaluation of expressions

Unit- II

Trees and Graphs: Trees – Binary Trees – Binary Tree Traversal – Binary Tree Representations – Binary Search Trees - threaded Binary Trees - Application of trees (Sets). Representation of Graphs – Graph implementation – graph Traversals - Minimum Cost Spanning Trees – Shortest Path Problems-Application of graphs.

Unit- III

Searching and Sorting Sorting: Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Selection Sort. Searching – Linear search, Binary search.

Unit- IV

Greedy Method and Dynamic programming Greedy Method: Knapsack problem– Job Sequencing with deadlines – Optimal storage on tapes. General method – Multistage Graph Forward Method– All pairs shortest path – Single source shortest path – Search Techniques for Graphs – DFS – Connected Components – Bi-Connected Components.

Unit- V

Backtracking: General Method – 8-Queen‟s – Sum Of Subsets – Graph Colouring – Hamiltonian Cycles – Branch And Bound: General Method – Travelling Sales Person Problem.

Books for study:

1.Seymour Lipshutz, Schaum‟s Outlines – "*Data Structures with C"*, Tata McGraw Hill publications,2011.

Chapters:

Unit I : 1.5, 2.5, 2.6, 5.10, 5.11, 6.2, 6.11, 6.14

Unit II : 7.1-7.4, 7.7, 7.8, 7.24, 8.3, 8.4, 8.7, 8.9.

Unit III : 4.7-4.9, 9.3, 9.4, 9.6.

2.Ellis Horowitz and SartajSahni, "*Fundamentals of Computer Algorithms*", Galgotia Publications Pvt., Ltd, 2010.

Chapters:

Unit IV : 4.2, 4.4, 4.6, 5.1-5.4, 6.2-6.4.

Unit V : 7.1-7.5, 8.1, 8.3.

Books for Reference:

1. Gregory L.Heileman , "*Data Structures, Algorithms and Object-Oriented Programming"*, McGraw Hill International Edition, Singapore,1996.
2. A.V.Aho, J.D. Ullman, J.E.Hopcraft "*Data Structures and Algorithms*", Addison Wesley Publication,2000.
3. Ellis Horowitz and SartajSahni, Sanguthevar Raja sekaran , "*Fundamentals of Computer Algorithms*", Galgotia Publications Pvt.Ltd, 2010.

Web Resources / E.Books:

1. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
2. https://www.programiz.com/dsa
3. https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill: To make the students to know the basic concepts of programming language.

Activities to be given: Students shall be practiced with different programming concepts.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge (According to Bloom's Taxonomy)
CLO1	To understand the asymptotic notations and analysis of time and space complexity	K1 to K3

	To understand the concepts of Linked List, Stack and Queue.	
CLO2	To understand the Concepts of Trees and Graphs Perform traversal operations on Trees and Graphs. To enable the applications of Trees and Graphs.	K1 to K3
CLO3	To apply searching and sorting techniques	K1 to K4
CLO4	To understand the concepts of Greedy Method To apply searching techniques.	K1 to K3
CLO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CLO1	3	3	3	3	3	3
CLO2	3	3	1	3	3	3
CLO3	3	3	3	2	3	2
CLO4	3	2	3	2	3	3
CLO5	3	3	3	3	3	3

1-Basic Level 2- Intermediate Level 3- Advanced Level

LESSON PLAN : TOTAL HOURS (70HRS)

UNIT	**DESCRIPTION**	**HRS**	**MODE**
I	Arrays and ordered Lists Abstract data types – asymptotic notations – complexity analysis- Linked lists: Singly linked list – doubly linked lists - Circular linked list, General lists- stacks – Queues – Circular Queues – Evaluation of expressions	12	Chalk and Talk, PPT, quiz, on the spot test
II	Trees and Graphs Trees – Binary Trees – Binary Tree Traversal – Binary Tree Representations – Binary Search Trees - threaded Binary Trees - Application of trees (Sets). Representation of Graphs – Graph implementation – graph Traversals - Minimum Cost Spanning Trees – Shortest Path Problems-Application of graphs	12	Chalk and Talk, quiz, on the spot test
III	Searching and Sorting Sorting – Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Selection Sort. Searching – Linear search, Binary search	16	Chalk and Talk, PPT, group discussion, and You tube Links
IV	Greedy Method and Dynamic Programming Greedy Method: Knapsack problem– Job Sequencing with deadlines – Optimal storage on tapes. General method –	15	Chalk and Talk, PPT, quiz.

	Multistage Graph Forward Method– All pairs shortest path – Single source shortest path – Search Techniques for Graphs – DFS – Connected Components – Bi-Connected Components		
V	Backtracking General Method – 8-Queen‟s – Sum Of Subsets – Graph Colouring – Hamiltonian Cycles – Branch And Bound: General Method – Travelling Sales Person Problem.	15	Chalk and Talk, PPT, group discussion , quiz, open book test

Course Designer

Mrs.V.Jayavani

Annexure –10a

Department of Computer Science (Data Science and Analytics)				Class: I B.Sc CS (DS)				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hours/ Week**	**CIA**	**SE**	**Total**
II	Core	23OUCSD2P	Data Structures & Algorithms Lab	5	5	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	**Employability Oriented**	**Entrepreneurship Oriented**
✓	✔	

Course Objectives:

To predict the performance of different algorithms in order to guide design decisions, provide theoretical estimation for the required resources of an algorithm to solve a specific computational problem.

List of Programs:

1. Perform stack operations
2. Perform queue operations
3. Perform tree traversal operations
4. Search an element in an array using linear search.
5. Search an element in an array using binary search
6. Sort the given set of elements using Merge Sort.
7. Sort the given set of elements using Quick sort.
8. Search the Kth smallest element using Selection Sort
9. Find the Optimal solution for the given Knapsack Problem using Greedy Method.
10. Find all pairs shortest path for the given Graph using Dynamic Programming method
11. Find the Single source shortest path for the given Travelling Salesman problem using
12. Dynamic Programming method
13. Find all possible solution for an N Queen problem using backtracking method
14. Find all possible Hamiltonian Cycle for the given graph using backtracking method

Books for study:

1. Ellis Horowitz , Sartaj Sahni, Susan Anderson Freed, "*Fundamentals of DATA STRUCTURES in C*", Universities Press, Second Edition.
2. E. Horowitz, S. Sahni and S. Rajasekaran, "*Fundamentals of Computer*

Algorithms", Universities Press, Second Edition.

Books for Reference:

1. Seymour Lipschutz, "*Data Structures with C* ", Schaum's outlineseries in computers, Tata McGraw Hill, First Edition.
2. R.Krishnamoorthy and G.Indirani Kumaravel, *"Data Structures using C"*, Tata McGrawHill – 2008.
3. A.K.Sharma, "*Data Structures using C*" , Pearson Education India,2011.
4. G. Brassard and P. Bratley, "*Fundamentals of Algorithms*", PHI, New Delhi,1997.
5. A.V. Aho, J.E. Hopcroft, J.D. Ullmann,, "*The design and analysis ofComputer Algorithms*", Addison Wesley, Boston, 1974.
6. Thomas H. Cormen, C.E. Leiserson, R L.Rivest and C. Stein, "*Introduction to Algorithms*", MIT Press, , Third edition, 2009.

Web Resources / E.Books:

1. https://www.programiz.com/dsa
2. https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/
3. https://www.studocu.com/in/document/amity-university/c-programming-lab/lab-exercises-data-structures-using-c/23508929

Pedagogy

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Course learning Outcomes (CLO's):

CLO	Course Outcomes Statement	Knowledge (According to Bloom's Taxonomy)
CLO1	Implement data structures using C	K1 to K3
CLO2	Implement various types of linked lists and their applications	K1 to K3
CLO3	Implement Tree Traversals	K1 to K4
CLO4	Implement various algorithms in C	K1 to K3
CLO5	Implement different sorting and searching algorithms	K1 to K4

Annexure –10a

LESSON PLAN FOR PRACTICAL: TOTAL HOURS (75HRS)

Cycle	Description	Hrs	Mode
1	Perform stack operations Perform queue operations Perform tree traversal operations	15	Writing and executing the program in a system
2	Search an element in an array using linear search. Search an element in an array using binary search Sort the given set of elements using Merge Sort	15	Writing and executing the program in a system
3	Sort the given set of elements using Quick sort. Search the Kth smallest element using Selection Sort Find the Optimal solution for the given Knapsack Problem using Greedy Method.	15	Writing and executing the program in a system
4	Find all pairs shortest path for the given Graph using Dynamic Programming method Find the Single source shortest path for the given Travelling Salesman problem using Dynamic Programming method	15	Writing and executing the program in a system
5	Find all possible solution for an N Queen problem using backtracking method Find all possible Hamiltonian Cycle for the given graph using backtracking method	15	Writing and executing the program in a system

Course Designer

Mrs.V.Jayavani

Annexure –10a

EVALUATION (PRACTICAL)
Core Lab / Skill Enhancement Course Lab

Internal (Formative) : 40 marks

External (Summative) : 60 marks

Total :100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

- ✓ There will be Two Internal Practical Examination.
- ✓ Duration of Internal Examination will be 2 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x8)	16
2.	II – Test and Debug the Program (2x4)	08
3.	III - Printing the Correct Output (2x4)	08
4.	IV- Viva	03
5.	V –Record book	05
	Total	**40**

Question Paper Pattern for External Practical Examination: 60 Marks

- ✓ Duration of External Examination will be 3 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x10)	20
2.	II – Test and Debug the Program (2x10)	20
3.	III- Printing the Correct Output (2x5)	10
4.	IV – Viva	5
5.	V - Record book	5
	Total	**60**

Annexure –10a

Department of Computer Science (Data Science and Analytics)				Class: I B.Sc CS (DS)				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hours/ Week**	**CIA**	**SE**	**Total**
II	Skill Enhancement Course :SEC 2 (NME)	23OUCSDSECN2	Computer fundamentals	2	2	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	**Employability Oriented**	**Entrepreneurship Oriented**
✓	✔	✔

Course Objectives:

1. Discuss the Introduction about Computer and its Components.
2. To Perform the Microsoft Word, Excel, PowerPoint and its operations.
3. To get Knowledge about the Internet and Intranet
4. Insert heading levels within a web page.
5. Insert ordered and unordered lists within a web page. Create a web page.

Course Content:

Unit I

Introduction to Computers - Generations of Computer – Data and Information – Components of Computer – Software – Hardware – Input Devices - Output Devices — Types of Operating System.

Unit – II

MS Word: Introduction – Elements of Window – Files, Folders and Directories – Text Manipulating: Cut, Copy, Paste, Drag and Drop – Text Formatting: Font – Style, Size, Face and Colors (Both foreground and background) – Alignment - Bullets and Numbering - Header and footer- watermark – inserting objects (images, other application document) – Table creation – Mail merge.

Unit III

MS Excel: Introduction – Inserting rows and columns – Sizing rows and columns – Implementing formulas – Generating series - Functions in excel – Creation of Chart – Inserting objects – Filter – Sorting – Inserting worksheet.

Unit IV

MS PowerPoint: Introduction – Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) – Slide show– Types of Views – Types of Animations – Inserting Objects – Implementing multimedia (Video and Audio) – Templates (Built-in and User-Defined).

Unit V

Internet: Introduction to Internet and Intranet – Services of Internet - Domain Name – URL –

Browser – Types of Browsers – Search Engine - E-Mail – Basic Components of E-Mail –.How to send group mail. **E-Commerce**: Digital Signature – Digital Currency – Online shopping and transaction.

Book for Study:

1. G. Manjunath, "*Computer Basics*", Vasan Publications, 2010.
2. Pradeep K. Sinha & PritiSinha, "*Computer Fundamentals*", BPB Publications, 6th Edition, 2004.

Web Resources/ EBooks:

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

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

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

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

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

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Rationale for nature of Course:

Knowledge and Skill:

- Can easily connect and share information with them using Network tools.

Activities to be given:

- To apply the knowledge of online transactions to create a web design.
- To practice the use of Internet, Search Engines and Web Browsing software.

Course learning Outcomes (CLOs):

CLO	Course Outcomes Statement	Knowledge(According to Bloom's Taxonomy)
CLO1	Understand the basics of Computer and its Generations. Be able to understand the components of computer.	K1 to K3
CLO2	To Understand the introduction about MS Word. Be able to perform the Elements of window, Text Formatting, Text Manipulating options in MS Word.	K1 to K3
CLO3	To Understand the introduction about MS Excel. Be able to inserting and sizing the cells Implementing formulas and inserting worksheet.	K1 to K3
CLO4	To Understand the introduction about MS PowerPoint Be able to perform the slides manipulation. Implementing Multimedia and templates.	K1 to K3

CLO5	To Understand the introduction about Internet and Intranet. Be able to access the browsers. To get knowledge about basic components of E-Mail and E-Commerce	K1 to K3

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) (SCIENCE)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CLO1	1	2	1	2	3	2
CLO2	1	2	1	2	3	3
CLO3	1	2	3	3	2	3
CLO4	2	2	2	2	3	2
CLO5	2	2	3	2	3	2

1-Basic Level 2- Intermediate Level 3- Advanced Level

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) (ARTS)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CLO1	1	3	1	2	3	2
CLO2	2	3	2	3	3	2
CLO3	2	3	1	2	2	1
CLO4	2	2	2	1	1	2
CLO5	3	3	1	2	3	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

LESSON PLAN: TOTAL HOURS (30HRS)

UNIT	**DESCRIPTION**	**HRS**	**MODE**
I	**Introduction to Computers** - Generations of Computer – Data and Information – Components of Computer – Software – Hardware – Input Devices - Output Devices — Types of Operating System.	**6**	**Chalk and Talk, PPT, group discussion.**
II	**MS Word**: Introduction – Elements of Window – Files, Folders and Directories – Text Manipulating: Cut, Copy, Paste, Drag and Drop – Text Formatting: Font – Style,	**6**	**Chalk and Talk, PPT, group discussion.**

	Size, Face and Colors (Both foreground and background) – Alignment - Bullets and Numbering - Header and footer- watermark – inserting objects (images, other application document) – Table creation – Mail merge.		
III	**Ms Excel**: Introduction – Inserting rows and columns – Sizing rows and columns – Implementing formulas – Generating series - Functions in excel – Creation of Chart – Inserting objects – Filter – Sorting – Inserting worksheet.	**6**	**Chalk and Talk, PPT, group discussion.**
IV	**MS PowerPoint**: Introduction – Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) – Slide show– Types of Views – Types of Animations – Inserting Objects – Implementing multimedia (Video and Audio) – Templates (Built-in and User-Defined).	**6**	**Chalk and Talk, PPT, group discussion.**
V	**Internet**: Introduction to Internet and Intranet – Services of Internet - Domain Name – URL – Browser – Types of Browsers – Search Engine - E-Mail – Basic Components of E-Mail –.How to send group mail. **E-Commerce**: Digital Signature – Digital Currency – Online shopping and transaction.	**6**	**Chalk and Talk, PPT, group discussion.**

Course Designer

Mrs.P.Krishna Geetha

Annexure –10a

Department of Computer Science (Data Science and Analytics)				Class: I B.Sc CS (DS)				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hours/ Week**	**CIA**	**SE**	**Total**
II	Skill Enhancement Course: SEC 3	23OUCSDSEC 3P	Open Source Software Technologies Lab	2	2	40	60	100

Course Objectives:

1. Able to Acquire and understand the basic concepts in Java,application of OOPS concepts.
2. Acquire knowledge about operators and decision-making statements.
3. To Identify the significance and application of Classes, arrays and interfaces and analyzing java arrays
4. Understand about the applications of OOPS concepts and analyze overriding and packages through java programs.
5. Can Create window-based programming using applet and graphics programming.

Course Content:

List of Programs:

1. Get name of the user from a form and show greeting text.

2. To check whether given number is palindrome or not.

3. To check whether given number is Armstrong or not.

4. To find largest values of two numbers using nesting of function.

5. To design the Mathematical calculator program.

6.To find the Age calculation program.

7. To check whether given number is String palindrome or not.

8. Create a PHP page for login page without sql connection.

9. To Array manipulation.

10. To design personal information

11. Create a PHP page for login page with sql connection.

12. To Read from existing file.

13. To Write a file

14. To calculate Date and Time function .

15. To design Curriculum Vitae.

16. To Count Number of Visits on a web page using cookies.

17. Create a web page to advertise a product of the company using images and audio.

18. Create a web page for Travel agency.

19. Create a web page for software company websites.

20.Create a PHP page for login system using session.

Books for Reference:

1. Steven Holzner, "*The Complete Reference PHP*", Mc Graw Hill, Indian Edition , 2004.
2. Thomas Blom Hansen and Jason Lengstrof, "*PHP for Absolute Beginners*", 2nd Edition, Apress Publication.
3. Rich Bower, Daniel Lopez Ridreejo, Alian Liska , "*Apache Administrator's Handbook*", Sams Publication.
4. David Powers, "*PHP8 Solutions*",5th Edition, Apress Publication.
5. Naramore Eligabette, Gerner Jason, Wrox Press, "*Beginning PHP5, Apache, MySQL Web Development*", Wiley Dreamtech Press 2005.

Web Resources/ E.Books:

1. **https://www.idrbt.ac.in/open-source-lab/**
2. **https://www.apsit.edu.in/open-source-technologies-project-lab**
3. **https://acanets.github.io/ostl-dev/**

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, ICT tools and Peer Teaching.

Knowledge and Skill:

- Can easily connect and share information with them using Network tools.

Activities to be given:

- To apply the knowledge of online transactions to create a web design.
- To practice the use of Internet, Search Engines and Web Browsing software.

Course learning Outcomes (CLOs):

CLO	Course Outcomes Statement	Knowledge(According to Bloom's Taxonomy)
CLO1	Acquire and understand the basic concepts in Java, application of OOPS concepts.	K1 to K3
CLO2	Acquire knowledge about operators and decision-making statements.	K1 to K3

CLO3	Identify the significance and application of Classes, arrays and interfaces and analyzing java arrays	K1 to K3
CLO4	Understand about the applications of OOPS concepts and analyze overriding and packages through java programs.	K1 to K3
CLO5	Create window-based programming using applet and graphics programming.	K1 to K3

LESSON PLAN: TOTAL HOURS (75 HRS)

UNIT	DESCRIPTION	HRS	MODE
I	Get name of the user from a form and show greeting text. To check whether given number is palindrome or not. To check whether given number is Armstrong or not. To find largest values of two numbers using nesting of function.	15	Writing and executing the program in a system
II	To design the Mathematical calculator program. To find the Age calculation program. To check whether given number is String palindrome or not. Create a PHP page for login page without sql connection.	15	Writing and executing the program in a system
III	To Array manipulation. To design personal information Create a PHP page for login page with sql connection. To Read from existing file.	15	Writing and executing the program in a system
IV	To Write a file To calculate Date and Time function. To design Curriculum Vitae. To Count Number of Visits on a web page using cookies.	15	Writing and executing the program in a system
V	Create a web page to advertise a product of the company using images and audio. Create a web page for Travel agency. Create a web page for software company websites. Create a PHP page for login system using session.	15	Writing and executing the program in a system

Course Designer
Ms.K.Shalini

Annexure –10a

EVALUATION (PRACTICAL)
Core Lab / Skill Enhancement Course Lab

Internal (Formative) : 40 marks

External (Summative) : 60 marks

Total :100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

- ✓ There will be Two Internal Practical Examination.
- ✓ Duration of Internal Examination will be 2 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x8)	16
2.	II – Test and Debug the Program (2x4)	08
3.	III - Printing the Correct Output (2x4)	08
4.	IV- Viva	03
5.	V –Record book	05
	Total	**40**

Question Paper Pattern for External Practical Examination: 60 Marks

- ✓ Duration of External Examination will be 3 hours.

S.No	Components	Marks
1.	I – Writing the Program (2x10)	20
2.	II – Test and Debug the Program (2x10)	20
3.	III- Printing the Correct Output (2x5)	10
4.	IV – Viva	5
5.	V - Record book	5
	Total	**60**