SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi and Affiliated to Pondicherry University)

(Accredited by NAAC with 'A' Grade and Accredited by NBA-AICTE, New Delhi)

Madagadipet, Puducherry

Second Meeting of the Board of Studies

Department of Computational Studies

for the Programme

Bachelor of Data Science And Analytics

Venue

First Floor, SAS Block

Sri ManakulaVinayagar Engineering College

Madagadipet, Puducherry – 605 107

Date & Time

30-06-2023 & 11.00 am to 1.00 pm

School of Arts and Science
Department of Computational Studies
Minutes of Board of Studies Meeting for B.Sc. Data Science and Analytics

The Second meeting of Board of Studies for the course B.Sc. Data Science and Analytics was held through online on 30.06.2023 at 11:00 am in the Department of Computational Studies, School of Arts and Science, Sri Manakula Vinayagar Engineering College with the Head of the Department in the Chair.

The following members were present for the Second Meeting of Board of Studies.

S. No.	Name of the Member with Designation and official Address	Responsibility in the BoS
1	**Dr. N. MOGANARANGAN, M.E., Ph.D.** Professor & Head, Department of Computational Studies, School of Arts & Science, Sri Manakula Vinayagar Engineering College (Autonomous) Madagadipet, Puducherry 605 107 **E-mail: moganarangan.cse@smvec.ac.in** **Mobile: 98945 33661**	Chairman
2	**Dr. PUNAM BEDI M.Sc., M.Tech., Ph.D.** Professor, Department of Computer Science, University of Delhi, Delhi – 110 007. **Email: punambedi@gmail.com , Mobile:9899125785**	Pondicherry University Nominee
3	**Dr. R. AROKIA PAUL RAJAN MCA, PGDBA, MA, PhD.,** Associate Professor, Computer Science, School of Sciences, Bangalore Central Campus, Christ University, Bangalore, Karnataka. **Mail id: paulraajan@gmail.com** **Ph: 9443459242**	Subject Expert (Academic Council Nominee)
4	**Dr. M. DURAISAMY, MCA., M.Phil., Ph.D., TNSET.** Associate Professor and Head, Department of Computer Applications, Government Arts and Science College, Kariyampatti, Tirupattur, Tamilnadu - 635 901. **E-mail: duraimca78@gmail.com** **Mobile: 98431 55358.**	Subject Expert (Academic Council Nominee)
5	**Mr.E.IYYAPPAN,** Senior Application Developer, IQVIA, Bangalore. **E-mail: eiyyappan.mca@gmail.com** **Mobile:9790700670**	Member (Industry Representative)

Co-opted Expert Members		
6	**Dr. J. MADHUSUDANAN, ME., Ph.D.,** Professor and Head, Department of Artificial Intelligence and Data Science, Sri Manakula Vinayagar Engineering College, Madagadipet, Puducherry. 605 107. **E-mail: madhu@smvec.ac.in** **Mobile: 9003739274**	Co-opted Expert Member
7	**Mr. M. SHANMUGAM, M.Sc., M.Phil., M.E., SET, (Ph.D).,** Associate Professor, Department of Computer Science Engineering, Sri Manakula Vinayagar Engineering College **E-mail: shanmugam.mm@smvec.ac.in** **Mobile: 9444370963**	Co-opted Expert Member
Internal Members		
8	**Mr. N. VELAN, M.C.A.,** Assistant Professor, Department of Computational Studies, School of Arts and Science, Sri Manakula Vinayagar Engineering College, Madagadipet, Puducherry. 605 107. **E-mail: velancs.sas@smvec.ac.in** **Mobile: 8344577751**	Internal Member
9	**Mrs. A. SHAMSATH BEGAM, M.C.A.,** Assistant Professor, Department of Computational Studies, School of Arts and Science, Sri Manakula Vinayagar Engineering College, Madagadipet, Puducherry. 605 107. **E-mail: shamsathbegum.sas@smvec.ac.in, Mobile: 9500399774**	Internal Member
10	**Dr. M.A. ISHRATH JAHAN M.A., M.Phil., Ph.D.,** Associate Professor & Head, Department of English, School of Arts and Science, Sri Manakula Vinayagar Engineering College, Madagadipet, Puducherry. 605 107. **E-mail: ishrath@smvec.ac.in** **Mobile: 9443075126.**	Internal Member
11	**Mr. P.KRISHNAMOORTHY M.Sc., M.Phil.,** Assistant Professor and Head, Department of mathematics, School of Arts and Science, Sri Manakula Vinayagar Engineering College, Madagadipet, Puducherry. 605 107. **E-mail: krishnamat14@gmail.com** **Mobile: 9750028056.**	Internal Member

Agenda of the Meeting

Item No.: BoS/U.G/ B.Sc. Data Science and Analytics/2.1	❖ Welcome Address. ❖ To Confirm the minutes of the First meeting of the Board of Studies.
Item No.: BoS/U.G/ B.Sc. Data Science and Analytics/2.2	❖ To discuss and approve the of Syllabi of 3rd Semester for the Programme Bachelor of Data Science and Analytics under Regulation 2020
Item No.: BoS/U.G/ B.Sc. Data Science and Analytics/2.3	❖ To discuss and approve the Curriculum Framework (1 to 6 Semester) under Regulation 2023 and Syllabi of 1st Semester for the Programme Bachelor of Data Science and Analytics under Regulation 2023.
Item No.: BoS/U.G/ B.Sc. Data Science and Analytics/2.4	Discussion of the following as in the Regulation - 2023 of School of Arts and Science ❖ Admission eligibility criteria / norms to enroll as student in the specific programme as prescribed by UGC ❖ Conduct of Internal assessment test, model practical exams, award of internal assessment /Re Earn / Improvement / Evaluation Procedures. ❖ Value added Courses ❖ Department research activities Professional Bodies activities and its outcome
Item No.: BoS/U.G/ B.Sc. Data Science and Analytics/2.5	Any other item with the permission of the Chair

The Chairman proceeded with the presentation to deliberate on agenda items.

Minutes of the Meeting

Item No.: BoS/U.G/ B.Sc. Data Science and Analytics/2.1

- Dr. Moganarangan.N, Chairman, welcomed all the external and internal members. The meeting thereafter deliberated on agenda items that had been approved by the Chairman.

- The Board of studies members appreciated regarding the Minutes of the First Meeting of BoS and recommended the same to the Academic council.

Item No.: BoS/U.G/ B.Sc. Data Science and Analytics/2.2:

The Curriculum and Syllabi of 3rd Semester for the Programme Bachelor of Data Science and Analytics under Regulation 2020 recommended to Academic Council.

The approved curriculum and 3rd Semester Syllabus of (R-2020) details are given in Annexure- I

Item No.: BoS/U.G/ B.Sc. Data Science and Analytics/2.3:

The Curriculum and Syllabi of 1st Semester for the Programme Bachelor of Data Science and Analytics under Regulation 2023 recommended to Academic Council.

The Framed curriculum and 1st Semester Syllabus of (R-2023) details are given in Annexure- II

Item No.: BoS/U.G/ B.Sc. Data Science and Analytics/2.4:

Discussion of the following as in the Regulation - 2023 of School of Arts and Science

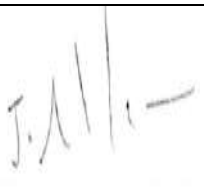
- Admission eligibility criteria / norms to enroll as student in the specific programme as prescribed by UGC
- Conduct of Internal assessment test, model practical exams, award of internal assessment /Re Earn / Improvement / Evaluation Procedures.
- Value added Courses
- Department research activities

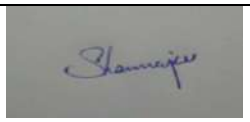
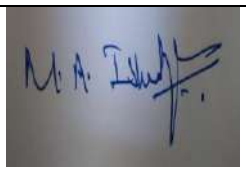
Professional Bodies activities and its outcome

The Board members appreciated the revised R-2023.

The Board of Studies approved the above suggestions for B.Sc Data Science and Analytics. The meeting was concluded at 1:30 pm with vote of thanks by Dr. N. MOGANARANGAN, Professor Department of Data Science and Analytics

Minutes of the second Meeting of the Board of studies held on 30.06.2023 is signed by the members who attended the meeting.

S. No.	Name of the Member with Designation and official Address	Responsibility in the BoS	Signature
1	**Dr. N MOGANARANGAN M.E, Ph.d.,** Professor & Head, Department of Computational Studies, School of Arts & Science, Sri Manakula Vinayagar Engineering College (Autonomous) Madagadipet, Puducherry 605 107 E-mail: moganarangan.cse@smvec.ac.in Mobile: 98945 33661	Chairman	
2	**Dr. PUNAM BEDI M.Sc., M.Tech., Ph.D.** Professor, Department of Computer Science, University of Delhi, Delhi – 110 007. **Email: punambedi@gmail.com** **Mobile:9899125785**	University Nominee	
3	**Dr. R. AROKIA PAUL RAJAN MCA, PGDBA, MA, PhD.,** Associate Professor, Computer Science, School of Sciences, Bangalore Central Campus, Christ University, Bangalore, Karnataka. **Mail id: paulraajan@gmail.com** **Ph: 9443459242**	Subject Expert (Academic Council Nominee)	
4	**Dr. M. DURAISAMY, MCA., M.Phil., Ph.D., TNSET.** Associate Professor and Head, Department of Computer Applications, Government Arts and Science College, Kariyampatti, Tirupattur, Tamilnadu - 635 901. **E-mail: duraimca78@gmail.com** **Mobile: 98431 55358.**	Subject Expert (Academic Council Nominee)	
5	**Mr.E.IYYAPPAN,** Senior Application Developer, IQVIA, Bangalore. **E-mail: eiyyappan.mca@gmail.com** **Mobile:9790700670**	Member (Industry Representative)	
Co-opted Expert Members			
6	**Dr. J. MADHUSUDANAN, ME., Ph.D.,**Professor and Head, Department of Aretificial Intelligence and Data Science, Sri Manakula Vinayagar Engineering College, Madagadipet, Puducherry. 605 107. **E-mail: madhu@smvec.ac.in** **Mobile: 9003739274**	Co-opted Expert Member	

7	**Mr. M. SHANMUGAM, M.Sc., M.Phil., M.E., SET, (Ph.D).,** Associate Professor, Department of Computer Science Engineering, Sri Manakula Vinayagar Engineering College **E-mail: shanmugam.mm@smvec.ac.in** **Mobile: 9444370963**	Co-opted Expert Member	
Internal Members			
10	**Mr. N. VELAN, M.C.A.,** Assistant Professor, Department of Computational Studies, School of Arts and Science, Sri Manakula Vinayagar Engineering College, Madagadipet, Puducherry. 605 107. **E-mail: velancs.sas@smvec.ac.in** **Mobile: 8344577751**	Internal Member	
11	**Mrs. A. SHAMSATH BEGAM, M.C.A.,** Assistant Professor, Department of Computational Studies, School of Arts and Science, Sri Manakula Vinayagar Engineering College, Madagadipet, Puducherry. 605 107. **E-mail: shamsathbegum.sas@smvec.ac.in** **Mobile: 9500399774**	Internal Member	
13	**Dr. M.A. ISHRATH JAHAN M.A., M.Phil., Ph.D.,** Associate Professor & Head, Department of English, School of Arts and Science,Sri Manakula Vinayagar Engineering College, Madagadipet, Puducherry. 605 107. **E-mail: ishrath@smvec.ac.in** **Mobile: 9443075126.**	Internal Member	
14	**Mr. P.KRISHNAMOORTHY M.Sc., M.Phil.,** Assistant Professor and Head, Department of mathematics, School of Arts and Science, Sri Manakula Vinayagar Engineering College, Madagadipet, Puducherry. 605 107. **E-mail: krishnamat14@gmail.com** **Mobile: 9750028056.**	Internal Member	

The meeting was concluded with vote of thanks by **Dr. N. MOGANARANGAN,**, Head of the Department, Department of Computational Studies.

Dr. N. MOGANARANGAN,
HOD / Dept. of Computational Studies,
Chairman-BoS (B.Sc DS&A)

Dean SAS
[Dr. S. Muthulakshmi]

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE
(An Autonomous Institution)
(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi & Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry - 605 107

SCHOOL OF ARTS AND SCIENCE

Department of Computational Studies

B.Sc. Data Science and Analytics

Minutes of 2nd meeting of Board of Studies

ANNEXURE - I

Annexure I

SEMESTER – III										
S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20DAT305	Database Management System	DSC	4	0	0	4	25	75	100
2	A20DAT306	Introduction to Data Science	DSC	4	0	0	4	25	75	100
3	A20DAE3XX	**Discipline Specific Elective–I**	DSE	3	0	0	3	25	75	100
4	A20DAD303	Linear Algebra	IDC	3	1	0	4	25	75	100
5	A20XXO3XX	**Open Elective–I**	OE	2	0	0	2	25	75	100
Practical										
6	A20DAL305	RDBMS Lab	DSC	0	0	4	2	50	50	100
7	A20DAL306	Python for Data Science Lab	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A20DAS303	Cloud Computing using Linux	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
9	A20DAC303	AWS Cloud	EEC	0	0	4	0	100	0	100
							23	**425**	**475**	**900**

SEMESTER – IV										
S. No	Course Code	Course Title	Category	Periods			Credits	Max. Marks		
				L	T	P		CAM	ESM	Total
Theory										
1	A20DAT407	NoSQL Databases	DSC	4	0	0	4	25	75	100
2	A20DAT408	Introduction of Artificial Intelligence	DSC	4	0	0	4	25	75	100
3	A20DAE4XX	**Discipline Specific Elective–II**	DSE	4	0	0	3	25	75	100
4	A20DAD404	Health Analytics	IDC	3	0	0	4	25	75	100
5	A20XXO4XX	**Open Elective–II**	OE	2	0	0	2	25	75	100
Practical										
6	A20DAL407	NoSQL Databases - Lab	DSC	0	0	4	2	50	50	100
7	A20DAL408	Artificial Intelligence (PROLOG) Lab	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A20DAS404	AWS Web Services	SEC	0	0	4	2	100	0	100
Employment Enhancement Course										
9	A20DAC404	Blockchain	EEC	0	0	4	0	100	0	100
							23	**425**	**475**	**900**

SEMESTER – V										
S. No	**Course Code**	**Course Title**	**Category**	**Periods**			**Credits**	**Max. Marks**		
				L	**T**	**P**		**CAM**	**ESM**	**Total**
Theory										
1	A20DAT509	Introduction to Machine Learning	DSC	4	0	0	4	25	75	100
2	A20DAT510	IoT Cloud and Data Analytics	DSC	4	0	0	4	25	75	100
3	A20DAT511	Software Project Management	DSC	4	0	0	4	25	75	100
4	A20DAE5XX	**Discipline Specific Elective–III**	DSE	3	0	0	3	25	75	100
Practical										
5	A20DAL509	Machine Learning Lab	DSC	0	0	4	2	50	50	100
6	A20DAP501	Mini Project	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
7	A20DAS505	R Programming Lab	SEC	0	0	4	2	100	0	100
Online Certification Course										
8	A20DAX501	NPTEL – Big Data Computing, Data Mining and Online Privacy	OCC	0	0	0	0	0	0	0
							21	**300**	**400**	**700**

SEMESTER – VI										
S. No	**Course Code**	**Course Title**	**Category**	**Periods**			**Credits**	**Max. Marks**		
				L	**T**	**P**		**CAM**	**ESM**	**Total**
Theory										
1	A20DAT612	Deep Learning	DSC	**3**	0	0	4	25	75	100
2	A20DAT613	Data Handling and Visualization	DSC	**3**	0	0	4	25	75	100
3	A20DAT614	Text and Image Analytics	DSC	**3**	0	0	4	25	75	100
4	A20DAE6XX	**Discipline Specific Elective–IV**	DSE	**3**	0	0	3	25	75	100
Practical										
5	A20DAP602	Project Viva-Voce	DSC	**0**	0	10	5	40	60	100
Skill Enhancement Course										
6	A20DAS606	Research Methodology	SEC	**0**	0	4	2	100	0	100
							22	**240**	**360**	**600**

DISCIPLINE SPECIFIC ELECTIVE COURSES

ELECTIVES										
Sl. No	**Course Code**	**Course Title**	**Category**	**Periods**			**Credits**	**Max. Marks**		
				L	**T**	**P**		**CAM**	**ESM**	**Total**
Discipline Specific Elective (DSE - I) – offered in Third Semester										
1	A20DAE301	Operating System	DSE	3	-	-	3	25	75	100
2	A20DAE302	Information Security	DSE	3	-	-	3	25	75	100
3	A20DAE303	Computer Networks	DSE	3	-	-	3	25	75	100
Discipline Specific Elective (DSE - II) – offered in Fourth Semester										
1	A20DAE404	Infrastructure Management	DSE	3	-	-	3	25	75	100
2	A20DAE405	Client Server Technology	DSE	3	-	-	3	25	75	100
3	A20DAE406	Image Processing	DSE	3	-	-	3	25	75	100
Discipline Specific Elective (DSE - III) – offered in Fifth Semester										
1	A20DAE507	Wireless Sensor Network	DSE	3	-	-	3	25	75	100
2	A20DAE508	Data Science using R	DSE	3	-	-	3	25	75	100
3	A20DAE509	Virtualization using Cloud	DSE	3	-	-	3	25	75	100
Discipline Specific Elective (DSE - IV) – offered in Sixth Semester										
1	A20DAE610	Process Management	DSE	3	-	-	3	25	75	100
2	A20DAE611	Software Engineering	DSE	3	-	-	3	25	75	100
3	A20DAE612	Introduction to Digital Marketing	DSE	3	-	-	3	25	75	100

OPEN ELECTIVE COURSES

COMPLETE LIST OF OPEN ELECTIVES OFFERED BY ALL THE DEPARTMENTS

Open Elective – I (Offered in Semester III)				
Sl. No	**Course Code**	**Course Title**	**Offering Department**	**Permitted Departments**
1	**A20BTO301**	Boon and Bane of Microbes	Bioscience	Chemistry, Food Science, Physics
2	**A20BTO302**	Microbial Technology for Entrepreneurship	Bioscience	Chemistry, Food Science, Physics
3	**A20BTO303**	Origin of Life	Bioscience	Chemistry, Food Science, Physics
4	**A20CHO304**	Food Analysis (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
5	**A20CHO305**	Molecules of Life (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
6	**A20CHO306**	Water Analysis (Practical)	Chemistry	Bioscience, Computational Studies, Food Science, Mathematics, Physics
7	**A20CMO307**	Fundamentals of Accounting and Finance	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
8	**A20CMO308**	Fundamentals of Management	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
9	**A20CMO309**	Fundamentals of Marketing	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
10	**A20CPO310**	Data Structures	Computational Studies	Mathematics
11	**A20CPO311**	Programming in C	Computational Studies	Commerce and Management, Mathematics, Media Studies
12	**A20CPO312**	Programming in Python	Computational	Commerce and Management,

			Studies	Mathematics, Media Studies
13	**A20ENO313**	Conversational Skills	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
14	**A20ENO314**	Fine-tune your English	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
15	**A20ENO315**	Interpersonal Skills	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
16	**A20MAO316**	Mathematical Modelling	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
17	**A20MAO317**	Quantitative Aptitude - I	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
18	**A20MAO318**	Statistical Methods	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
19	**A20VCO319**	Event Management	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
20	**A20VCO320**	Graphic Design	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
21	**A20VCO321**	Role of social media	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
22	**A20NDO322**	Basic Food Groups	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil

23	**A20NDO323**	Life Style Management	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
24	**A20NDO324**	Nutritive Value of Foods	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
25	**A20PHO325**	Astrophysics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
26	**A20PHO326**	Basic of Modern Communication System	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
27	**A20PHO327**	Bio-Physics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
28	**A20TMO328**	அடிப்படைத்தமிழ்	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
29	**A20TMO329**	வாழ்வியல் இலக்கணம்	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
30	**A20TMO330**	புதுக்கவிதைப் பட்டறை	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics

Open Elective – II (Offered in Semester IV)

Sl. No.	Course Code	Course Title	Offering Department	Permitted Departments
1	**A20BTO401**	Fermented Food	Bioscience	Chemistry, Food Science, Physics

2	**A20BTO402**	Herbal Technology	Bioscience	Chemistry, Food Science, Physics
3	**A20BTO403**	Self-Hygiene	Bioscience	Chemistry, Food Science, Physics
4	**A20CHO404**	C++ Programming and its Application to Chemistry	Chemistry	Computational Studies, Mathematics, Physics
5	**A20CHO405**	Computational Chemistry Practical	Chemistry	Computational Studies, Mathematics, Physics
6	**A20CHO406**	Instrumental Methods of Analysis	Chemistry	Computational Studies, Mathematics, Physics
7	**A20CMO407**	Essential Legal Awareness	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
8	**A20CMO408**	Essentials of Insurance	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
9	**A20CMO409**	Practical Banking	Commerce and Management	Bioscience, Chemistry, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
10	**A20CPO410**	Database Management Systems	Computational Studies	Commerce and Management, Media Studies, Mathematics
11	**A20CPO411**	Introduction to Data Science using Python	Computational Studies	Chemistry, Commerce and Management, English, Media Studies, Mathematics, Physics
12	**A20CPO412**	Web Development	Computational Studies	Commerce and Management, Media Studies, Mathematics
13	**A20ENO413**	English for Competitive Exam	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
14	**A20ENO414**	English Next-India	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics

15	**A20ENO415**	Functional English	English	Chemistry, Commerce and Management, Computational Studies, Media Studies, Mathematics, Physics
16	**A20MAO416**	Discrete mathematics	Mathematics	Chemistry, Computational Studies, Physics
17	**A20MAO417**	Operations Research	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
18	**A20MAO418**	Quantitative Aptitude - II	Mathematics	Chemistry, Commerce and Management, Computational Studies, Physics, Biotechnology, Nutrition and Dietetics
19	**A20VCO419**	Basics of News Reporting	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
20	**A20VCO420**	Scripting for media	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
21	**A20VCO421**	Video Editing	Media Studies	Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Physics
22	**A20NDO422**	Food Labelling	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
23	**A20NDO423**	Hygiene and Sanitation	Food Science	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
24	**A20NDO424**	Nutrition for Adolescent	Food Science	Bioscience, Chemistry,

				Commerce and Management, Computational Studies, English, Mathematics, Media Studies, Physics, Tamil
25	**A20PHO425**	Digital Electronics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
26	**A20PHO426**	Geo-Physics	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
27	**A20PHO427**	Space Science	Physics	Bioscience, Chemistry, Computational Studies, Mathematics, Media Studies
28	**A20TMO428**	சிறுகதைப் பயிற்சி	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
29	**A20TMO429**	செய்தி வாசிப்பு பயிற்சி	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics
30	**A20TMO430**	நிகழ்த்துக்கலை	Tamil	Bioscience, Chemistry, Commerce and Management, Computational Studies, English, Food Science, Mathematics, Media Studies, Physics

Department	**Computational Studies**	Programme: **B.Sc. Data Science and Analytics**						
Semester	**Third**	Course Category Code: **DSC**			*End Semester Exam Type: **TE**			
Course Code	**A20DAT305**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Database Management System**	**4**	**0**	**0**	**4**	**25**	**75**	**100**
Prerequisite	Basic knowledge in Data Base							

Course Objectives	To learn about Database Structure.
	To study about data modeling and relational database
	To study about normalization techniques
	To understand the concept of SQL commands
	To understand the concept of PL/SQL language.

Course Outcome	*After the completion of this course, the students will be able to:*		BT Mapping (Highest Level)
	CO1	Exploring the overall concept regarding Database.	**K2**
	CO2	Design conceptual and relational database.	**K2**
	CO3	Normalize relational database design of an application.	**K3**
	CO4	Know about basic SQL Commands.	**K4**
	CO5	Understand the concept of PL/SQL queries.	**K4**

UNIT-I	**INTRODUCTION**	**Periods: 12**	
Database System Application - Purpose of Database Systems - Types of Databases - View of Data - DBMS vs RDBMS - Data Models - Data Independence - System Structure - Database Architecture			**CO1**
UNIT-II	**DATA MODELLING AND RELATIONAL**	**Periods: 12**	
ER Model concept - Notation for ER Diagram - ER Design Issues - Mapping Constraints - Schema Relation - Keys - Generalization - Specialization - Aggregation - Relationships of Higher Degree - Relational Model Concept - Relational Algebra - Join Operations - Integrity Constraints.			**CO2**
UNIT-III	**NORMALIZATION**	**Periods: 12**	
Functional Dependency - 1 Normal Form - 2 Normal Form - 3 Normal Form - BCNF - 4 Normal Form - 5 Normal Form - Relational Decomposition - Multivalued Dependency - Join Dependency.			**CO3**
UNIT-IV	**SQL**	**Periods: 12**	
SQL Syntax - SQL Data Types - SQL Operators - DDL - DML - TCL - DCL - SQL Database - SQL Table - SQL Select - SQL Clause - SQL Order By - SQL Insert - SQL Update - SQL Delete - SQL Join - SQL Keys - SQL Built In Functions.			**CO4**
UNIT-V	**PL/SQL**	**Periods:12**	
Introduction - Basic Syntax - Data Types - Variables - Constants and Literals - Operators - Conditions - Loops - Strings - Arrays - Procedures - Functions - Cursors - Records - Exceptions - Triggers - Package - Collections - Transactions.			**CO5**

LecturePeriods: 60	**TutorialPeriods: -**	**PracticalPeriods: -**	**TotalPeriods: 60**

TextBooks

1. Abraham Silberschatz, Henry F Korth, S Sudharshan, "Database System Concepts", McGraw-Hill, 7th Edition, 2019.
2. RamezElmasri and ShamkantNavathe, Durvasula V L N Somayajulu, Shyam K Gupta, "Fundamentals of Database Systems", Pearson Education, 2018.
3. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom, "Database Systems The Complete Book" Prentice Hall, 2nd Edition, 2014.

ReferenceBooks

1. Systems", Tata McGraw Hill, 2011.
2. Date CJ, Kannan A, Swamynathan S, "An Raghu Ramakrishna, Johannes Gehrke, "Database Management Systems", McGraw Hill, 3rdEdition,2014.

3. G.K.Gupta,"Database Management Introduction to Database System", Pearson Education, 8thEdition,2006. Paul Beynon-Davies, "Database Systems", Palgrave Macmillan, 3rdEdition, 2003.

Web References

1. https://docs.oracle.com/cd/E11882_01/server.112/e41084/toc.htm MySQL Online Documentation
2. http://dev.mysql.com/doc/
3. http://www.rjspm.com/PDF/BCA-428%20Oracle.pdf
4. https://nptel.ac.in/courses/106/106/106106095/
5. https://www.tutorialspoint.com/dbms/index.htm

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	3	3	2	2	2	2
2	3	3	3	2	3	2	3	2	3
3	2	2	3	3	2	3	2	2	3
4	2	2	2	2	2	2	2	2	2
5	3	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **B.Sc. Data Science and Analytics**						
Semester	**Third**	Course Category Code: **DSC**			*End Semester Exam Type: **TE**			
Course Code	**A20DAT306**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**PYTHON FOR DATA SCIENCE**	**4**	**0**	**0**	**4**	**25**	**75**	**100**
Prerequisite	Basic knowledge in Python							

Course Objectives	To acquire programming skill in core python.
	To learn the basic looping and functions.
	To learn how to design python program and applications.
	To acquire the basic packages.
	To develop the object oriented programming.

Course Outcome	*After the completion of this course, the students will be able to:*	BT Mapping (Highest Level)
CO1	Define the structure and components of a python program.	**K2**
CO2	Illustrate the concepts of Python decision statements.	**K2**
CO3	Use list, tuple, Set and dictionary in python program.	**K3**
CO4	Read / write data from/to files and structure a program using Exceptions and Modules.	**K4**
CO5	Understand the concept of PL/SQL queries.	**K4**

UNIT-I	**INTRODUCTION TO PYTHON PROGRAMMING LANGUAGE**	**Periods: 12**
Introduction to Python Language –- Strengths and Weaknesses – IDLE – Operators – Data Types – Introduction List ,Tuple, Set, Dictionary. String : Slicing, Basic operations on strings- Built in methods		**CO1**
UNIT-II	**DECISION MAKING ,LOOPING & FUNCTIONS**	**Periods: 12**
Control Flow: Introduction – Control Flow and Syntax – Indenting – Relational Expressions – Logical Expressions – If Statement – If else – else if – Nested if. Loop: The while Loop– Nested while Loop – For Loop – Nested for Loop- – Break and continue Functions: parameters – Return values – Local and global scope – Function composition – Recursion and lambda functions.		**CO2**
UNIT-III	**LIST, TUPLE, SET, DICTIONARY AND ARRAYS**	**Periods: 12**
Lists: List operations – List slices – List methods – List loop – Mutability – Aliasing – Cloning lists – List parameters – Tuples: Tuple assignment — Tuple as return value — Advanced list processing — List comprehension — Sets — Dictionaries: Operations and methods — Arrays.		**CO3**
UNIT-IV	**FILES, EXCEPTIONS, MODULES AND PACKAGES**	**Periods: 12**
Built In Functions. Files and Exception: Text Files – Reading and writing files – Format operator – Command line arguments – Errors and exceptions – Handling exceptions – Modules – Standard modules – Packages.		**CO4**
UNIT-V	**DATABASE CONNECTIVITY**	**Periods:12**
Introduction to SQL – Basic SQL Quires - Introduction to GUI with TKinter – ASED based on TKinter.		**CO5**

LecturePeriods: 60	**TutorialPeriods: -**	**PracticalPeriods: -**	**TotalPeriods: 60**

TextBooks

1. Martin C Brown, "Python The Complete Reference", McGraw-Hill Education, 4th Edition,2018
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist,,,,, Shroff/O,,Reilly Publishers, 2nd edition, 2016(http://greenteapress.com/wp/thinkpython/).
3. ReemaThareja, "Python Programming Using Problem Solving Approach", ISBN:9780199480173, Oxford University Press, First edition, 2017.

ReferenceBooks

1. Robert Sedgewick, "Kevin Wayne, Robert Dondero – Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. 2016.

2. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd.,2015.
3. Ben Stephenson, “The Python Workbook A Brief Introduction with Exercises and Solutions”, Springer International Publishing, Switzerland2014.

Web References

1. https://www.learnpython.org/
2. https://pythonprogramming.net/introduction-learn-python-3-tutorials/
3. https://www.codecademy.com/learn/learn-python
4. https://nptel.ac.in/courses/106/106/106106182/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	3	3	2	2	2	2
2	3	3	3	2	3	2	3	2	3
3	2	2	3	3	2	3	2	2	3
4	2	2	2	2	2	2	2	2	2
5	3	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **B.Sc. Data Science and Analytics**						
Semester	**Third**	Course Category Code: **DSE**			*End Semester Exam Type: **TE**			
Course Code	**A20DAE301**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**OPERATING SYSTEMS**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
Prerequisite	Basic knowledge in Windows							

Course Objectives	To grasp a fundamental understanding of Operating Systems.	
	To learn the concepts of process and Multithreaded Programming	
	To understand the concept CPU scheduling and deadlock.	
	To understand memory management concepts in Operating System.	
	Understand the concepts of file systems and System Security.	
Course Outcome	*After the completion of this course, the students will be able to:*	BT Mapping (Highest Level)
	CO1 Define the concepts of operating systems operations.	**K2**
	CO2 Apply the concepts of processes and multithreaded.	**K2**
	CO3 Examine the concept of CPU scheduling and deadlock techniques.	**K3**
	CO4 Simulate the principles of memory management.	**K4**
	CO5 Identify appropriate file system and disk organizations for a variety of computing scenario.	**K4**

UNIT-I	**INTRODUCTION**	**Periods: 12**
Introduction to Operating System - Classification of Operating System - Operating System generation - Operating system operations - Operating system services and systems calls, System programs - Operating system structure - Distributed Systems.		**CO1**
UNIT-II	**PROCESS MANAGEMENT**	**Periods: 12**
Introduction to Process - Process State - Process control block - Process Scheduling - Context Switching - Operations on a Process - Interprocess Communication – Basic concept of Multithreaded Programming.		**CO2**
UNIT-III	**CPU SCHEDULING AND DEADLOCK**	**Periods: 12**
CPU Scheduling: Introduction - Types of CPU Scheduler — Scheduling criteria — Scheduling algorithms - Multiple processor scheduling - Deadlock - Basic Concept of Deadlock- Deadlock Prevention - Deadlock Avoidance - Deadlock - Detection and Recovery.		**CO3**
UNIT-IV	**MEMORY MANAGEMENT**	**Periods: 12**
Basic Concept of Memory Management - Swapping and Overlays - Contiguous Memory Allocation - Paging - Structure of the Page Table - Segmentation - Virtual Memory Management - Demand paging - Page Replacement Algorithms.		**CO4**
UNIT-V	**FILE MANAGEMENT AND SYSTEM SECURITY**	**Periods:12**
File Management - File concept - File operations - Access methods - Directory Structure - File Protection - Allocation Methods – Various Disk Scheduling algorithms. System Security: Security issues – Program Threats - System and Network Threats – Cryptography as a Security Tool.		**CO5**

LecturePeriods: 45	**TutorialPeriods: -**	**PracticalPeriods: -**	**TotalPeriods: 45**

TextBooks

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley &Sons Ninth Edition, 2017.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India, 3rd Edition, 2015.
3. Gary Nutt, "Operating Systems - A Modern Perspective", Pearson Education, Second Edition, 2013.

ReferenceBooks

1. William Stallings, "Operating System", Prentice Hall of India, 6th Edition, 2015.

2. Thomas Anderson and Michael Dahlin, "Operating Systems principles and practice", Wiley, 2nd Edition,2014.
3. Harvey M. Deitel, "Operating Systems", Pearson Education, Third Edition, 2013.
4. Silberschatz, Galvin, "Operating System Concepts", Wiley, Student Edition, 2006.
5. William Stallings, "Operating System: Internals and design Principles", New Edition (7), Pearson Education

Web References

1. https://nptel.ac.in/courses/106108101/
2. http://www.tcyonline.com/tests/operating-system-concepts
3. http://www.galvin.info/history-of-operating-system-concepts-textbook
4. https://www.cse.iitb.ac.in/~mythili/teaching/cs347_autumn2016/index.html
5. https://www.cse.iitk.ac.in/pages/CS330.html

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	3	3	3	3	2	2
2	2	2	3	2	3	2	3	2	3
3	2	2	3	3	2	3	2	2	3
4	2	2	2	2	2	2	2	2	2
5	3	3	3	3	3	3	2	2	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **B.Sc. Data Science and Analytics**						
Semester	**Third**	Course Category Code: **DSE**			*End Semester Exam Type: **TE**			
Course Code	**A20DAE302**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**INFORMATION SECURITY**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
Prerequisite	Basic knowledge in Security and Privacy							

Course Objectives	To provide an understanding of principals.	
	To understand the technologies.	
	To explore the basic ethics.	
	To navigate the risk management.	
	To observe the control strategies.	
Course Outcome	*After the completion of this course, the students will be able to:*	BT Mapping (Highest Level)
	CO1 Understand the history of information security.	**K2**
	CO2 Acquire knowledge about legal and ethical aspects.	**K2**
	CO3 Providing basic approaches in information security.	**K3**
	CO4 Observing the major issues in risk management	**K4**
	CO5 Description of control strategies.	**K4**

UNIT-I	**INTRODUCTION**	**Periods: 12**	
Introduction — History of Information Security — defining security — CNSS Security Model — Components of an Information Security – Approaches to Information Security Implementation – System Development Life Cycle.			**CO1**
UNIT-II	**NEED FOR SECURITY**	**Periods: 12**	
The Need for Security – Introduction - Business Needs First – Threats – Attacks – Secure SoftwareDevelopment			**CO2**
UNIT-III	**ETHICS**	**Periods: 12**	
Legal, Ethical, and Professional Issues in Information Security - Law and Ethics in Information Security - Relevant U.S. Laws - International Laws and Legal Bodies.			**CO3**
UNIT-IV	**RISK MANAGEMENT**	**Periods: 12**	
Ethics and Information Security - Codes of Ethics and Professional Organizations — Risk Management - Introduction - An Overview of Risk Management – Risk Identification – Risk Assessment.			**CO4**
UNIT-V	**CONTROL STRATEGIES**	**Periods:12**	
Risk Control Strategies - Selecting a Risk Control Strategy - Quantitative Versus Qualitative Risk Control Practices - Risk Management Discussion Points			**CO5**

LecturePeriods: 45	**TutorialPeriods: -**	**PracticalPeriods: -**	**TotalPeriods: 45**

TextBooks

1. Michael E. Whitman & Herbert J. Mattord, "Principles of Information Security", Course Technology,Cengage Learning, 4thedition, 2011. (Chapters 1,2,3,4,5)
2. James M. Stewart, Ed Tittel, Mike Chapple „CISSP: Certified Information Systems SecurityProfessional Study Guide", Wiley 2008.
3. Network Security Strategies by Aditya Mukherjee

ReferenceBooks

1. Software-Defined Networking and Securityby Dijiang Huang, Ankur Chowdhary, SandeepPisharody
2. Security Engineering A Guide to Building Dependable Distributed Systemsby Ross Anderson
3. Jan Killmeyer Tudor, " Information Security Architecture: An Integrated Approach to Security in theOrganization," CRC Press,

September 2000
4. Thomas R. Peltier, " Information Security Risk Analysis," Auerbach Publications, January 2001
5. Arnaud de Borchgrave, Frank J. Cilluffo, Sharon L. Cardash, " Cyber Threats and InformationSecurity : Meeting the 21st Century Challenge," Center for Strategic & Int'l Studies, May 2001

Web References

1. https://www.sitesbay.com/cyber-security/index
2. https://www.baynetworks.com/security/
3. https://bayshorenetworks.com/
4. https://www.baycollege.edu/academics/programs/computer-network-systems-security.php

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	3	3	2	3	3	2
2	3	3	3	2	3	2	3	2	3
3	2	2	3	3	2	3	2	2	3
4	3	2	2	2	2	2	2	2	2
5	3	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **B.Sc. Data Science and Analytics**						
Semester	**Third**	Course Category Code: **DSE**			*End Semester Exam Type: **TE**			
Course Code	**A20DAE303**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**COMPUTER NETWORKS**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
Prerequisite	Basic knowledge in Python using Data Science							

Course Objectives	To understand the basic concepts of Data Communications.	
	To understand the functionalities and components involved in the physical layer.	
	To learn the basic concepts of data link layer services and network layer communication protocols	
	To understand various load characteristics and network traffic conditions, decide the transport protocols to be used.	
	To analyze and compare the different protocols available in the application layer.	
Course Outcome	*After the completion of this course, the students will be able to:*	BT Mapping (Highest Level)
	CO1 Analyze the network components and network standards.	**K2**
	CO2 Determine the Physical layer functionalities, Transmission modes and media**.**	**K2**
	CO3 Analyze the Error correction and detection techniques and determine the proper usage of IP address, subnetmask and default gateway in a routed network.	**K3**
	CO4 Describe, analyze and compare different protocols in transport layer**.**	**K4**
	CO5 Analyze the functional working of different protocols of application layer**.**	**K4**

UNIT-I	**DATA COMMUNICATIONS**	**Periods: 12**
Overview of Data Communications – Networks and its types – Network topologies. Transmission technologies: Signal Transmission – Digital signaling – Analog Signaling. Networks Models: Protocol Layering – OSI reference model – TCP/IP Protocol suite.		**CO1**
UNIT-II	**PHYSICAL LAYER**	**Periods: 12**
Physical layer functionalities — Analog to digital conversion using PCM, Transmission Modes: Parallel– Serial. Transmission Media: Guided and unguided media. Switching: Introduction. Circuit Switching and Packet switching Networks.		**CO2**
UNIT-III	**DATA LINK LAYER AND NETWORK LAYER**	**Periods: 12**
Data link layer services – Error Detection and Correction – Sliding window protocols – Network devices. Network layer functionality. Routing Algorithms: Shortest path algorithm, Distance vector routing – Sub netting – Network layer protocols: IPV4, IPV6.		**CO3**
UNIT-IV	**TRANSPORT & SESSION LAYER**	**Periods: 12**
The Transport Services - Connection management – Transport layer Congestion Control – Transport Layer Protocols: User Datagram Protocol (UDP) – Transmission Control Protocol (TCP). – Establishment of Session Layer		**CO4**
UNIT-V	**PRESENTATION & APPLICATION LAYER**	**Periods:12**
Data representation and Comparison of presentation layer - Application Layer Protocols – HTTP – FTP – Telnet – Email (SMTP, POP3, IMAP, MIME) – DNS – Need for Cryptography and Network Security – Firewalls.		**CO5**

LecturePeriods: 45	**TutorialPeriods: -**	**PracticalPeriods: -**	**TotalPeriods: 45**

TextBooks

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.
2. Tanenbaum,A.S. and David J. Wetherall "Computer Networks", 5th ed., Prentice Hall, 2011
3. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach: International Edition", Pearson Education, Sixth edition, 2013.

ReferenceBooks

1. Larry L. Peterson and Bruce S. Davie, “Computer Networks- A system approach”, 5th edition, Elsevier, 2012.
2. Stallings, W., “Data and Computer Communications”, 10th Ed., Prentice Hall Int. Ed., 2013.
3. DayanandAmbawade, Deven Shah, "Advanced Compter Networks", Dreamtech Press, 1st edition, 2011.
4. PallapamanviV , "Data Communications and Computer Networks", PHI, 4th edition, 2014.
5. Andre S.Tanenbaum, "Computer Networks", Pearson Publication, 4th Edition, 2018.

Web References

1. https://www.geeksforgeeks.org/last-minute-notes-computer-network/
2. https://lecturenotes.in
3. https://www.cse.iitk.ac.in/users/dheeraj/cs425/
4. https://nptel.ac.in/courses/106/105/106105183/
5. https://nptel.ac.in/courses/106/105/106105081/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	3	3	2	3	3	2
2	3	3	3	2	3	2	3	2	3
3	3	2	3	3	2	3	2	2	3
4	2	2	2	2	2	2	3	2	2
5	3	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Mathematics**	Programme: **B.Sc. Data Science and Analytics**						
Semester	**Third**	Course Category Code: **IDC**			*End Semester Exam Type: **TE**			
Course Code	**A20MAD303**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**LINEAR ALGEBRA**	**3**	**1**	**0**	**4**	**25**	**75**	**100**
Prerequisite	Basic knowledge in Mathematics							

Course Objectives	To provide an understanding on matrices and determinants
	To make them apply the applications of matrices.
	To provide an understanding on Vector Space and Subspace.
	To understand the concept of Linear dependence - Linear Independence.
	To understand the concept of inner product space.

Course Outcome	*After the completion of this course, the students will be able to:*		BT Mapping (Highest Level)
	CO1	Demonstrate an understanding of applications of Matrices and Determinants.	**K2**
	CO2	Analyse the applications of matrices and determinants in business and economics.	**K2**
	CO3	Define basic concepts of vector spaces and linear transformations	**K3**
	CO4	Determine basis and dimension of vector space	**K4**
	CO5	Construct orthonormal basis from a given basis.	**K4**

UNIT-I	**MATRICES AND DETERMINANTS**	**Periods: 12**	
Matrices: Definition and Types -Transpose of a Matrix - Determinants of a Matrix. - Inverse of a Matrix. Rank of the matrix -- Characteristic equation - Eigen values and Eigen vectors of a real matrix -Properties of Eigen values and Eigenvectors.			**CO1**
UNIT-II	**APPLICATIONS OF MATRICES**	**Periods: 12**	
Matrix Representation of Data – Matrix Addition and Subtraction - Scalar Multiplication. Methods of Solving non-homogenous system of linear equations: Matrix Inverse method - Determinants method - Gauss Jordon - Elimination method.			**CO2**
UNIT-III	**VECTOR SPACES**	**Periods: 12**	
Definition and Example – Subspaces – Linear transformation – Span of a set..			**CO3**
UNIT-IV	**BASIS AND DIMENSION**	**Periods: 12**	
Linear dependence - Linear Independence – Basis and Dimension –Rank and Nullity.			**CO4**
UNIT-V	**MATRIX AND INNER PRODUCT SPACE**	**Periods:12**	
Matrix of a linear transformation -Inner product space – Definition and examples – Orthogonality – Gram Schmidt orthogonalization process			**CO5**

LecturePeriods: 45	**TutorialPeriods: 15**	**PracticalPeriods: -**	**TotalPeriods: 60**

TextBooks

1. I. N. Hersttein, Topics in Algebra, Second Edition, John Wiley & Sons(Asia), 1975.
2. S.Lipschutz (2005) Beginning Linear Algebra, Tata McGraw Hill Edition, New Delhi.
3. J.B.Fraleigh (1986) A First Course in Algebra (3rd Edition) Addison Wesley. Mass. (Indian Print).

ReferenceBooks

1. Arumugam S and Thangapandi Isaac A, Modern Algebra, SciTech Publications (India) Ltd, Chennai, Edition 2012.
2. M.L.Santiago. (2002) Modern Algebra, Tata McGraw Hill, New Delhi.
3. Surjeet Singh and QaziZameeruddin. (1982) Modern Algebra.Vikas Publishing House Pvt. Ltd., New Delhi, 1982

Web References

1. https://webspace.maths.qmul.ac.uk/p.j.cameron/notes/linalg.pdf

2. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf
3. https://www.math.ucdavis.edu/~linear/linear.pdf
4. https://www.cs.cornell.edu/courses/cs485/2006sp/LinAlg_Complete.pdf
5. https://minireference.com/static/tutorials/linear_algebra_in_4_pages.pdf

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	3	3	2	2	2	2
2	3	3	3	2	3	2	3	2	3
3	2	2	3	3	2	3	2	2	3
4	2	2	2	2	2	2	2	2	2
5	3	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **B.Sc. Data Science and Analytics**						
Semester	**Third**	CourseCategoryCode: **DSE**			*End SemesterExamType:**LE**			
CourseCode	**A20DAL305**	Periods/Week			Credit	MaximumMarks		
		L	T	P	C	IM	ESE	TM
Course Name	**RDBMS Lab**	**0**	**0**	**4**	**2**	**50**	**50**	**100**
Prerequisite	Basic Knowledge in C programming							

Course Objectives	To implement Basic SQL commands.
	To implement Basic SQL commands.
	To learn and understand DDL & DML.
	To execute PL/SQL programs.
	To execute PL/SQL programs.

Course Outcome	*Aftercompletion ofthecourse,thestudentswillbeableto*	BT Mapping (Highest Level)
CO1	Implement SQL commands.	**K2**
CO2	Implement SQL commands.	**K2**
CO3	Implement DDL and DML programs.	**K3**
CO4	Understand PL/SQL programs.	**K4**
CO5	Understand PL/SQL programs.	**K4**

List of Experiment

1. Perform the following: Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)
2. Implement the concept of Keys.
3. Perform the following: Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database.
4. For a given set of relation schemes, create tables and perform the following Simple Queries, Aggregate functions, Queries with group by and having clause,
5. Create a table and perform Date Functions, String Functions and Math Functions.
6. Create a table and perform Join Queries- Inner Join, Outer Join Subqueries- With IN clause, With EXISTS clause.
7. Implement the concept of Procedure in PL/SQL.
8. Implement the concept of Functions in PL/SQL.
9. Implement the concept of Cursor in PL/SQL.
10. Implement the concept of Trigger in PL/SQL.

LecturePeriods: -	**TutorialPeriods:-**	**PracticalPeriods:30**	**TotalPeriods:30**

TextBooks

1. 1.RamezElmasri and ShamkantNavathe, Durvasula V L N Somayajulu, Shyam K Gupta, “Fundamentals of Database Systems”, Pearson Education, 2018.
2. 2. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom, “Database Systems The Complete Book” Prentice Hall, 2nd Edition, 2014.
3. G.K.Gupta,"Database Management Introduction to Database System”, Pearson Education, 8thEdition,2006. Paul Beynon-Davies, “Database Systems”, Palgrave Macmillan, 3rdEdition, 2003.

ReferenceBooks

1. Ramez Elmasri, Durvasul VLN Somyazulu, Shamkant B Navathe, Shyam K Gupta, Fundamentals of Database Systems, Pearson Education, 7thEdition, 2016.

2. Raghu Ramakrishna, Johannes Gehrke, Database Management Systems, McGraw Hill,3rdEdition, 2014.
3. Abraham Silberschatz, Henry F Korth, S Sudharshan, Database System Concepts", McGraw-Hill Indian Edition, 7th Edition, 2013.
4. Kuhn,"RMAN Recipes for Oracle Database", Apress, 2nd Edition,2013.
5. Date CJ, Kannan A, Swamynathan S, An Introduction to Database System, Pearson Education, the Edition, 2006.

Web References

1. https://docs.oracle.com/cd/E11882_01/server.112/e41084/toc.htm MySQL Online Documentation
2. http://dev.mysql.com/doc/
3. http://www.rjspm.com/PDF/BCA-428%20Oracle.pdf

*LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	2	3	2	3	3	2	2	2
2	3	3	3	2	3	2	3	2
3	2	2	3	3	2	3	2	2
4	2	2	2	2	2	2	2	2
5	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Internal Marks			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance	50	100
Marks	30	10	10		

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **B.Sc. Data Science and Analytics**						
Semester	**Third**	CourseCategoryCode: **DSC**			*End SemesterExamType:**LE**			
CourseCode	**A20DAL306**	Periods/Week			Credit	MaximumMarks		
		L	T	P	C	IM	ESE	TM
Course Name	**Python for Data Science Lab**	**0**	**0**	**4**	**2**	**50**	**50**	**100**
Prerequisite	Basic Knowledge in python programming							

Course Objectives	To practice the fundamental programming methodologies in the Python programming language.		
	Toapplylogicalskillsforproblemsolvingusingcontrolstructuresandarrays.		
	To implement, test and debug programs that use different data types, variables, strings, arrays, pointers and structures.		
	To design basic networking styles and provides recursive solution to problems.		
	To understand the miscellaneous aspects of networking.		
Course Outcome	*Aftercompletion ofthecourse,thestudentswillbeableto*		BT Mapping (Highest Level)
	CO1	Apply and practice logical formulations to solve simple problems leading to specific applications.	**K2**
	CO2	Develop python programs for simple applications making use of basic constructs, arrays and strings.	**K2**
	CO3	Develop the networking programs using IP.	**K3**
	CO4	Design the module for Client and Server.	**K4**
	CO5	Construct the network specializations.	**K4**

List of Experiment

1. Finding Area of a Triangle, Rectangle and Square.
2. Checking whether a given number is Prime or not.
3. Implementation of User defined functions.
4. Various operations on List and Tuples.
5. Various operations on string and dictionary.
6. Various types of inheritance using python..
7. Detect Network Changes Automatically.
8. Log Management with Python and Network Monitoring with Cacti.
9. NetFlow and sFlow Based Monitoring.
10. Alerting and Email Notification.
11. Testing DHCP Server and Client.
12. Test Network Speed with Python.

LecturePeriods: -	**TutorialPeriods:-**	**PracticalPeriods:30**	**TotalPeriods:30**

TextBooks

ReferenceBooks

1. Stallings, W., “Data and Computer Communications”, 10th Ed., Prentice Hall Int. Ed., 2013.
2. John V Guttag, “Introduction to Computation and Programming Using Python‟”, MIT Press, Revised and expanded Edition, 2013.

Web References

1. https://pythonprogramming.net/introduction-learn-python-3-tutorials/
2. ttps://www2.mvcc.edu/users/faculty/jfiore/CP/labs/LaboratoryManualForComputerProgramming.pdf
3. https://www.codecademy.com/learn/learn-python
4. https://www.geeksforgeeks.org/last-minute-notes-computer-network/
5. https://lecturenotes.in

*LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	2	2	3	3	2	3	2
2	2	3	3	2	3	3	3	2
3	3	2	3	3	2	3	2	2
4	2	2	2	2	2	2	2	2
5	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Internal Marks			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance	50	100
Marks	30	10	10		

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**			Programme: **B.Sc DATA SCIENCE AND ANALYTICS**				
Semester	**THIRD**			Course Category Code: **SEC**		*End Semester Exam Type: **TE**		
Course Code	**A20DAS303**			Periods / Week		Credit	Maximum Marks	
				L	T	P	C	CAM	ESE	TM
Course Name	**CLOUD COMPUTING USING LINUX**			**2**	**0**	**0**	**2**	**100**	**-**	**00**
Prerequisite	**Basic knowledge in cloud computing**									
Course Outcome	*After completion of the course, the students will be able to*							BT Mapping (Highest Level)		
	CO1	Explain the core concepts of the cloud computing paradigm						**K2**		
	CO2	Apply fundamental concepts in cloud infrastructures.						**K2**		
	CO3	Illustrate the fundamental concepts of cloud storage such as Amazon S3 and HDFS.						**K3**		
	CO4	Explain the Utility Computing concepts						**K3**		
	CO5	Understand the Amazon Web Services concepts						**K4**		
UNIT-I	**Introduction**						**Periods: 6**			
Introduction to Cloud Computing- The Evolution of Cloud Computing – Hardware Evolution – Internet Software Evolution – Server Virtualization - Federation in the Cloud - Presence in the Cloud.										**CO1**
UNIT-II	**SERVICES**						**Periods: 6**			
Web Services Deliver from the Cloud – Communication-as-a-Service – Infrastructure-as-a-Service – Monitoring-as-a-Service – Platform-as-a-Service – Software-as-a-Service – Building Cloud Network.										**CO2**
UNIT-III	**Cloud Infrastructure**						**Periods: 6**			
Introduction - Advancing towards a Utility Model – Evolving IT infrastructure – Evolving Software Applications – Continuum of Utilities- Standards and Working Groups – Standards - Bodies and Working Groups – Service Oriented Architecture – Business Process Execution Language										**CO3**
UNIT-IV	**Utility Computing**						**Periods: 6**			
Utility Computing Technology – Virtualization – Hyper Threading – Blade Servers - Automated Provisioning - Policy Based Automation – Application Management – Evaluating Utility Management Technology										**CO4**
UNIT-V	**Amazon Web Services**						**Periods: 6**			
Identity and Access Management(IAM) – Elastic Compute Cloud(EC2) – EC2 Instance Storage – S3 – Database & Analytics..										**CO5**
Lecture Periods: 30		**Tutorial Periods: -**		**Practical Periods: -**			**Total Periods: 30**			

Text Books

1. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing", McGraw Hill Education

(India) Private Limited Publications, First Reprint, 2013. Units I, II, III

2. Amir M. Rahmani , Pasi Liljeberg, Preden, Axel Jantsch, " Computing in the Internet of Things - Intelligence at the Edge", Springer International Publishing, 2018. Units IV, V Books for Reference

Reference Books

1. Michael Miller, "Cloud Computing Web Based Applications that change the way you work and collaborate online", Pearson Education, 2009.

2. Evangelos Markakis, George Mastorakis, Constandinos X, Mavromoustakis and Evangelos Pallis, "Cloud and Fog Computing in 5G Mobile Networks: Emerging advances and Applications", The Institution of Engineering and Technology, 2017.

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	3	3	2	2	2	2
2	3	3	3	2	3	2	3	2	3
3	2	2	3	3	2	3	2	2	3
4	2	2	2	2	2	2	2	2	2
5	3	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	80		-	10	10	-	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE
(An Autonomous Institution)
(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi & Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry - 605 107

SCHOOL OF ARTS AND SCIENCE

Department of Computational Studies

B.Sc. Data Science and Analytics

ACADEMIC

REGULATIONS2023(R-2023)

CURRICULUM AND SYLLABI

ANNEXURE - II

PROGRAMME SPECIFIC OUTCOMES (PO'S)

DEPARTMENT OF COMPUTATIONAL STUDIES

PO'S	STATEMENTS
PO1	It provides an ability to apply knowledge of Mathematics, Computer software and hardware in practice. It enhances not only comprehensive understanding of the theory but practical also.
PO2	The program prepares the young professionals in wide range of areas such as Digital logics and computer architecture, Algorithms, Programming, Networking, Software Engineering, Information Security, Web Designing, Micro-processors and micro-controllers
PO3	The program equips to demonstrate the capabilities required to apply cross-functional business knowledge and technologies in solving real-world problems and to demonstrate use of appropriate techniques to effectively manage business challenges
PO4	curriculum is divided based on various streams specialization that is needed in the IT Domain. Hence a student can specialize himself/herself in a particular stream.
PO5	It provides an opportunity to prepare for the competitive examination and also getting admission to Higher Education and Government organizations.
PO6	Become employable in various IT companies as programmer, system engineer, software tester, junior programmer, web developer, system administrator, software developer etc.

PROGRAMMING SPECIFIC OUTCOMES(PSOs)

B.Sc(DATA SCIENCE AND ANALYTICS)

PSO	STATEMENTS
PSO1	Develop competence in the application of statistical techniques at a high level
POS2	Provide practical skills of applied data science and business analytics
POS3	Demonstrate an understanding on the concepts and principles related to their area of study and be able to communicate ideas and findings in a reliable and structured way.

STRUCTUREFORUNDERGRADUATEPROGRAMME

S.No	CourseCategory	Break down Of Credits
1	Language Modern Indian Language (MIL)	6
2	English (ENG)	6
3	Discipline Specific Core Courses(DSC)	81
4	DisciplineSpecificElectiveCourses (DSE)	12
5	Inter-DisciplinaryCourses(IDC)	16
6	SkillEnhancementCourses(SEC)	12
7	EmployabilityEnhancementCourses(EEC*)	-
8	AbilityEnhancementCompulsoryCourses(AECC)	4
9	OpenElective(OE)	4
10	ExtensionActivity(EA)	0
11	In-Plant Training (IT)	3
12	Online Certification Course (OCC)	-
	Total	144

SCHEMEOFCREDITDISTRIBUTION –SUMMARY

S. No	CourseCategory	CreditsperSemester						TotalCredits
		I	II	III	IV	V	VI	
1	Language Modern Indian Language (MIL)	3	3	-	-	-	-	6
2	English (ENG)	3	3	-	-	-	-	6
3	Discipline Specific Core Courses(DSC)	12	12	12	12	16	17	81
4	DisciplineSpecificElectiveCourses (DSE)	-	-	3	3	3	3	12
5	Inter-DisciplinaryCourses(IDC)	4	4	4	4	-	-	16
6	SkillEnhancementCourses(SEC)	2	2	2	2	2	2	12
7	EmployabilityEnhancementCourses(EEC*)	-	-	-	-	-	-	-
8	AbilityEnhancement Courses(AEC)	1	1	1	1	-	-	4
9	OpenElective(OE)	-	-	2	2	-	-	4
10	ExtensionActivity(EA)	-	-	-	-	-	-	0
11	In-Plant Training	-	-	3	-	-	-	3
12	Online Certification Course (OCC)	-	-	-	-	-	-	-
	Total	25	25	24	27	21	20	144

**** EECwillnotbeincludedforthecomputationof"TotalofCredits"aswellas"CGPA"***

SEMESTER–I										
S.No	CourseCode	CourseTitle	Category	Periods			Credits	Max.Marks		
				L	T	P		CPM	ESM	Total
Theory										
1	A23TAT101C / A23FRT101C	Tamil-I / French – I *	MIL	3	0	0	3	25	75	100
2	A23GET101C	General English–I	ENG	3	0	0	3	25	75	100
3	A23DAT101D	C Programming	DSC	4	0	0	4	25	75	100
4	A23DAT102D	Data Structure and Algorithms Using C	DSC	4	0	0	4	25	75	100
5	A23DAD101D	Applied Probability and Statistics	IDC	3	1	0	4	25	75	100
Practical										
6	A23DAL101D	C Programming Lab	DSC	0	0	4	2	50	50	100
7	A23DAL102D	Data Structure and Algorithms Using C Lab	DSC	0	0	4	2	50	50	100
SkillEnhancement Course										
8	A23ENSA02C	Soft Skill	SEC	0	0	4	2	100	0	100
AbilityEnhancement Course										
9	A23AETA01C	Public Administration	AEC	2	0	0	1	100	0	100
EmploymentEnhancementCourse										
10	A23DAC101D	Microsoft Excel Analytics	EEC	0	0	4	0	100	0	100
							25	**525**	**475**	**1000**

SEMESTER–II										
S.No	Course Code	CourseTitle	Category	Periods			Credits	Max.Marks		
				L	T	P		CPM	ESM	Total
Theory										
1	A23TAT202C / A23FRT202C	TAMIL-II / FRENCH II	MIL	3	0	0	3	25	75	100
2	A23GET202C	GENERAL ENGLISH- II	ENG	3	0	0	3	25	75	100
3	A23DAT203D	C++ Programming	DSC	4	0	0	4	25	75	100
4	A23DAT204D	Introduction to Big Data	DSC	4	0	0	4	25	75	100
5	A23DAD202D	Statistics for Data Science	IDC	3	1	0	4	25	75	100
Practical										
6	A23DAL203D	C++ Programming Lab	DSC	0	0	4	2	50	50	100
7	A23DAL204D	Big Data Analytics Lab	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A23ENSA01C	COMMUNICATION SKILL LAB	SEC	0	0	4	2	100	0	100
Ability Enhancement Course										
9	A23AETA02C	ENVIRONMENTAL STUDIES	AEC	2	0	0	1	100	0	100
Extension Activities										
10	A23AETA02C	NATIONAL SERVICE SCHEME	EA	0	0	4	0	100	0	100
EmploymentEnhancementCourse										
11	A23DAC202D	Data Analysis using Spark Tool	EEC	0	0	4	0	100	0	100
							25	**625**	**475**	**1100**

SEMESTER–III										
S.No	Course Code	CourseTitle	Category	Periods			Credits	Max.Marks		
				L	T	P		CPM	ESM	Total
Theory										
1	A23DAT305D	Database Management System	DSC	4	0	0	4	25	75	100
2	A23DAT306D	Python for Data Science	DSC	4	0	0	4	25	75	100
3	A23CPEXXXX	DISCIPLINE SPECIFIC ELECTIVE- I	DSE	3	0	0	3	25	75	100
4	A23DAD303D	Linear Algebra	IDC	3	1	0	4	25	75	100
5	A23XXO30XX	OPEN ELECTIVE-I	OE	2	0	0	2	25	75	100
Practical										
6	A23DAL305D	RDBMS Lab	DSC	0	0	4	2	50	50	100
7	A23DAL306D	Python for Data Science Lab	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
8	A23MAS01C	QUANTITATIVE APTITUDE AND LOGICAL REASONNING	SEC	0	0	4	2	100	0	100
Ability Enhancement Course										
9	A23AETA03C	INDIAN CONSTUTION	AEC	2	0	0	1	100	0	100
Employment Enhancement Course										
10	A23DAC303D	Social Network Analysis	EEC	0	0	4	0	100	0	100
							24	**525**	**475**	**1000**

SEMESTER–IV										
S.No	Course Code	CourseTitle	Category	Periods			Credits	Max.Marks		
				L	T	P		CPM	ESM	Total
Theory										
1	A23DAT407D	No SQL DATABASES	DSC	4	0	0	4	25	75	100
2	A23CPT408D	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	DSC	4	0	0	4	25	75	100
3	A23CPEXXX	DISCIPLINE SPECIFIC ELECTIVE –II	IDC	3	1	0	4	25	75	100
4	A23DAD404D	HEALTH ANALYTICS	DSE	3	0	0	3	25	75	100
5	A23XXO40XX	OPEN ELECTIVE-II	OE	2	0	0	2	25	75	100
Practical										
6	A23DAL407D	No SQL DATABASES - LAB	DSC	0	0	4	2	50	50	100
7	A23DAL408D	ARTIFICIAL INTELLIGENCE (PROLOG) LAB	DSC	0	0	4	2	50	50	100
SkillEnhancement Course										
8	A23DAS404	AWS Web Services	SEC	0	0	4	2	100	0	100
Ability Enhancement Course										
9	A23AETA04C	VALUE EDUCATION	AEC	2	0	0	1	100	0	100
Employment Enhancement Course										
10	A23DAC404	SAS TOOL	EEC	0	0	4	0	100	0	100
In-Plant Training										
11	A23CPN401D	INTERNSHIP	DSC	0	0	2	3	100	0	100
							27	**625**	**475**	**1100**

SEMESTER–V										
S.No	Course Code	CourseTitle	Category	Periods			Credits	Max.Marks		
				L	T	P		CPM	ESM	Total
Theory										
1	A23DAT509D	INTRODUCTION TO MACHINE LEARNING	DSC	4	1	0	4	25	75	100
2	A23DAT510D	IoT CLOUD AND DATA ANALYTICS	DSC	4	1	0	4	25	75	100
3	A23DAT511D	SOFTWARE ENGINEERING MANAGEMENT	DSC	4	0	0	4	25	75	100
4	A23CPEXXXX	DISCIPLINE SPECIFIC ELECTIVE –III	DSE	3	0	0	3	25	75	100
Practical										
5	A23DAL509D	MACHINE LEARNING LAB	DSC	0	0	4	2	50	50	100
6	A23DAP501D	MINI PROJECT	DSC	0	0	4	2	50	50	100
Skill Enhancement Course										
7	A23DAS505	R PROGRAMMING LAB	SEC	0	0	4	2	100	0	100
Online CertificationCourse										
8	A23CPM501D	NPTEL\ SWAYAM	OCC	0	0	4	0	100	0	100
							21	**400**	**400**	**800**

SEMESTER–VI										
S.No	Course Code	CourseTitle	Category	Periods			Credits	Max.Marks		
				L	T	P		CPM	ESM	Total
Theory										
1	A23CDAT612D	DEEP LEARNING	DSC	4	0	0	4	25	75	100
2	A23DAT613D	DATA HANDLING AND VISUALIZATION	DSC	4	0	0	4	25	75	100
3	A23DAT614D	TEXT AND IMAGE ANALYTICS	DSC	3	0	0	4	25	75	100
4	A23CPEXXXX	DISCIPLINE SPECIFIC ELECTIVE –IV	DSE	3	0	0	3	25	75	100
Practical										
5	A23DAP602C	PROJECT WORK & VIVA-VOCE	DSC	0	0	4	5	40	60	100
Skill Enhancement Course										
6	A23DAS606D	RESEARCH METHODOLOGY	SEC	0	0	4	2	100	0	100
							22	**265**	**335**	**600**

Department	Tamil		Programme:B.Sc DATA SCIENCE AND ANALYTICS						
Semester	First		Course Category Code: MIL			*End Semester Exam Type: TE			
CourseCode	A23TAT101C		Periods/Week			Credit	Maximum Marks		
			L	T	P	C	CAM	ESE	TM
Course Name	TAMIL – I		3	-	-	3	25	75	100
(Common to B.Sc., BBA., B.COM., BCA., B.COM CS.,)									
Prerequisite	+2 வகுப்பில் தமிழை ஒரு பாடமாக கொண்டிருக்க வேண்டும்.								
Course Objectives	• செவ்விலக்கிய தன்மை கொண்ட தமிழ்மொழியின் சிறப்பினை எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.								
	• இரண்டாயிரம் ஆண்டுகாலத் தமிழின் தொன்மையையும் வரலாற்றையும் அதன் விழுமியங்களையும் பண்பாட்டையும் எடுத்துரைப்பதாக இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.								
	• தமிழ் இலக்கியம் உள்ளடக்கத்திலும், வடிவத்திலும் பெற்றமாற்றங்கள், அதன் சிந்தனைகள், அடையாளங்கள் ஆகியவற்றைக் காலந்தோறும் எழுதப்பட்ட இக்கியங்களின் வழியாகக் கூறுவதற்கு இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.								
	• வாழ்வியல் சிந்தனைகள், ஒழுக்கவியல் கோட்பாடுகள், சமத்துவம், சூழலியல் எனப் பல கூறுகளை மாணவர்களுக்கு எடுத்துரைக்கும் விதத்தில் இப்பாடத்திட்டம் உருவாக்கப்பட்டுள்ளது.								
	• சிந்தனை ஆற்றலைப் பெருக்குவதற்குத் தாய்மொழியின் பங்களிப்பினை உணர்த்த இப்பாடத்திட்டம் அமைக்கப்பட்டுள்ளது.								
Course Outcome	On completion of the course, the students will be able to							BT Mapping (Highest Level)	
	CO1	• இலக்கியங்கள் உணர்த்தும் வாழ்வியல் நெறிமுறைகளைப் பேணிநடத்தல்.						K3	
	CO2	• நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.						K3	
	CO3	• தகவல் தெடர்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்தல்.						K3	
	CO4	• தாய்மொழியின் சிறப்பை அறிதல்.						K3	
	CO5	• இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.						K3	

UNIT-I	இக்கால இலக்கியம்- மரபுக்கவிதைகள்- புதுக்கவிதைகள்- சிறுகதை	Periods: 09	
• மரபுக்கவிதைகள் - பாரதியார்-வெள்ளிப் பனிமலையின் மீதுலாவுவோம்... (13 பாடல்கள்)- பாரதிதாசன்-புரட்சிக்கவி (பேரன்புக் கொண்டவரே...முதல் - கவிஞனுக்கும் காதலிக்கும் மீட்சிதந்தார் வரை) தங்கப்பா - பனிப்பாறை நுனிகள் - வாழ்க்கை ஓவியம். புதுக்கவிதைகள்-அப்துல் ரகுமான் - வடலூரும் வார்தாவும் - யுகி - உயிர்ப்பு (இயற்கையின் எலும்பு முறிப்பு) – சிறுகதை -ஆர்.சூடாமணி - சாம்பலுக்குள்.			CO1
UNIT-II	நாடகம் -உரைநடை- நாவல்	Periods: 09	
• நாடகம் - பிரபஞ்சன் - முட்டை - உரைநடை - இரா.வேங்கடாசலபதி - அந்தக் காலத்தில் காப்பி இல்லை –நாவல் - இரா.முருகவேள் - மிளிர்கல்			CO2
UNIT-III	பக்தி இலக்கியம்-சைவம்-வைணவம்-கிறித்துவம்-இஸ்லாம்	Periods: 09	
• பக்தி இலக்கியம் -சைவம்-திருஞானசம்பந்தா - முதல் திருமுறை - தோடுடையசெவியன்...பாடல் மட்டும் - திருநாவுக்கரசர் - நான்காம் திருமுறை - கூற்றாயினவாறு...பாடல் மட்டும்- சுந்தரர் - ஏழாம் திருமுறை - பித்தாபிறைசூடி...பாடல் மட்டும் - மாணிக்கவாசகர் - திருவாசகம் - புல்லாய் புழுவாய்...பாடல் மட்டும் - திருமூலர் - திருமந்திரம் - ஆர்க்கும் இடுமின்...பாடல் மட்டும் - காரைக்காலம்மையார்-திருவிரட்டை மணிமாலை - அன்பால் அடைவதெவ்வாறு...பாடல் மட்டும். வைணவம் - பொய்கையாழ்வார் - வையம் தகளியாய்...பாடல் மட்டும் -பூதத்தாழ்வார் - அன்பே தகளியாய்...பாடல் மட்டும் - பேயாழ்வார் - திருக்கண்டேன் பொன்மேனி...பாடல் மட்டும் - நம்மாழ்வார் - திருவாய்மொழி - உளன் எனின்...பாடல் மட்டும் - பெரியாழ்வார் - பெரியாழ்வார் திருமொழி - வாக்குத் தூய்மை...பாடல் மட்டும் -ஆண்டாள - நாச்சியார் திருமொழி– என்பு உருகி இனவேல்...பாடல் மட்டும் - கிறித்துவம் - இரட்சண்ய மனோகரம் - ஆவிக்குறுவெந்துயர்...முதல் உனையல்லது பற்றுதோ வரை - இஸ்லாம் - குணங்குடி மஸ்தான் சாகிபு– ரகுமான் கண்ணி -அடைத்த மனக்கோட்டை....முதல் என்கண் வரை			CO3
UNIT-IV	சிற்றிலக்கியம் - முத்தொள்ளாயிரம் - உலா- கலம்பகம்- பள்ளு- இடைக்காலப் புலவர்கள்	Periods: 09	
• சிற்றிலக்கியம் - முத்தொள்ளாயிரம் - 1.வேரறுகைபம்பிச் சுரையாய்...2.மாலை விலைபகர்வார்... 3.என்னை உரையல் ...எனத் தொடங்கும் பாடல்கள் மட்டும் - உலா - குலோத்துங்கசோழன் உலா - தாளை அரவிந்தச் சாதp...முதல் நிலவென்றாள் வரை - கலம்பகம் -திருவரங்கக்கலம்பகம் - உருமாறிப் பலபிறப்பும்...முதல் ஆடீர் வாசல் வரை - பள்ளு - முக்கூடற்பள்ளு - நாட்டுவளம் - கறைபட்டுள்ளது...எனத்தொடங்கும் பாடல் மட்டும் -தூது-அழகர் கிள்ளைவிடு தூது - இன்சொல்லை.....முதல் உபதேசமாக உரைப்பாய் வரை • இடைக்காலப் புலவர்கள் - இராமலிங்க அடிகள் - மஹாதேவமாலை–படித்தேன்...முதல் பொய் உலகியல் வரை – வீரமாமுனிவர் திருக்காவலூர்க் கலம்பகம் - தழை–போதவிழ்ப;...எனத்தொடங்கும் பாடல் மட்டும் - மு.முஹம்மதுதஹா - ∴.கௌதுமுஹியிய்யித்தீன்			CO4

R.D. Mohamed Nagar

பிள்ளைத் தமிழ் - வயிறுபுடைக்க உண்கின்றீர்...பாடல் மட்டும்.		
UNIT-V	**மொழிப்பயிற்சி-இலக்கிய வரலாறு**	**Periods: 09**
• மொழிப்பயிற்சி - 1.வலிமிகும் இடங்கள் ,வலிமிகா இடங்கள்.- 2.அகரவரிசைப்படுத்துதல்.-3.நேர்காணல் - இலக்கிய வரலாறு - இக்கால இலக்கியம், பக்தி இலக்கியம், சிற்றிலக்கியம் குறித்த பாடப்பகுதியை ஒட்டியது.		**CO5**

Lecture Periods: 45	**Tutorial Periods:-**	**PracticalPeriods:-**	**TotalPeriods:45**

Text Books

- பாரதியார் – பாரதியார் கவிதைகள், முனைடந நுனவைழைெ, ீரடிடளைாநன துரநெ 2இ 2020.
- சிவகுமார். எஸ்., - கொங்குதேர் வாழ்க்கை, பாடல் தொகுப்பு நூல் - தொகுதி -1 யுனைடெட் ரைட்டர்ஸ், சென்னை -86. முதற்பதிப்பு 2003.
- சூடாமணி.ஆர். - தனிமைத் தளிர், தேர்ந்தெடுத்த சிறுகதைகள், காலச்சுவடு பதிப்பகம், முதல் பதிப்பு: செப்டம்பர் 2013.
- பிரபஞ்சன் - ஜீவநதி (நாடகங்கள்) – கவிதா பப்ளிகே'ன், 8, மாசிலாமணி தெரு, பாண்டிபஜார், தி.நகர், சென்னை -600 017
- முருகவேள். இரா., - மிளிர்கல், ஐம்பொழில் பதிப்பகம், திருப்பூர், இரண்டாம் பதிப்பு, 2014.

Reference Books

- வல்லிக்கண்ணன், புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும், ஸ்ரீசெண்பகா பதிப்பகம், ஜனவரி,1, 2020.
- சிற்பிபாலசுப்பிரமணியம் மற்றும் நீலபத்மநாபன் (ப.ஆசி.) – புதிய தமிழ் இலக்கிய வரலாறு, தொகுதி-1,2,3, சாகித்திய அகாதெமி, புதுடெல்லி, 2013.
- பாக்கியமேரி, வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு (செம்மை மற்றும் விரிவுப் பதிப்பு), பாரிநிலையம். சென்னை,
- ஆனந்தன், முனைவர்.சு., - தமிழ் இலக்கிய வரலாறு, கண்மணி பதிப்பகம், திருச்சி-2. இருபத்தி மூன்றாம் பதிப்பு– 2015.
- பரந்தாமனார், அ.கி., - நல்ல தமிழ் எழுத வேண்டுமா, பாரி நிலையம், சென்னை, 1998.

Web References

1. http://www.tamilvu.org – 2.http://www.tamilweb.com – 3.http://www.tamilkodal.com – 4. www.store.tamillexican.com
5.www.kala.tamilforu.blogspot.com 6.www.noolagam.com

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO 3
1	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3
3	3	2	3	3	2	3	3	3
4	2	3	1	3	2	2	2	3
5	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**French**			Programme: **B.Sc DATA SCIENCE AND ANALYTICS**				
Semester	**FIRST**			Course Category Code: **MIL**			*End Semester Exam Type **TE**	
Course Code	**A23FRT101C**			Periods/Week			Credit	Maximum Marks
				L	T	P	C	CAM	ESE	TM
Course Name	**FRENCH I**			**3**	**0**	**0**	**3**	**25**	**75**	**100**
(Common to B.A.., B.SC., and BCA Branches)										
Prerequisite	Basic knowledge of French language									
Course Objective	To introduce the basics of French language to the students									
	To enable the students to read, understand and write simple sentences									
	To help them to grasp the fundamentals of French grammar									
	To make the students to formulate correct phrases									
	To introduce them French and Francophone countries and their cultures									
Course Outcomes	***On completion of the course, the students will be able to***									BT Mapping (Highest Level)
	CO1	have a general understanding of the language								**K3**
	CO2	analyze and interpret simple phrases written in French								**K3**
	CO3	have the basics of French grammar								**K3**
	CO4	communicate and ask basic questions in French language								**K3**
	CO5	appreciate the diversity and multiplicity of French and Francophone world								**K3**

UNIT-I	**S'introduire**	**Periods:09**	
1. Le francais, les Francais, la France 2. Je m'appelle Elise, et vous ? 3. Saluer, se presenter, remercier 4. Vous dansez ? D'accord 5. Interroger quelqu'un et donner des informations			**CO1**
UNIT-II	**Demander des questions sur quelqu'un**	**Periods:09**	
1. Monica, Yokiko et compagnie 2. Dire ce qu'on l'aime 3. Les voisins de Sophie 4. Demander des informations sur quelqu'un			**CO2**
UNIT-III	**Expliquer quelque chose**	**Periods:09**	
1. Tu vas au Luxembourg ? 2. Dire où on va, dire d'où on vient 3. Nous venons pour l'inscription 4. A vélo, en train, en avion… 5. Expliquer un itinéraire, proposer quelque chose			**CO3**
UNIT-IV	**Poser des questions et commander**	**Periods:09**	
1. Pardon monsieur, le BHV s'il vous plait 2. Au marché 3. Acheter quelque chose, demander le prix 4. On déjeune ici ? 5. Aller au restaurant, comprendre un menu			**CO4**
UNIT-V	**Inviter et proposer quelque chose**	**Periods:09**	
1. On va chez ma copine ? 2. Proposer quelque chose 3. Demander et donner des informations sur quelqu'un 4. Chez Susana 5. Etre invité chez quelqu'un			**CO5**

Lecture Periods: 45	**Tutorial Periods:**	**Practical Periods:-**	**Total Periods:45**

Text Books

2. Sylvie Poisson Quinton and Michèle Maheo, *Festival 1 Méthode de Français*, CLE editions, 2009
3. Nathalie Hirschsprung and Tony Tricot, *Cosmopolite 1*, Hachette editions, 2017
4. Caroline Veltcheff and Stanley Hilton, *Preparation du Delf A1*, Hachette editions, 2011

Reference Books

1. Régine Mérieux and Yves Loiseau, *Latitudes 1*, Didier editions, 2017
2. Annie Berthet and Emmanuelle Daili, *Alter Ego + A1*, Hachette editions, 2012
3. Bruno Giradeau, *Réussir le Delf A1*, Didier editions, 2019
4. Richard Lescure, *Delf A1 150 Activités,* Langers and CLE, 2005
5. Manisha Verma, *La grammaire élémentaire française*, Notion Press, 2010

Web References

2. https://www.tv5monde.com
3. https://www.rfi.fr
4. https://www.lemonde.fr
5. https://www.frenchpodcasts.com
6. https://www.coursera.org

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (PO)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	3	3	3	3	3	3
2	3	3	3	3	2	3	3	3
3	3	3	3	3	3	3	2	3
4	2	3	2	2	3	3	3	3
5	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**ENGLISH**	Programme: **B.Sc DATA SCIENCE AND ANALYTICS**						
Semester	**FIRST**	Course Category Code: **ENG**			End Semester Exam Type: **TE**			
Course Code	**A23GET101C**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**GENERAL ENGLISH - I**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
(Common to B.A.., B.SC., AND BCA Branches)								
Prerequisite	Basic part-two language and knowledge gained from Grammar and Vocabulary							

Course Objectives	To recognize the rhythms, metrics and other aspects of Literature	
	To read a variety of texts critically and proficiently	
	To enable the students to enjoy the flair of literature through the work of great writer	
	To make the students to know the functions of basic grammar	
	To enable them understanding the intrinsic nuances of writing in English language	

Course Outcomes	***On completion of the course, the students will be able to***	BT Mapping (Highest Level)
	CO1 comprehend and discuss the various facets of selected poems	**K3**
	CO2 analyze and interpret texts written in English	**K3**
	CO3 read drama with graduate-level interpretive and analytical proficiency	**K3**
	CO4 improve the fluency and formation of grammatically correct sentence	**K3**
	CO5 enhance the writing skills for specific purposes	**K3**

UNIT-I	**POETRY**	**Periods: 09**
6. Rudyard Kipling – *IF* 7. William Wordsworth – *Daffodils* 8. Percy Bysshe Shelley – *Ozymandias* 9. William Ernest Henley – *Invictus* 10. Rabindranath Tagore – *On the Nature of Love*		**CO1**
UNIT-II	**PROSE**	**Periods: 09**
5. Bertrand Russell – *The Road to Happiness* 6. Charles Lamb – *A Dissertation upon Roast Pig*		**CO2**
UNIT-III	**SHORT STORIES**	**Periods: 09**
6. Oscar Wilde – *The Devoted Friend* 7. R. K. Narayan – *God and the Cobbler*		**CO3**
UNIT-IV	**DRAMA**	**Periods: 09**
6. H H Munro – *The Death Trap* 7. J.M. Synge – *Riders to the Sea*		**CO4**
UNIT-V	**GRAMMAR AND COMPOSITION**	**Periods: 09**
6. Parts of Speech 7. Subject-Verb Agreement 8. Letter Writing 9. Essay Writing		**CO5**

Lecture Periods: 45	**Tutorial Periods: 0**	**Practical Periods: -**	**Total Periods: 45**

Text Books

5. Narayan, R.K, *Malgudi days*, Indian Thought Publication, 2019
6. Synge John Millington, *Riders to the Sea*, Sahitya Sarowar Publisher, 2022
7. P. C. Wren, H. Martin, *High School Wren and Martin English Grammar and Composition*, S. Chand & Company Pvt. Ltd, 2022.

Reference Books

1. Lamb, Charles, *Selected Prose*, Penguin Classics Publication, 2nd Edition, 2013.
2. S.C. Gupta, *English Grammar & Composition Very Useful for All Competitive Examinations*, Arihant Publications,

2014.
3. Saki, H. H. Munro, F. Carruthers Gould, *The Complete Works of Saki: Illustrated Edition: Novels, Short Stories, Plays, Sketches & Historical Works, including Reginald, The Chronicles of Clovis, ... The Death-Trap*, The Westminster Alice Kindle Edition, e-artnow, 2018.
4. J.M. Synge, S.C. Narula. *Riders to the Sea*. Surjeet Publication. 2018.
5. S.C.Gupta. *A Handbook for Letter Writing*. Arihant Publication. 2016.

Web References

7. https://www.englishcharity.com/of-love-by-francis-bacon-explanation/
8. https://www.gradesaver.com/charles-lamb-essays/study-guide/summary-a-dissertation-upon-roast-pig
9. https://allpoetry.com/On-The-Nature-Of-Love
10. http://sittingbee.com/god-and-the-cobbler-r-k-narayan/
11. https://www.toppr.com/guides/essays/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3
1	3	3	3	3	3	3	3	3
2	3	3	3	3	3	3	3	3
3	3	2	3	3	2	3	3	3
4	2	3	2	1	2	2	3	2
5	3	3	3	3	3	3	3	3

Correlation Level:

High	Moderate	Low
3	2	1

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme **: B.Sc DATA SCIENCE AND ANALYTICS**						
Semester	**First**	Course Category Code: **CC**			*End Semester Exam Type: **TE**			
Course Code	**A20DAT101**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**C PROGRAMMING**	**4**	**0**	**0**	**4**	**25**	**75**	**100**
(Common to _____ Branches)								
Prerequisite								

Course Outcome		*After completion of the course, the students will be able to*	BT Mapping (Highest Level)
	CO1	Develop simple applications in C using different data types.	**K3**
	CO2	Develop programs involving decision structures, loops, arrays and functions.	**K3**
	CO3	Classify the difference between call by value and call by reference	**K3**
	CO4	Design and develop programs using Pointers to understand the dynamics of memory.	**K3**
	CO5	Understand the File management Operations and perform different file operations.	**K3**

UNIT-I	**INTRODUCTION TO C**	**Periods: 12**	
Introduction to C Programming – Algorithm – Pseudo code – Flow chart – Basic Structure of C Program – Keywords and Identifiers – Data Types – Variables – Constants – Operators – Arithmetic Expressions – Type conversions – Input and Output operations.			**CO1**
UNIT-II	**DECISION MAKING AND BRANCHING**	**Periods: 12**	
Decision Making Statements: if statement, if-else, nested if-else statement, else if ladder and Switch Statement – Looping: While Loop, for loop, do-while loop – break and continue statement, go to statement.			**CO2**
UNIT-III	**ARRAYS AND FUNCTIONS**	**Periods: 12**	
Introduction to Arrays – Declaration of Array – one-dimensional array, two – dimensional array, multidimensional array – Functions: Introduction to Functions – Function Definition – Category of Functions –call by value, call by reference – Storage classes - auto, register, static, extern, arrays to functions.			**CO3**
UNIT-IV	**STRING AND POINTERS**	**Periods: 12**	
Strings – Declaring Strings – Reading and Writing strings – String Handling Functions – Pointers – Initialization of Pointer – Pointers Expressions – Pointer Arithmetic – pointers and arrays – array of pointers – pointer as function arguments – pointers to functions – Const Pointer – sizeof() operator.			**CO4**
UNIT-V	**STRUCTURES,UNIONS AND FILE MANAGEMENT**	**Periods: 12**	
C Structure – Structure Initialization – Arrays of Structures – Nested Structure – Structures and Functions –Unions – Concept of a file – File Management – input /output operations on files – Random access to file – Error handling in files.			**CO5**

Lecture Periods: 45	**Tutorial Periods: 15**	**Practical Periods: -**	**Total Periods: 60**

Text Books

1. Balagurusamy. E, "Programming in ANSI C", Tata McGraw Hill, 8th Edition, 2019.
2. Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, 4th Edition, New Delhi, 2015.
3. Herbert Schildt," C: The Complete Reference", McGraw Hill, 4th Edition, 2014.
4. Yashwant Kanetkar, "Let us C", BPB Publications, 16th Edition, 2017.
5. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
6. The C Programming Language by Brian Kernighan and Dennis Ritchie 2nd edition.

Reference Books

1. Ashok N Kamthane, “Computer Programming”, Pearson education, Second Impression, 2012.
2. VikasVerma, “A Workbook on C “, Cengage Learning, 2rd Edition, 2012.
3. Dr. P. Rizwan Ahmed, “Office Automation”, Margham Publications, 2016.
4. P.Visu, R.Srinivasan and S.Koteeswaran, “Fundamentals of Computing and Programming”, 4th Edition, SriKrishna Publications, 2012.
5. PradipDev, ManasGhoush, “Programming in C”, 2rd Edition, Oxford University Press, 2011.

Web References

1. https://www.programiz.com/c-programming
2. https://www.geeksforgeeks.org/c-language-set-1-introduction/
3. https://www.tutorialspoint.com/cprogramming
4. https://www.assignment2do.wordpress.com/.../solution-programming-in-ansi-c
5. https://nptel.ac.in/courses/106/104/106104128/
6. https://www.coursera.org/courses?query=c%20programming
7. https://www.udemy.com/course/c-programming-for-beginners-/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	3	3	3	2	3	3
2	3	3	3	3	3	3	3	2	3
3	3	2	3	3	2	3	3	3	3
4	2	3	2	3	2	2	2	2	2
5	3	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**			Programme: **B.Sc. Data Science and Analytics**				
Semester	**First**			Course Category Code: **DSC**		*End Semester Exam Type: **TE**		
Course Code	**A23DAT102D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Data Structure and Algorithms Using C**	**4**	**0**	**0**	**4**	**25**	**75**	**100**
Prerequisite	Basic knowledge in Algorithms in Data Structures							
Course Objectives	To introduce the primary data structures and algorithms for their associated operations.							
	To understand the applications of data structures.							
	To learn the implementation issues of the data structures introduced.							
	To understand the concepts of searching and sorting Techniques.							
	To understand the basic concepts of stack, queue, List, Trees and Graphs							

Course Outcome	*After the completion of this course, the students will be able to:*	BT Mapping (Highest Level)
CO1	Analyze algorithms based on time and space complexity	**K2**
CO2	Implement and Apply linear data structures to solve simple problems.	**K2**
CO3	Represent and Apply Non-linear data structures to solve complex problems.	**K3**
CO4	Use Divide and conquer method to solve various problems.	**K4**
CO5	Use Greedy techniques to solve real time problem.	**K4**

UNIT-I	**INTRODUCTION TO DATA STRUCTURES AND ALGORITHMS**	**Periods: 12**
Types of data structures - Abstract Data Type (ADT) - Analysis of algorithm - Time and space complexity - Recurrence relation - Asymptotic notation. Sorting - Searching.		**CO1**
UNIT-II	**LIST ADT**	**Periods: 12**
Static and dynamic Representation – Types -Single Linked List-Doubly Linked List – Circular Linked List – Operations and Applications.		**CO2**
UNIT-III	**STACK AND QUEUE ADT**	**Periods: 12**
Static and arrays – Operations - Applications- Balancing Parenthesis- Evaluation of Arithmetic Expression- Infix to Postfix conversion. Queue ADT: Static and dynamic Representation – Linear queue – circular queue.		**CO3**
UNIT-IV	**TREE ADT AND GRAPH ADT**	**Periods: 12**
Representation – Types - Binary Tree - Threaded Binary Tree - Binary Search Tree - Operation and Application. Graph: Representation – Types -Graph Traversal – Depth First Search - Breadth First Search –Application - Minimum cost spanning tree - Topological Sorting.		**CO4**
UNIT-V	**ALGORITHM DESIGN TECHNIQUES**	**Periods:12**
Divide and Conquer - General method – Finding Minimum Maximum – Merge Sorting - Greedy Method: General Method – knapsack problem – Single source shortest path – Dijkstras: Job sequencing.		**CO5**

LecturePeriods: 60	**TutorialPeriods: -**	**PracticalPeriods: -**	**TotalPeriods: 60**

TextBooks

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 4th Edition, Pearson Education, 2013.
2. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", Second Edition, The Orient Blackswan,2019.
3. A Puntambekar, "Data Structures", 3rd Revised Edition, Technical Publications Pune, 2008.

ReferenceBooks

1. ReemaThareja, "Data Structures Using C", Edition, Oxford University Press, 2017.

2. Gilles Brassard, “Fundamentals of Algorithms”, Pearson Education, 2015.
3. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, Reprint, 2006.
4. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, 2rd Edition, University Press, 2008.

Web References

1. https://www.geeksforgeeks.org/
2. http://opendatastructures.org/
3. https://nptel.ac.in/courses/106/106/106106127

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	2	3	2	3	2	3	2	3	2
2	2	3	3	2	3	3	3	2	3
3	3	2	3	3	2	3	2	3	2
4	2	2	2	2	2	2	2	2	2
5	3	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Mathematics**	Programme: **B.Sc. Data Science and Analytics**						
Semester	**First**	Course Category Code: **IDC**			*End Semester Exam Type: **TE**			
Course Code	**A23MAD104D**	Periods/Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Applied Probability and Statistics**	**3**	**1**	**0**	**4**	**25**	**75**	**100**

Prerequisite	Basic knowledge in Probability and Statistics
Course Objectives	Know The concepts of discrete and continuous random variables.
	Learn the application of probability distributions.
	Understand the concept of correlation and regression.
	Apply the testing of hypothesis.
	Study the Small Sampling and its Applications.

Course Outcome	*After the completion of this course, the students will be able to:*	BT Mapping (Highest Level)
	CO1 Solve the problems under Random variables.	**K2**
	CO2 Apply the various distributions in real life problems	**K2**
	CO3 Find the correlation between the variables and find the regression lines.	**K3**
	CO4 Solve the various real life problems using large sampling.	**K4**
	CO5 Apply the various test under small sampling.	**K4**

UNIT-I	**RANDOM VARIABLES**	**Periods: 12**
Random Variables: Discrete - continuous random variables - probability mass - probability density and cumulative distribution functions - Mathematical expectation – Variance-Problems.		**CO1**
UNIT-II	**PROBABILITY DISTRIBUTIONS(DISCRETE AND CONTINIOUS)**	**Periods: 12**
Binomial, Poisson, Normal, exponential and Gamma distributions -their Properties.-Problems(Excluded Derivatesof Mean,Variance,MGF for all distributions)		**CO2**
UNIT-III	**CORRELATION & REGRESSION**	**Periods: 12**
Coefficient of correlation- the rank correlation.-Regression Coefficient-The lines of regression.		**CO3**
UNIT-IV	**LARGE SAMPLES**	**Periods: 12**
Testing of hypothesis: Null hypothesis, Alternate hypothesis, Type I& Type II errors-Level of significance. Large sample tests: (i) Test of Equality of means of two samples, equality of sample mean and population mean (cases of known variance & unknown variance, equal and unequal variances) (ii) Tests of significance of difference between sample S.D and population S.D. (iii) Tests of significance difference between sample proportion and population proportion, difference between two sample proportions.		**CO4**
UNIT-V	**STRUCTURES,UNIONS AND FILE MANAGEMENT**	**Periods:12**
Student t-distribution, Test of significance sample mean and population mean, difference between means of two small samples. Snedecor's F- distribution . Test of equality of two population variances. Chi-square distribution, Chi-square test of goodness of fit-Problems only(Excluded Derivations of all tests)		**CO5**

LecturePeriods: 45	**TutorialPeriods: -15**	**PracticalPeriods: -**	**TotalPeriods: 60**

TextBooks

1. an,—Probability,statistics and Random Processes, ‖TataMc.Graw-Hill CompanyLtd.,3rdEdition,2008. T.Veeraraj Publishing

2. Probability and Statistics for Engineers by Richard Arnold Johnson, Irwin Miller and John E. Freund, New Delhi,Prentice Hall.
3. Probability and Statistics for Engineers and Sciences by Jay L. Devore, Cengage Learning.

ReferenceBooks

1. Ervin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Fundamentals of Mathematical Statistics by S.C. Guptha &V.K. Kapoor, S. Chand
3. Introduction to Probability and Statistics for Engineers and Scientists by Sheldon M. Ross, Academic Press.

Web References

1. https://www.efunda.com/math/math_home/math.cfm
2. https://www.ocw.mit.edu/resources/#Mathematics.
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	3	3	2	3	2	3	2	3	2
2	2	3	2	2	3	3	3	2	3
3	3	2	3	2	2	3	2	3	2
4	2	2	2	2	2	2	2	2	2
5	3	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	10		5	5	5	75	100

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **B.Sc. Data Science and Analytics**						
Semester	**First**	CourseCategoryCode: **DSE**			*End SemesterExamType:**LE**			
CourseCode	**A23DAL101D**	Periods/Week			Credit	MaximumMarks		
		L	T	P	C	IM	ESE	TM
Course Name	**C Programming Lab**	**0**	**0**	**4**	**2**	**50**	**50**	**100**
Prerequisite	Basic Knowledge in C programming							

Course Objectives	To familiarize with C programming constructs.
	To develop programs in C using basic constructs.
	To develop programs in C using arrays.
	To develop applications in C using strings, pointers, functions.
	To develop applications in C using structures.
	To develop applications in C using file processing.

Course Outcome	*Aftercompletion ofthecourse,thestudentswillbeableto*	BT Mapping (Highest Level)
CO1	Apply the various basic programming constructs.	**K2**
CO2	Develop C programs for simple applications making use of basic constructs, arrays and strings.	**K2**
CO3	Develop C programs involving function.	**K3**
CO4	Design applications using pointers, and structure.	**K4**
CO5	Apply concept of file management.	**K4**

List of Experiment

1. Write a program to initialize, assignment & printing variables of different data types.
2. Write a program to demonstrate arithmetic operators and logical operators.
3. Write a Program to read marks of students in five subjects and print results using decision statements.
4. Write a program to print prime numbers in the given range.
5. Write a program to print minimum and maximum elements using 1D array.
6. Write a program to perform matrix addition and matrix subtraction using 2D array.
7. Write a program to verify the given string is palindrome or not.
8. Write a program to find product of two numbers using functions with arguments, with return type.
9. Develop program to illustrate pointers and Structure.
10. Develop programs for file operations.

LecturePeriods: -	**TutorialPeriods:-**	**PracticalPeriods:30**	**TotalPeriods:30**

TextBooks

1. Balagurusamy. E, “Programming in ANSI C”, Tata McGraw Hill, 8th Edition, 2019.
2. Byron S Gottfried and Jitendar Kumar Chhabra, “Programming with C”, Tata McGraw Hill Publishing Company,4th Edition, New Delhi, 2015.
3. Herbert Schildt,” C: The Complete Reference”, McGraw Hill, 4th Edition, 2014.
4. Yashwant Kanetkar, “Let us C”, BPB Publications, 16th Edition, 2017.

ReferenceBooks

1. Zed A Shaw,” Learn C the Hard Way: Practical Exercises on the Computational Subjects You KeepAvoiding(Like C)”, Addison Wesley, 2016.
2. Anita Goel and Ajay Mittal, ”Computer Fundamentals and programming in C”, 1st Edition, PearsonEducation ,2011.
3. Yashwanth Kanethkar, “Let us C”, 13th Edition, BPB Publications, 2008.
4. Maureen Sprankle, Jim Hubbard,” Problem Solving and Programming Concepts,” 9th Edition, Pearson,2011.
5. E. Balaguruswamy, “Programming in ANSI C”, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0

Web References	
1.	https://alison.com/course/introduction-to-c-programming
2.	https://www.geeksforgeeks.org/c-programming-language/
3.	http://cad-lab.github.io/cadlab_data/files/1993_prog_in_c.pdf
4.	https://www.tenouk.com/clabworksheet/clabworksheet.html
5.	https://fresh2refresh.com/c-programming/
6.	http://www.skiet.org/downloads/cprogrammingquestion.pdf

*LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	2	3	2	2	2	3
2	2	2	3	2	3	2	3	2
3	3	2	3	3	2	3	2	3
4	2	2	2	2	2	2	2	2
5	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Internal Marks			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance	50	100
Marks	30	10	10		

* Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**	Programme: **B.Sc. (Data Science and Analytics)**						
Semester	**First**	CourseCategoryCode: **DSE**			*End SemesterExamType:**LE**			
CourseCode	**A23DAL102D**	Periods/Week			Credit	MaximumMarks		
		L	T	P	C	IM	ESE	TM
Course Name	**Data Structure and Algorithms using C Lab**	**0**	**0**	**4**	**2**	**50**	**50**	**100**
Prerequisite	Basic Knowledge in C programming							

Course Objectives	Ability to identify the appropriate data structure for given problem.	
	To learn about the concepts of Searching and Sorting.	
	Identify suitable data structure to solve various computing problems	
	To study about the linear and non-linear Data Structures.	
	To learn about the concepts of ADT including List, stack and Queues	
Course Outcome	*Aftercompletion ofthecourse,thestudentswillbeableto*	BT Mapping (Highest Level)
	CO1 Use appropriate data structure for given problem.	**K2**
	CO2 Solve the given problem by identifying the appropriate Data Structure.	**K2**
	CO3 Develop C programs involving function.	**K3**
	CO4 Design applications using pointers, and structure.	**K4**
	CO5 Apply concept of file management.	**K4**

List of Experiment

1. .Write programs for implementing Linear searching techniques to arrange a list.
2. Write programs for implementing Bubble sort sorting techniques to arrange a list.
3. Design and implement Stack and its operations using List.
4. Design and implement Queue and its operations using List.
5. Uses Stack operations to convert infix expression into postfix expression.
6. Write programs for the following operations on Single Linked List.

(i) Creation (ii) insertion (iii) deletion (iv) traversal

7. Write programs for the following operations on Circular Linked List.

(i) Creation (ii) insertion (iii) deletion (iv) traversal

8. Write a Python program to implement Stack using linked list.
9. Write a program to perform the following operation using binary search tree:(i). Create a binary search tree.

(ii). Traverse the above binary search tree recursively in pre-order, post-order and in-order.

(iii). Count the number of nodes in the binary search tree.

10. Write programs to implement the following graph traversal algorithms using depth first search.

LecturePeriods: -	**TutorialPeriods:-**	**PracticalPeriods:30**	**TotalPeriods:30**

TextBooks

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 4th Edition, Pearson Education, 2013.
2. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", Second Edition, The Orient Blackswan,2019.
3. A Puntambekar, "Data Structures", 3rd Revised Edition, Technical Publications Pune, 2008.

ReferenceBooks

1. Rance D. Necaise, "Data Structures and Algorithms using Python", Wiley, John Wiley &Sons,INC., 2011.
2. Benjamin Baka, David Julian, "Python Data Structures and Algorithms", Packt Publishing Ltd.,2017,

3. Ellis Horowitz, SartajSahni, ”Fundamentals of Data Structures”, Illustrated Edition, Computer Science Press, 2018.

Web References

1. https://docs.python.org/3/tutorial/datastructures.html
2. http://interactivepython.org/runestone/static/pythonds/index.html
3. http://www.tutorialspoint.com/data_structures_algorithms
4. http://www.geeksforgeeks.org/data-structures/

*LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)					Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
1	3	3	2	3	3	3	2	2
2	2	3	3	2	3	3	3	2
3	3	2	3	3	2	3	2	3
4	2	2	2	2	2	2	2	2
5	3	3	3	3	3	3	3	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Internal Marks			End Semester Examination (ESE) Marks	Total Marks
	Model Exam	Record	Attendance	50	100
Marks	30	10	10		

***** Application oriented / Problem solving / Design / Analytical in content beyond the syllabus

Department	**Computational Studies**			Programme: **B.Sc Data Science and Analytics**				
Semester	**I**			Course Category Code: **SEC**		*End Semester Exam Type: **TE**		
Course Code	**A23ENSA02C**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Soft Skills**	**0**	**0**	**4**	**2**	**100**	**-**	**100**
	(Common to Science Branches)							

Prerequisite	Basic grammar knowledge
Course Objectives	**The main objectives of the course are,**
	To train students in Soft skills in order to enable them to be professionally competent
	To facilitate the students for Goal setting and Goal Achieving skills
	To enrich the sense of social responsibility and accountability of the students
	To help the students to train them for Stress Management and Time Management
	To train the students to work with team environment and Creative thinking

Course Outcome	**On completion of the course, the students will be able to**		BT Mapping (Highest Level)
	CO1	enhance the Soft skills and compete professionally	**K3**
	CO2	achieve Goal setting and Goal Achieving skills	**K3**
	CO3	improve their social responsibility and accountability skills	**K6**
	CO4	enrich Stress Management and Time Management	**K6**
	CO5	Demonstrate the quality of a Team ship and Creative thinking	**K2**

UNIT-I	**POSITIVE ATTITUDE**	**Periods: 06**
Skills-Personal Skills: Knowing Oneself/Self-Discovery-Confidence Building- Defining Strengths of Attitude -formation of attitudes - psychological factors - the power of positive attitude -the benefits of positive attitude – developing positive attitude - negative attitude – the causes of negative attitude -the consequences of negative attitude -how to change negative attitude		**CO1**
UNIT-II	**GOAL SETTING**	**Periods: 06**
Introduction - importance of goal setting - goal definition – types of goals -what exactly goal setting why people don't set goals -how to choose the right goals - SMART GOALS -Career goals -benefits of career goal setting -goal setting tips		**CO2**
UNIT-III	**STRESS AND TIME MANAGEMENT**	**Periods: 06**
Definition of Stress management - types of stress - causes of stress - stress management and reduction techniques Definition of Time management - Setting goals, planning – prioritizing - setting deadlines - multi-tasking - practicing self-discipline - overcoming procrastination		**CO3**
UNIT-IV	**TEAMWORK SKILLS**	**Periods: 06**
Communication as Social Construction - Dynamics of professional Group communication - Group and Team - Team Building Process - Managing conflict and appreciating/respecting differences - Decision making & effective negotiation - Types of teams - Understanding, Identity and nurturing sensitivity (in terms of gender, orientation, language)		**CO4**
UNIT-V	**PROBLEM SOLVING THROUGH CREATIVE THINKING**	**Periods: 06**
Thinking Creatively-Improving Perceptions -Creative thinking as an essential skill - Techniques of creative thinking (such as brainstorming, lateral thinking, mind mapping, rich pictures, role play) - Practical problem solving through creative thinking - Case Study		**CO5**

Lecture Periods: -	**Tutorial Periods: -**	**Practical Periods: 30**	**Total Periods:30**

Text Books ((Minimum 2 and maximum 3 – Latest editions to be given)

1. Sabina Pillai, Agna Fernandez, *Soft Skills and Employability Skills*, Cambridge University Press, 2017.
2. Jeff Butterfield, *Soft Skills for Everyone*, Cengage India Private Limited, 2nd Edition, 2020.
3. Alex K, *Soft Skills*, S Chand & Company, 1st Edition, 2014

Reference Books (Minimum 5– Latest editions to be given)

1. Barun Mitra, *Personality Development and Soft Skills 2*, Oxford University Press, 2016
2. Prashant Sharma, *Soft Skills 3rd Edition: Personality Development for Life Success*, BPB Publications, 2021.
3. Ghosh, B.N, *Managing Soft Skills for Personality Development*, Tata McGraw Education Publication, 1st Edition, 2012.

Web References (Minimum 5)

1. https://www.mindtools.com/a5ykiuq/personal-goal-setting
2. https://www.healthlinkbc.ca/health-topics/stress-management-managing-your-time
3. https://www.herzing.edu/blog/7-important-teamwork-skills-you-need-school-and-your-career

* TE – Theory Exam, LE – Lab Exam

COs/POs/PSOs Mapping

COs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	3	-	-	3	3	2	3	2	2	3
2	-	-	-	-	-	3	-	-	2	3	3	2	3	2	3
3	-	-	-	-	-	2	-	-	3	3	3	3	2	2	3
4	-	-	-	-	-	2	-	-	3	2	3	2	3	2	3
5	-	-	-	-	-	2	-	-	2	2	2	1	2	1	3

Correlation Level: 1 - Low, 2 - Medium, 3 – High

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Assignment*	Attendance		
Marks	80		-	10	10	-	100

Department	**Computational Studies**			Programme: **B.Sc Data Science and Analytics**				
Semester	**I**			Course Category Code: **AEC**		*End Semester Exam Type: **TE**		
Course Code	**A23AETA01C**	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CAM	ESE	TM
Course Name	**Public Administration**	**2**	**0**	**0**	**1**	**100**	**-**	**100**
	(Common to all science Branches)							

Prerequisite	Basic Knowledge in Public administration		
Course Objectives	**The main objectives of the course are,**		
	To introduce the elements of public administration		
	To help the students obtain a suitable conceptual perspective of public administration		
	To introduce them the growth of institution devices to meet the need of changing times		
	To instill and emphasize the need of ethical seriousness in contemporary Indian Public Administration		
Course Outcome	**On completion of the course, the students will be able to**		BT Mapping (Highest Level)
	CO1	Understand the concepts and evolution of Public Administration.	**K2**
	CO2	Be aware of what is happening in the Public Administration in the country.	**K1**
	CO3	Explain the Territory Administration in the State and the Centre.	**K2**
	CO4	Appreciate emerging issues in Indian Public Administration.	**K6**
	CO5		

UNIT-I	INTRODUCTION TO PUBLIC ADMINISTRATION	**Periods: 07**	
Meaning, nature and Scope of Public Administration and its relationship with other disciplines- Evolution of Public Administration as a discipline –– Woodrow Wilson, Henry Fayol , Max Weber and others - Evolution of Public Administration in India – Arthashastra – Colonial Administration upto 1947			**CO1**
UNIT-II	PUBLIC ADMINISTRATION IN INDIA	**Periods: 08**	
Enactment of Indian Constitution - Union Government – The Cabinet – Central Secretariat -– All India Services – Training of Civil Servants – UPSC – NitiAyog – Statutory Bodies: The Central Vigilance Commission – CBI - National Human Rights Commission – National Women's Commission –CAG			**CO2**
UNIT-III	STATE AND UNION TERRITORY ADMINISTRATION	**Periods: 08**	
Differential Administrative systems in Union Territories compared to States Organization of Secretariat: - Position of Chief Secretary, Functions and Structure of Departments, Directorates – Ministry of Home Affairs supervision of Union Territory Administration – Position of Lt.Governor in UT – Government of UnionTerritories Act 1963 – Changing trend in UT Administration in Puducherry and Andaman and Nicobar Island.			**CO3**
UNIT-IV	EMERGING ISSUES IN INDIAN PUBLIC ADMINISTRATION	**Periods: 07**	

Changing Role of District Collector – Civil Servants – Politicians relationship – Citizens Charter - Public Grievance Redressal mechanisms –– The RTI Act 2005 – Social Auditing and Decentralization – Public Private partnership.	**CO4**

Lecture Periods: 30	**Tutorial Periods: -**	**Practical Periods: -**	**Total Periods:30**

Text Books

1. Avasthi and Maheswari, "Public Administration", Lakshmi Narain Agarwal, 1st Edition, 2016.
2. Ramesh K.Arora, "Indian Public Administration: Institutions and Issues", New Age InternationalPublishers, 3rdEdition, 2012.
3. RumkiBasu, "Public Administration: Concept and Theories", Sterling, 1st Edition, 2013.

Reference Books

1. Siuli Sarkar, "Public Administration in India", Prentice Hall of India, 2nd Edition, 2018.
2. M. Laxmikanth, "Public Administration", McGraw Hill Education, 1st Edition, 2011.
3. R.B.Jain, "Public Administration in India, 21st Century Challenges for Good Governance",Deep andDeepPublications, 2002.

Web References

1. http://cic.gov.in/
2. http://www.mha.nic.in/
3. http://rti.gov.in/
4. http://www.cvc.nic.in/

* TE – Theory Exam, LE – Lab Exam

Evaluation Method

Assessment	Continuous Assessment Marks (CAM)					End Semester Examination (ESE) Marks	Total Marks
	CAT 1	CAT 2	Model Exam	Report	Attendance		
Marks	70		-	20	10	-	100