

ANNEXURE - II



S M V E C
SCHOOL OF ARTS AND SCIENCE
 (Approved by Government of Puducherry, Affiliated to Pondicherry University)
 Madagadipet, Puducherry - 605107



PG DEPARTMENT OF COMPUTATIONAL STUDIES

R24_B.Sc. Data Science and Analytics

II SEMESTER									
Code No.	Title of Course	Periods			Course Category	Credits	Max. Marks		
		L	T	P			CAM	ESM	Total
A24CPT203C	Problem Solving & Programming Fundamentals	4	0	0	MJD	4	25	75	100
A24DAT201D	Exploratory Data Analysis	4	0	0	MJD	4	25	75	100
A24DAD202D	Foundations of Data Science - II	4	0	0	MID	4	25	75	100
A24ENM202C	Professional Communication in English	3	0	0	MLD	3	25	75	100
A24TAT202C/ A24FRT202C	Tamil II / French II	2	0	0	AEC	2	25	75	100
A24DAS201D	Exploratory Data Analysis Lab	0	0	6	SEC	3	50	50	100
A24VAC202C	Environmental Studies	2	0	0	VAC	2	25	75	100
A24DAC202D	C Programming	0	0	4	EEC	0	100	0	100
						22	300	500	800

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Department	Computational Studies			Programme: B.Sc Data Science and Analytics						
Semester	SECOND			Course Category Code: MJD		*End Semester Exam Type: TE				
Course Code	A24CPT203C			Periods / Week			Credit	Maximum Marks		
				L	T	P	C	CA M	ESE	TM
Course Name	Problem Solving & Programming Fundamentals			4	0	0	4	25	75	100
Prerequisite	Problem Solving Skills									
Course Outcome	<i>After the completion of this course, the students will be able to:</i>								BT Mapping (Highest Level)	
	CO1	Analyze problems and develop top-down designs							K2	
	CO2	Write, compile, and debug basic programs							K3	
	CO3	Implement logic with conditionals and loops							K3	
	CO4	Manipulate arrays of various dimensions							K4	
CO5	Design and implement functions with recursion.							K4		
UNIT-I	Introduction to Computer Problem-Solving						Periods: 12			
Problem-solving Aspect – Top-down Design – Implementation of Algorithms – Program Verification – Efficiency of Algorithms – Analysis of Algorithms.									CO1	
UNIT-II	Basic programming constructs						Periods: 12			
Basic Data types (Numerical, String) – Variables – Expressions – I/O statements – Compile and Run – Debugging									CO2	
UNIT-III	Decision Making – Branching & Looping						Periods: 12			
Decision making – Relational Operators – Conditional statement, Looping Statements – Nested loops – Infinite loops – Switch Statements									CO3	
UNIT-IV	Array Techniques						Periods: 12			
Array Manipulation – Different operations – One dimensional Array – Two-dimensional Array – Multidimensional Array – Character – Arrays and Strings									CO4	
UNIT-V	Modular solutions						Periods: 12			
Introduction to Functions – Importance of Design of Functions – Arguments – Parameters – Return Values – Local and Global Scope – Recursion									CO5	
Lecture Periods: 60			Tutorial Periods: -			Practical Periods: -			Total Periods: 60	
Text Books										
1. R. G. Dromey, "How to Solve it by Computer", Pearson Education India, Thirteen Edition, 2013. 2. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", Third Edition, O'Reilly Publishers, 2020.										
Reference Books										
1. Reema Thareja, "Python Programming: Using Problem Solving Approach", Oxford University Press, 2019 2. Karthikeyan E, "A Textbook on C: Fundamentals, Data Structures and Problem Solving", PHI Learning, 2008										
Web References										
1. https://status.net/articles/problem-solving-skills-examples-steps-processes-techniques/ 2. https://www.nptel/problem-solving-methodologies/										

* TE – Theory Exam, LE – Lab Exam

R. G. Dromey

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COs/POs/PSOs Mapping

COs	Program Outcomes (POs)						Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
1	3	2	3	3	2	2	2	2	3
2	3	2	2	3	3	3	2	2	2
3	2	2	2	2	3	3	3	2	2
4	3	3	2	2	2	2	2	2	3
5	2	3	2	2	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	5	75	100

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

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Department	Computational Studies			Programme: B.Sc Data Science and Analytics						
Semester	SECOND			Course Category Code: MJD		*End Semester Exam Type: TE				
Course Code	A24DAT201D			Periods / Week			Credit	Maximum Marks		
				L	T	P		C	CAM	ESE
Course Name	Exploratory Data Analysis			4	0	0	4	25	75	100
Prerequisite	Python Programming									
Course Outcome	<i>After completion of the course, the students will be able to</i>							BT Mapping (Highest Level)		
	CO1	Perform data loading, transformation, and preliminary analysis for real-world data						K3		
	CO2	Create charts and graphs to effectively communicate and interpret patterns in data during Exploratory Data Analysis						K3		
	CO3	Apply advanced statistical measures to describe and interpret datasets, including measures of central tendency and dispersion						K3		
	CO4	Critically evaluate and draw meaningful conclusions from the analysis results						K3		
	CO5	Demonstrate proficiency in handling time series datasets and performing Time Series Analysis (TSA) using Python.						K2		
UNIT-I	INTRODUCTION					Periods: 12				
Understanding Data Science – Significance of EDA – Making sense of Data – Comparing EDA with classical and Bayesian analysis – software tools.									CO1	
UNIT-II	VISUAL AIDS FOR EDA					Periods: 12				
Line – Bar charts – Scatter Plot – Area Plot – Pie – Table – Polar chart – Histogram – Lollipop EDA with Personal: Email Technical requirements –Loading – Transformation -Data Analysis Data Transformation Managing Database – Techniques – Benefits									CO2	
UNIT-III	DESCRIPTIVE STATISTICS					Periods: 12				
Understanding statistics – Measures of central tendency – Measures of dispersion. Correlation Understanding correlation – Types of analysis – Multivariate analysis using Titanic dataset.									CO3	
UNIT-IV	GROUPING DATASETS					Periods: 12				
Understanding groupby() – Groupby mechanics – Data aggregation – Pivot tables – Cross-tabulations. Time series Analysis Understanding Time series dataset – TSA with Open Power System Data.									CO4	
UNIT-V	MODEL DEVELOPMENT AND EVALUATION					Periods: 12				
Hypothesis Testing and Regression, Model Development and Evaluation , EDA on Wine Quality Data Analysis									CO5	
Lecture Periods: 60			Tutorial Periods:		Practical Periods: -		Total Periods: 60			
Text Books										
1. Daniel Garfield, Exploratory Data Analysis: Uncovering Insights from Your Data”, 2023, Kindle Edition										
Reference Books										
1. Suresh Kumar Mukhiya, Usman Ahmed, “Hands-On Exploratory Data Analysis with Python”, 2020, PACKT Publishing										
2. John W. Tukey, “Exploratory Data Analysis” , 1977										
3. Jake VanderPlas, “Python Data Science Handbook: Essential Tools for Working with Data”, 2016, O'Reilly Media										
Web References										
1. https://towardsdatascience.com/										

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2. <https://www.khanacademy.org/math/statistics-probability>
3. <https://www.frenchpodcasts.com>
4. <https://www.coursera.org>

COs/POs/PSOs Mapping

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

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	5	75	100

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

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Department	Computational Studies		Programme: B.Sc Data Science and Analytics.						
Semester	SECOND		Course Category Code: MID			*End Semester Exam Type: TE			
Course Code	A24DAD202D		Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CAM	ESE	TM
Course Name	Foundations of Data Science - II		4	0	0	4	25	75	100
Prerequisite	Basic Data Science Knowledge								
Course Outcome	After completion of the course, the students will be able to							BT Mapping (Highest Level)	
	CO1	Formulate and find optimal solution in the real life optimizing / allocation / assignment problems involving conditions and resource constraints.						K2	
	CO2	Optimize effectively through LP methods and solve using R programming						K2	
	CO3	solve transportation problems regarding determination of supply to various destinations						K3	
	CO4	Understand the application of Assignment models						K4	
	CO5	Understand the usage of Minimal tree problems and Simulation for Solving Business Problems							
UNIT-I	DATA VISUALIZATION					Periods: 12			
Introduction to Visualization, Introduction to Tableau, Dimensions, and measures, descriptive statistics, basic charts, Dashboard Design and principle, Integrate, Tableau with Google sheet.								CO1	
UNIT-II	REAL-TIME APPLICATIONS OF DATA SCIENCE					Periods: 12			
Applications of Data science – Implementation in different sectors, Advantages and Disadvantages, Exploration of Big data - Understanding and its use.								CO2	
UNIT-III	BIG DATA ANALYTICS					Periods: 12			
Terminologies – Introduction to NoSQL, Hadoop, MongoDB, JSON, Cassandra, MapReduce Programming, Hive, Pig.								CO3	
UNIT-IV	MACHINE LEARNING					Periods: 12			
Regression Model – Clustering – Collaborative Filtering –Association Rule Mining - Decision Trees, Naive Bayes, Support Vector Machine								CO4	
UNIT-V	DATA ANALYTICS ON TEXT					Periods: 12			
Major Text Mining Areas – Information Retrieval – Data Mining – Natural Language Processing (NLP) – Text Analytics sub-tasks: Cleaning and Parsing, Searching, Retrieval, Text Mining, Part-of-Speech Tagging, Stemming.								CO5	
Lecture Periods: 60		Tutorial Periods: -		Practical Periods: -		Total Periods: 60			
Text Books									
1. Cathy O'Neil and Rachel Schutt, "Doing Data Science, Straight Talk from The Frontline", O'Reilly, 2021.									
2. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining: Concepts and Techniques", Third Edition. 2018.									
Reference Books									
1.Sanjeev Wagh, Manisha Bhende, Anuradha Thakare, 'Fundamentals of Data Science, CRC Press, 1st Edition, 2022.									
2.Gilbert Strang, "Linear Algebra and Its Applications", New York: Academic Press, Fourth edition 2018.									
3.Seema Acharya, Subhasini Chellappan, Big Data Analytics, 2nd Edition, Wiley, 2019.									

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4. Suresh Kumar Mukhiya, Usman Ahmad "Hands-On Exploratory Data Analysis with Python" 1st Edition 2020.

Web References

1. <https://www.rfi.fr>
2. <https://www.lemonde.fr>
3. <https://www.frenchpodcasts.com>
4. <https://www.coursera.org>.

COs/POs/PSOs Mapping

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

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	5	75	100

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

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Department	Computational Studies		Programme: B.Sc Data Science and Analytics.						
Semester	SECOND		Course Category Code: MLD			*End Semester Exam Type: TE			
Course Code	A24ENM202C		Periods / Week			Credit	Maximum Marks		
			L	T	P	C	IM	ESE	TM
Course Name	Professional Communication in English		3	0	0	3	25	75	100
Prerequisite									
Course Objectives	<ul style="list-style-type: none"> • To develop proficiency in all four language skills [LSRW] in the context of professional communication in English. • To enhance speaking skills to communicate effectively in various professional settings such as interviews and discussions. • To improve reading and comprehension skills to understand spoken and written English in professional and general contexts. • To enhance writing skills to effectively convey ideas and information through various written mediums like letters, resumes, emails and reports and • To explore the different types of writing. 								
Course Outcome	<i>After completion of the course, the students will be able to</i>							BT Mapping (Highest Level)	
	CO1	Apply communication skills in order to overcome communication barriers, and adapt individual communication style to different professional contexts effectively.						K3	
	CO2	Demonstrate proficiency in listening to understand spoken English in various contexts and also to be able to synthesize and summarize important points.						K3	
	CO3	Exhibit effective speaking skills by communicating eloquently and confidently in professional contexts like seminars, group discussions and interviews by learning to generate ideas and present them in a structured manner.						K3	
	CO4	Display improved reading skills by comprehending and analysing texts to extract relevant information and identify main ideas to evaluate critically.						K3	
	CO5	Produce well-written documents like business letters, emails, resumes, essays, reports and professional correspondence utilizing appropriate language and formatting.						K3	
UNIT-I	BASIC COMMUNICATION SKILLS					Periods: 09			
Introduction; relevance of communication; communication process; types of communication; barriers to communication; overcoming barriers; frames of reference.								CO1	
UNIT-II	LISTENING					Periods: 09			
Types of listening; barriers to effective listening; listening and note taking; identifying important points; extracting salient points to summarize.								CO2	
UNIT-III	SPEAKING					Periods: 09			
Public speaking; Setting clear objectives; generating ideas; preparing the speech; seminars; purpose of seminars; making notes to speak from; presentations; structure of presentations; group discussions; types of group discussions and topics; group dynamics; interviews; types of interviews; basic interview structure								CO3	
UNIT-IV	READING					Periods: 09			
Comprehension, skimming, scanning, intensive reading, extensive reading, determining vocabulary from word parts and context clues; identifying the central argument as well as details								CO4	
UNIT-V	WRITING					Periods: 09			

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Functional grammar; spelling and punctuation: vocabulary; common errors; e-mails; resumes; report writing; note-making; description; narration; essay and paragraph writing.

CO5

Lecture Periods: 45

Tutorial Periods: -

Practical Periods: -

Total Periods: 45

Text Books

1. Billingham, Jo, and Beatrice Baumgartner Cohen. Giving Presentations. Oxford University Press, 2003.
2. Cholib, Mark. Towards Academic English: Developing Effective Writing Skills. CUP, 2007.
3. Dutt, Kiranmai P, et al. A Course in Communication Skills. Cambridge University Press, 2008.
4. Mohan, Krishna, and Meera Banerji. Developing communication skills. Macmillan, 2016.
5. Murphy, Raymond. Intermediate English Grammar. Cambridge University Press, 2012.

Reference Books

1. Prasad, Hari Mohan. How to Prepare for Group Discussion and Interview. Tata McGraw-Hill Publishing Company, 1998.
2. Seely, John. Oxford Guide to Effective Writing and Speaking: How to Communicate Clearly. Oxford University Press, 2013.
3. Tickoo, Champa, and Jaya Sasikumar. Writing with a Purpose. Generic Publishers, 2014. Ur, Penny. Discussions That Work. Cambridge University Press, 1981
4. Ogidi, O. C. Study Speaking: A Course in Spoken English for Academic Purposes. CUP, 1993.

Web References

1. <https://unm5.unm.edu/5-research-COMMUNICATION-skills.html>
2. <https://ebooks.inflibnet.ac.in/mgmt07/chapter/importance-types-of-listening/>
3. https://www.baycollege.edu/_resources/pdf/academics/academic-resources/open-education/principles-publicspeaking.pdf
4. <https://www.summitlearning.org/docs/63364>
5. [https://sde.uoc.ac.in/sites/default/files/sde_videos/SLM-I%20Sem%20English-Functional%20Grammar%20and%20Communication%20in%20English%20\(Scrutinized%20Final%20Draft\).pdf](https://sde.uoc.ac.in/sites/default/files/sde_videos/SLM-I%20Sem%20English-Functional%20Grammar%20and%20Communication%20in%20English%20(Scrutinized%20Final%20Draft).pdf)

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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	2	2	2	3
2	3	3	2	2	3	2	3	3
3	3	2	3	2	1	2	1	2
4	3	3	3	3	2	1	2	2
5	3	2	2	2	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

D. O. M. S. S. S.

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Department	Computational Studies			Programme: B.Sc Data Science and Analytics						
Semester	SECOND			Course Category Code: AEC		*End Semester Exam Type: TE				
Course Code	A24TAT202C			Periods / Week			Credit	Maximum Marks		
				L	T	P	C	CA M	ESE	TM
Course Name	TAMIL - II			2	0	0	2	25	75	100
(Common to B.A, B.Sc., BBA., B.COM., BCA., B.COM CS.,)										
Prerequisite										
Course Outcome	After the completion of this course, the students will be able to:								BT Mapping (Highest Level)	
	CO1	இலக்கியங்கள் உணர்த்தும் வாழ்வியல் நெறிமுறைகளைப் பேணிநடத்தல்.							K2	
	CO2	நமது எண்ணத்தை வெளிப்படுத்தும் கருவியாகத் தாய்மொழியைப் பயன்படுத்துதல்.							K3	
	CO3	தகவல் தொடர்புக்குத் தாய்மொழியின் முக்கியத்துவத்தை உணர்தல்.							K3	
	CO4	தாய்மொழியின் சிறப்பை அறிதல்.							K4	
	CO5	இலக்கிய இன்பங்களை நுகரும் திறன்களை வளர்த்தல்.							K4	
UNIT-I	காப்பியம்						Periods: 09			
சிலப்பதிகாரம் - வழக்குரைகாதைனிகாவியுநீரும்...முதல் தோற்றான் உயிர்வரை (8 வரிகள்) மணிமேகலை -பளிக்கறைபுக்ககாதைனிமதுமலர்க் கூந்தல்...முதல் புறமறிப் பாராய் வரை(106-121வரிகள்) பெரியபுராணம் -இளையான்குடிமாறநாயனார்புராணம் - ஓள்ளம் அன்புகொண்டு...(17ஆவது பாடல்மட்டும்) கம்பராமாயணம் - கும்பகர்ணவதைப்படலம் - உறங்குகின்றகும்பகன்ன... (45ஆவதுபாடல் மட்டும்) தேம்பாவணி -பாலமாட்சிப்படலம் - ஊட்டினார்அருள்...(229 பாடல்மட்டும்) சீறாப்புராணம் - மழையழைப்பித்தப் படலம் - வேயினைமுறித்துஎனத் தொடங்கும்(15ஆவது பாடல் மட்டும்)										
UNIT-II	பதினெண் கீழ்க்கணக்கு நூல்கள்						Periods: 09			
திருக்குறள் - வலியறிதல் (48),நெஞ்சொடுகிளத்தல் (125) நாலடியார் - அரும்பெறல்...(பாடல் எண்:34) சிறுபஞ்சமூலம் -புவாதுகாய்க்கும்...(பாடல் எண்:22) ஐந்திணைஐம்பது - சுவைவாய்ச் சிறுநீரை...(பாடல் எண்:38) கார்நாற்பது - கருவிளைகண்மலர்போல் பூத்தன...(பாடல் எண்:34) களவழிநாற்பது - ஞாப்பினுளெஞ்சிய (பாடல் எண்:2)										
UNIT-III	சங்க இலக்கியம் - எட்டுத்தொகை						Periods: 09			
ஐங்குறுநூறு - பாடல் எண்:44 -தோழி கூற்று குறுந்தொகை - பாடல் எண்:224 - தலைவி கூற்று நற்றிணை - பாடல் எண்:284 - தலைவன் கூற்று அகநானூறு - பாடல் எண்:145 - செவிலி கூற்று புறநானூறு - பாடல் எண்:102னி ஓளவையார் பரிபாடல் - பாடல் எண்:3 - திருமால் வாழ்த்து (1-11வரிகள்)										
UNIT-IV	பத்துப்பாட்டு						Periods: 09			
பொருநராற்றுப்படை-வாரியும் வடித்தும்...முதல் பெருந்தகுபாடினிவரை(25-47) சிறுபாணாற்றுப்படை- பைந்தனைஅவரை...முதல் வென்றிவேலூர் எய்தின் வரை (164-173) பெரும்பாணாற்றுப்படை-பார்வையாத்த...முதல் பதம் மிகப் பருகுவீர்வரை (95-105) குறிஞ்சிப்பாட்டு -அண்ணல் நெடுங்கோடு...முதல் சிவந்தகண்ணேம்வரை(54-61) மதுரைக்காஞ்சி -மைபடுபெருந்தோள்...முதல் பெரும்பெயர் மதுரை வரை (687-699) நெடுநல்வாடை -குளிக்காலக்காட்சி- கல்லென் துவலைத்...முதல் பண்ணுமுறைநிறுப்பவரை (64-70)										
UNIT-V	மொழிப்பயிற்சி, இலக்கியவரலாறு						Periods: 09			

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1.முதல்,கரு,உரிப்பொருள் அறிதல் 2.அலகிட்டுவாய்ப்பாடு 3.அணிகள் அறிதல் இலக்கியவரலாறு காப்பியம்,அறஇலக்கியம்,சங்க இலக்கியம் குறித்தப் பாடப்பகுதியைஒட்டிய இலக்கியவரலாறு.	CO5		
Lecture Periods: 45	Tutorial Periods: -	Practical Periods: -	Total Periods: 45
Text Books			
1. சிவகுமார்,எஸ்., -கொங்குதேர்வாழ்க்கை, பாடல் தொகுப்பு நூல் - தொகுதி -1, யுனைடெட் ரைட்டர்ஸ்,சென்னை -86. முதற்பதிப்பு.2003.			
2. சாமிநாதையர் டாக்டர் உ.வே. குறுந்தொகை மூலமும் உரையும், டாக்டர் உ.வே.சாமிநாதையர் நூல் நிலையம், வெளியீட்டெண்: 277,பெசன்ட் நகர், சென்னை 600 090.எட்டாம் பதிப்புனி 2020.			
3. வேங்கடராமன், வித்துவான்.ஹெச். (பதி.) - நற்றிணை மூலமும் உரையும்,டாக்டர்உ.வே.சாமிநாதையர் நூல் நிலையம், வெளியீட்டெண்: 277,பெசன்ட் நகர்,சென்னை 600 090. எட்டாம் பதிப்புனி 2020.			
4. திருவள்ளுவர்- சேயோன் டாக்டர் - திருக்குறள்,மயிலைத் திருவள்ளுவர்தமிழ்ச் சங்கம்,184,பிராட்வே,சென்னை 600 108			
5. வேங்கடசாமிநாட்டார்,ந.மு., - கார்நாற்பது,களவழிநாற்பதுனிசாரதாபதிப்பகம்,சாந்திஅடுக்ககம், ஸ்ரீகிரு'ணபுரம் தெரு, இராயப்பேட்டை,சென்னை -14. முதற்பதிப்பு: 2005.			
Reference Books			
1. சிற்பிபாலசுப்பிரமணியம் மற்றும் நீலபத்மநாபன் (ப.ஆ.சி.) னிபுதியதமிழ் இலக்கியவரலாறு, தொகுதி-1,2,3, சாகித்திய அகாதெமி, புதுடெல்லி, 2013.			
2. பாக்கியமேரி, வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு (செம்மை மற்றும் விரிவுப் பதிப்பு), பாரிநிலையம். சென்னை,			
3. ஆனந்தன். சு. முனைவர்., - தமிழ் இலக்கியவரலாறு,கண்மணிபதிப்பகம், திருச்சி-2. இருபத்தி மூன்றாம் பதிப்புனி 2015.			
4. பரந்தாமனார்,அ.கி.நல்லதமிழ் எழுதவேண்டுமா,பாரிநிலையம்,சென்னை, 1998.			
5. சம்பத், இரா., (பதி) -தொல்காப்பியக் கவிதையியல் வடிவம்-பாடுபொருள்-உத்தி-வகைமை,புதுச்சேரிமொழியியல் பண்பாட்டுஆராய்ச்சிநிறுவனம், புதுச்சேரி-605 001. முதற்பதிப்புனிஅக்டோபர் 2015.			
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

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COs/POs/PSOs Mapping

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

D. V. M. S. S. S.

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Department	Computational Studies		Programme: B.Sc Data Science and Analytics						
Semester	SECOND		Course Category Code: AEC			*End Semester Exam Type: TE			
Course Code	A24FRT202C		Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA M	ESE	TM
Course Name	FRENCH - II		2	0	0	2	25	75	100
Prerequisite	French I								
Course Outcome	<i>After the completion of this course, the students will be able to:</i>							BT Mapping (Highest Level)	
	CO1	Analyze problems and develop top-down designs						K3	
	CO2	Write, compile, and debug basic programs						K3	
	CO3	Implement logic with conditionals and loops						K3	
	CO4	Manipulate arrays of various dimensions						K3	
CO5	Design and implement functions with recursion.						K3		
UNIT-I	Introduction to Computer Problem-Solving					Periods: 12			
Problem-solving Aspect – Top-down Design – Implementation of Algorithms – Program Verification – Efficiency of Algorithms – Analysis of Algorithms .								CO1	
UNIT-II	Basic programming constructs					Periods: 12			
Basic Data types (Numerical, String) – Variables – Expressions – I/O statements – Compile and Run – Debugging								CO2	
UNIT-III	Decision Making – Branching & Looping					Periods: 12			
Decision making – Relational Operators – Conditional statement, Looping Statements – Nested loops – Infinite loops – Switch Statements								CO3	
UNIT-IV	Array Techniques					Periods: 12			
Array Manipulation – Different operations – One dimensional Array – Two-dimensional Array – Multidimensional Array – Character – Arrays and Strings								CO4	
UNIT-V	Modular solutions					Periods: 12			
Introduction to Functions – Importance of Design of Functions – Arguments – Parameters – Return Values – Local and Global Scope – Recursion								CO5	
Lecture Periods: 45			Tutorial Periods:		Practical Periods: -			Total Periods:	
			-					45	
Text Books									
1. R. G. Dromey, "How to Solve it by Computer", Pearson Education India, Thirteen Edition, 2013. 2. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", Third Edition, O'Reilly Publishers, 2020.									
Reference Books									
1. Reema Thareja, "Python Programming: Using Problem Solving Approach", Oxford University Press, 2019 2. Karthikeyan E, "A Textbook on C: Fundamentals, Data Structures and Problem Solving", PHI Learning, 2008									
Web References									
1. https://status.net/articles/problem-solving-skills-examples-steps-processes-techniques/ 2. https://www.geeksforgeeks.org/problem-solving-methodologies/									

* TE – Theory Exam, LE – Lab Exam

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COs/POs/PSOs Mapping

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

D.O. M... ..

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Department	Computational Studies		Programme: B.Sc Data Science and Analytics.						
Semester	SECOND		Course Category Code: SEC *End Semester Exam Type: LE						
Course Code	A24DAS201D		Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CAM	ESE	TM
Course Name	Exploratory Data Analysis Lab		0	0	6	3	50	50	100
Prerequisite	Basic Knowledge in database								
Course Outcome	<i>After the completion of this course, the students will be able to:</i>							BT Mapping (Highest Level)	
	CO1	Perform data loading, transformation, and preliminary analysis for real-world data						K3	
	CO2	Create charts and graphs to effectively communicate and interpret patterns in data during Exploratory Data Analysis.						K3	
	CO3	Apply advanced statistical measures to describe and interpret datasets, including measures of central tendency and dispersion						K3	
	CO4	Critically evaluate and draw meaningful conclusions from the analysis results.						K4	
	CO5	Demonstrate proficiency in handling time series datasets and performing Time Series Analysis (TSA) using Python.						K4	
<ol style="list-style-type: none"> 1. Download, Install and practice opensource tools for EDA – WEKA 2. Visualize the data using various graphs 3. Perform histogram analysis using NumPy, Matplotlib, pandas. 4. Write a program to generate different charts and plots. 5. Write a program to generate pivot using groupby() method. 6. Perform Time Series analysis and test with with a predictive model 7. Write a program to identify the correlation of the features/parameters in the Titanic Dataset. 8. Perform EDA on Wine Data 9. Demonstrate different visualizations based on Exercise 7. 10. Develop and evaluate ML models on open dataset 									
Lecture Periods: 30			Tutorial Periods: -		Practical Periods: -		Total Periods: 30		
Reference Books									
<ol style="list-style-type: none"> 1. Hands-On Exploratory Data Analysis with Python, Suresh Kumar Mukhiya, Usman Ahmed, 2020, PACKT Publishing 2. Exploratory Data Analysis: Uncovering Insights from Your Data, Daniel Garfield, 2023, Kindle Edition 									
Web References									
<ol style="list-style-type: none"> 1. https://pythonprogramming.net/introduction-learn-python-3-tutorials/ 2. https://www.codecademy.com/learn/learn-python 3. https://lecturenotes.in 									

* TE – Theory Exam, LE – Lab Exam

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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	2	3	3	3	3	2	2	2	3	3	3	3	2	2	2
2	3	3	2	3	2	3	3	2	3	2	3	2	3	3	2
3	2	2	3	3	2	3	3	2	2	3	3	2	3	3	2
4	3	3	2	2	2	3	3	3	3	2	2	2	3	3	3
5	2	2	2	3	3	3	2	2	2	2	3	3	3	2	2

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

D. O. M. S. S. S.

5/4

Department	Computational Studies			Programme: B.Sc Data Science and Analytics.							
Semester	SECOND			Course Category Code: VAC		End Semester Exam Type: TE					
CourseCode	A24VAC202C			Periods/Week			Credit	MaximumMarks			
				L	T	P	C	CAM	ESE	TM	
Course Name	ENVIRONMENTAL SCIENCES			2	0	0	2	25	75	100	
(Common to B.A., B.SC.,B.Com ., B.B.A and BCA Programme)											
Prerequisite	Basic Knowledge and awareness on Environmental Studies										
Course Objectives	To gain knowledge on the importance of natural resources and energy.										
	To know the structure and function of an ecosystem.										
	To imbibe an aesthetic value with respect to biodiversity, understand the threats and its conservation and appreciate the concept of interdependence.										
	To know the causes of types of pollution and disaster management.										
	To observe and discover the surrounding environment through field work.										
Course Outcomes	On completion of the course, the students will be able to								BT Mapping (Highest Level)		
	CO1	Understand about the various resources								K1	
	CO2	Learn about the biodiversity								K1	
	CO3	Learn the different types of pollution and to prevent the pollution								K2	
	CO4	Know about the pollution Act								K2	
	CO5	Observe various environmental issues in surroundings								K3	
UNIT-I	ENVIRONMENTAL SCIENCES: NATURAL RESOURCES						Periods:06				
Environmental Sciences - Relevance - Significance - Public awareness - Forest resources - Water resources - Mineral resources - Food resources - conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies										CO1	
UNIT-II	ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION						Periods:06				
Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem. Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) and local levels - Hotspots, threats to biodiversity - conservation of biodiversity –Insitu&Exsitu.										CO2	
UNIT-III	ENVIRONMENTAL POLLUTION AND MANAGEMENT						Periods:06				
Environmental Pollution - Causes - Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management - Floods, Earth quake, Cyclone and Landslides. Role of individuals in prevention of pollution - pollution case studies.										CO3	
UNIT-IV	SOCIAL ISSUES - HUMAN POPULATION						Periods:06				
Urban issues - Energy - water conservation - Environmental Ethics - Global warming - Resettlement and Rehabilitation issues - Environmental legislations - Environmental production Act. 1986 - Air, Water, Wildlife and forest conservation Act - Population growth and Explosion - Human rights and Value Education - Environmental Health - HIV/AIDS - Role of IT in Environment and Human Health - Women and child welfare - Public awareness - Case studies.										CO4	
UNIT-V	FIELD WORK						Periods:06				
Visit to a local area / local polluted site / local simple ecosystem - Report submission.										CO5	
Lecture Periods:30			Tutorial Periods:0			Practical Periods:-		Total Periods:30			
TextBooks											

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1. Bharucha Erach, "Textbook of Environmental Studies for Undergraduate Courses", Orient Black Swan, 2nd Edition, 2013.
2. Basu Mahua, Savarimuthu Xavier, "Fundamentals of Environmental Studies", Cambridge, 2nd Edition, 2017.
3. Agarwal, K.C. "Environmental Biology", Nidi Publications, 1st Edition, 2004.

Reference Books

1. Kumarasam, Alagappa Moses & Vasanthi, "Environmental Studies", Bharathidasan University Publications, 1st Edition, 2004.
2. Rajamannar, "Environmental Studies", EVR College Publications, 1st Edition, 2004.
3. Kalavathy, S, "Environmental Studies", Bishop Heber College Publications, 1st Edition, 2004.

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2. <http://eagri.org/eagri50/ENVS302/pdf/lec05.pdf>
3. <https://www.youtube.com/watch?v=78prsPYm98g>
4. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2792934/>
5. <https://www.frontiersin.org/articles/505570>

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