



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

111

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The B.Sc., Mathematics Graduates of the Sourashtra College will:

PEO 1	gain knowledge in foundational areas of mathematics.
PEO 2	communicate mathematics accurately, precisely and effectively.
PEO 3	develop mathematical thinking.
PEO 4	apply mathematical knowledge.
PEO 5	be able to solve mathematical problems using technology.
PEO 6	develop teaching skills, subject knowledge in the course of their study which will help them to shine in various fields including education, IT sector etc.,

UNDERGRADUATE (UG) PROGRAMME OUTCOMES (POs)

PO 1	Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study
PO 2	Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO 3	Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.
PO 4	Analytical Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.
PO 5	Scientific Reasoning: Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.
PO 6	Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.



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112

PROGRAMME SPECIFIC OUTCOMES (PSOs)

Upon completion of **B.Sc., Mathematics**, the students are expected /will be able to

PSO1	acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.
PSO2	understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.
PSO3	demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions.
PSO4	create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.
PSO5	use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
PSO6	develop foundational teaching skills by applying basic pedagogical techniques and Mathematical knowledge to explain clearly, support peer learning and cultivate interest in Mathematics.



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113

B.Sc. MATHEMATICS – II YEAR COURSE STRUCTURE – SEMESTER – III

S. No.	Course Code	Part	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	24UACT31	I	Tamil – பொதுத் தமிழ்-III	6	3	25	75	100	3
	24UACH31		Hindi – General Hindi – III						
	24UACS31		Sanskrit – Drama Grammar and History of Sanskrit Literature						
2	24UACE31	II	English – General English – III	6	3	25	75	100	3
3	24UMSC31	III	Core – 5: Vector Calculus and Applications	5	3	25	75	100	5
4	24UMSC32		Core – 6: Differential Equations and Applications	5	3	25	75	100	5
5	24UMSA31		Elective/Allied – 3*: Statistical Methods	5	3	25	75	100	5
	24UMSA32		Programming in Java – Theory & Practical	5	3	25	75	100	5
6	24UMSS31	IV	SEC**: Web Designing	1	3	25	75	100	1
	24UMSS32		E Commerce and Tally						
7	24UMSN31		SEC: NME: Mathematics for Competitive Examinations	2	3	25	75	100	2
			TOTAL	30				700	24

*Choose any one subject from Elective/Allied – 3

**Choose any one subject from SEC



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114

SEMESTER – IV

S. No.	Course Code	Part	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	24UACT41	I	Tamil – பொதுத் தமிழ் – IV	6	3	25	75	100	3
	24UACH41		Hindi – General Hindi – IV						
	24UACS41		Sanskrit – Alankara, Didactic & Modern Literature and Translation						
2	24UACE41	II	English – General English – IV	6	3	25	75	100	3
3	24UMSC41	III	Core-7: Industry Module – Industrial Statistics	5	3	25	75	100	4
4	24UMSC42		Core-8: Elements of Mathematical Analysis	5	3	25	75	100	5
5	24UMSA41		Elective/Allied – 4*: Mathematical Statistics	4	3	25	75	100	4
	24UMSA42		Transformation Techniques						
6	24UMSS41	IV	SEC **: Introduction to Data Science	2	3	25	75	100	2
	24UMSS42		Mathematical Finance						
7	24UMSN41		SEC: NME: Basic Data Analysis using Excel	2	3	25	75	100	2
8		V	Extension Activity	–	–	–	–	100	1
			TOTAL	30				800	23

*Choose any one subject from Elective/Allied – 4

**Choose any one subject from SEC



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115

COURSE STRUCTURE – SEMESTER – III

S. No.	Course Code	Part	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	24UACT31	I	Tamil – பொதுத் தமிழ்-III	6	3	25	75	100	3
	24UACH31		Hindi – General Hindi – III						
	24UACS31		Sanskrit – Drama Grammar and History of Sanskrit Literature						
2	24UACE31	II	English – General English – III	6	3	25	75	100	3
3	24UMSC31	III	Core – 5: Vector Calculus and Applications	5	3	25	75	100	5
4	24UMSC32		Core – 6: Differential Equations and Applications	5	3	25	75	100	5
5	24UMSA31		Elective/Allied – 3*: Statistical Methods	5	3	25	75	100	5
	24UMSA32		Programming in Java – Theory & Practical	5	3	25	75	100	5
6	24UMSS31	IV	SEC**: Web Designing	1	3	25	75	100	1
	24UMSS32		E Commerce and Tally						
7	24UMSN31		SEC: NME: Mathematics for Competitive Examinations	2	3	25	75	100	2
			TOTAL	30				700	24

*Choose any one subject from Elective/Allied – 3

**Choose any one subject from SEC

CA – Class Assessment (Internal)

SE – Summative Examination

SEC – Skill Enhancement Course

T – Theory

P – Practical



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116

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSC31	VECTOR CALCULUS AND ITS APPLICATIONS	CORE – 5	5	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

Curriculum Design and Development	Employability		✓	Skill Oriented		✓	Entrepreneurship		
	National	✓	Local		Regional		Global		
Curriculum Enrichment	Professional Ethics		Gender		Environment and Sustainability		Human Values		Other Values ✓

COURSE DESCRIPTION:

This course is designed to gain knowledge about Vector Calculus and its Applications.

COURSE OBJECTIVES:

To give

- knowledge about differentiation of vectors and on differential operators
- knowledge about derivatives of vector functions. Skills in evaluating line, surface and volume integrals
- the ability to analyze the physical applications of derivatives of vectors

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	understand the concept of differentiation of vectors.	Upto K3
CO 2	understand the concept of gradient, divergence, curl and its properties, discuss solenoidal and irrotational vector.	Upto K3
CO 3	evaluate the line integral of a vector valued function.	Upto K3
CO 4	evaluate the surface integral of a vector valued function.	Upto K3
CO 5	understand the concept of Green's, Gauss and Stoke's theorem	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



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117

VECTOR CALCULUS AND ITS APPLICATIONS

UNIT – I:

Introduction – Vector Algebra – Differentiation of vectors, Gradient

UNIT – II:

Divergence and Curl of a vector, Laplacian operator, Vector Identities, Solenoidal & Irrotational

UNIT – III:

Introduction – Line Integrals – Workdone by a force

UNIT – IV:

Surface Integrals – Definition – Related problems

UNIT – V:

Theorems of Green, Gauss and Stokes (statements only) – Related problems

TEXT BOOK:

Analytical Geometry 3D and Vector Calculus by Arumugam & Isaac, New Gamma Publications.

Unit I: Chapter–5 Sections 5 – 5.3

Page no. 5.1 – 5.13

Unit II: Chapter–5 Sections 5.4

Page no. 5.18 – 5.28

Unit III: Chapter–7 Sections 7 – 7.1

Page no. L&SInt1 – L&SInt6

Unit IV: Chapter–7 Section 7.2

Page no. L&SInt7 – L&SInt10

Unit V: Chapter–7 Section 7.3

Page no. L&SInt11 – L&SInt32.

REFERENCE BOOKS:

1. *Vector Analysis* by P. Duraipandian and Kayalal Pachaiyappa, S.Chand Publication.
2. J.C. Susan, *Vector Calculus, (4th Edn.)* Pearson Education, Boston, 2012.
3. A. Gorguis, *Vector Calculus for College Students*, Xilbius Corporation, 2014.
4. J.E. Marsden and A. Tromba, *Vector Calculus, (5th edn.)* W.H. Freeman, New York, 1988.

DIGITAL TOOLS:

<https://nptel.ac.in> , <https://www.mathwarehouse.com> , <https://www.mathhelp.com>
<https://www.mathsisfun.com>

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	1	3	1	2
CO2	3	1	1	3	1	3
CO3	3	1	1	3	1	1
CO4	3	1	1	3	1	2
CO5	3	1	1	3	1	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level



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118

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSC32	DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS	CORE – 6	5	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

Curriculum Design and Development	Employability		✓	Skill Oriented		✓	Entrepreneurship			
	National	✓	Local		Regional		Global			
Curriculum Enrichment	Professional Ethics		Gender		Environment and Sustainability		Human Values		Other Values	✓

COURSE DESCRIPTION:

To gain knowledge on Differential equations and its applications.

COURSE OBJECTIVES:

To give

- knowledge about the methods of solving Ordinary and Partial Differential Equations.
- the knowledge for understanding how Differential Equations can be used as a powerful tool in solving problems in science

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	determine solutions of Linear equations, solve Bernoulli's equations and exact differential equations	Upto K3
CO 2	find the solutions of equations of first order but not of higher degree and to determine particular integrals of algebraic, exponential, trigonometric functions and their products	Upto K3
CO 3	find solutions of simultaneous linear differential equations, linear equations of second order.	Upto K3
CO 4	form a PDE by eliminating arbitrary constants and arbitrary functions and solve Lagrange's equations	Upto K3
CO 5	explain standard forms I,II,III and solve Differential equations using Clairaut's form.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



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119

DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

UNIT – I:

Ordinary Differential Equations: Variable separable – Linear Equation – Bernoulli's Equation Exact differential equations.

Chapter II Sections 4, 5 & 6 Book Page 14 to 28

UNIT – II:

Equation of first order but not of higher degree: Equation solvable for dy/dx – Equation solvable for y –Equation solvable for x – Clairaut's form – Linear Equations with constant coefficients Particular integrals of algebraic, exponential, trigonometric functions and their products.

Chapter IV Sections 1, 2.1, 2.2, 3.1. Chapter V Sec 1, 2, 3, 4, 4.1, 4.2

Book Page 60 to 64 & 68 to 82

UNIT – III:

Simultaneous differential equations– Linear Equations of the Second Order –Complete solution in terms of a known integrals–Reduction to the Normal form.

Chapter VI Section 4,5 &6, Chapter VIII Sections 1,2 BP 121 to 128 &145 to148

UNIT – IV:

Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions, Lagrange's method of solving the Linear equations.

Chapter XII Sections 1.2, 3.1, 3.2 and 4 Book page 219 to 230

UNIT – V:

Special methods – Standard forms – I, II, III and IV Clairaut's forms (Simple problems only)

Chapter XII Sections 5.1, 5.2, 5.3, 5.4 Book page 232 to 238

TEXT BOOK:

Differential Equations and its applications – T.K. Manikkavasagam Pillay, S. Narayanan, S. Viswanathan (Printers & Publishers Pvt. Ltd) – 2015

REFERENCE BOOKS:

1. *Calculus* by S.Arumugam & Issac, New Gamma Publishing House.
2. *Calculus* by Shanthi Narayanan.

DIGITAL TOOL:

<https://nptel.ac.in>

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	1	2	2	2
CO2	3	1	1	3	2	2
CO3	3	1	1	2	3	2
CO4	3	2	1	2	2	3
CO5	3	2	1	1	1	2

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120

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSA31	STATISTICAL METHODS	ELECTIVE / ALLIED – 3	5	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

Curriculum Design and Development	Employability	✓	Skill Oriented		✓	Entrepreneurship		
	National	✓	Local	Regional		Global		
Curriculum Enrichment	Professional Ethics		Gender	Environment and Sustainability		Human Values	Other Values	✓

COURSE DESCRIPTION:

The course will seek to aid students to identify the concepts of statistics and comprehend and infer the basic tools in statistics. Students will also work with examples and apply the statistical methods to various problems in data analysis. It will cover topics such as measures of central tendency, measures of dispersion, moments, measures of skewness and kurtosis and correlation and regression.

COURSE OBJECTIVES:

To make the students

- understand the fundamental concepts and principles of statistics, including data collection, classification, and tabulation
- analyze raw and grouped data, and use measures of central tendency and dispersion to draw meaningful conclusions
- comprehend correlation and regression analysis, and the various methods of curve fitting
- construct and interpret index numbers, including weighted and unweighted indices and chain indices

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	apply measures of central tendency	Upto K3
CO 2	apply dispersion to analyze raw and grouped data and draw meaningful conclusions.	Upto K3
CO 3	discuss about various types of skewness and kurtosis problems	Upto K3
CO 4	fit various types of curves using principles of least square	Upto K3
CO 5	utilize correlation and regression analysis to explore relationships between variables.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



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121

STATISTICAL METHODS

UNIT – I:

Introduction: Statistics, Measures of central Tendency: Mean, Median, Mode, Geometric mean, Harmonic mean.

Chapter 2 – Page Number 11 to 57

UNIT – II:

Measures of dispersion – quartile deviation – standard deviation – and variance – Coefficient of variation.

Chapter 3 – Page Number 60 to 78

UNIT – III:

Introduction – Moments– Skewness and Kurtosis – Measure of Skewness – Karl Pearson coefficient of skewness and Bowley's coefficient of skewness.

Chapter 4 – Page Number 82 to 93.

UNIT – IV:

Curve fitting – Principle of least squares – linear, nonlinear, exponential and growth curves.

Chapter 5 – Page Number 95 to 105

UNIT – V:

Correlation – Rank Correlation – Regression analysis.

Chapter 6 – Page Number 106 to 138

TEXT BOOK:

Statistics – Arumugam & Isaac, New Gamma Publishing House, 2016

REFERENCE BOOK:

Statistical Methods – Manoharan

DIGITAL TOOLS:

- Statistics e-labs – <http://home.ubalt.edu/ntsbarsh/STAT-DATA/javastat.htm>
- Statistical Analysis Lab – https://onlinestatbook.com/stat_analysis/index.html
- <https://www.w3schools.com/statistics/index.php> – Interactive Statistics Tutorial
- [https://www.open.edu/openlearn/pluginfile.php/1061809/mod_resource/content/4/Medical %20statistics%20PDF.pdf](https://www.open.edu/openlearn/pluginfile.php/1061809/mod_resource/content/4/Medical%20statistics%20PDF.pdf) – Medical Statistics

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	2	2	2	2	3	1
CO3	2	2	1	2	2	3
CO4	1	2	2	1	1	1
CO5	2	3	2	2	2	2

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B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

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122

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSA32	PROGRAMMING IN JAVA (Theory & Practical)	ELECTIVE/ ALLIED – 3	4	1	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

Curriculum Design and Development	Employability		✓	Skill Oriented		✓	Entrepreneurship		
	National	✓	Local		Regional		Global		
Curriculum Enrichment	Professional Ethics		Gender		Environment and Sustainability		Human Values		Other Values ✓

COURSE DESCRIPTION:

This course is designed to gain knowledge about evolution of java and its features and to develop programmers in Java with its special Features.

COURSE OBJECTIVES:

To help the students

- get in-depth Knowledge about the evolution of java and its features
- bring out the difference and similarities between C, C++ and java.
- develop programmers in Java with its special features.
- apply the exception handling in Programming
- to implement the code in internet using Applet with AWT controls.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	know the importance of Java comparing the other language, constants, variables and data types.	Upto K3
CO 2	develop program using constructors and its types.	Upto K3
CO 3	analyse different types of inheritance, arrays, strings and vectors.	Upto K3
CO 4	create threads, managing errors and exceptions	Upto K3
CO 5	use system packages, API packages and managing input/output files in Java	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



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B.Sc. MATHEMATICS – SYLLABUS

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123

PROGRAMMING IN JAVA (THEORY)

UNIT – I:

OVERVIEW OF JAVA LANGUAGE: Introduction, Simple Java program structure, Java tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command line arguments.

CONSTANTS, VARIABLES & DATA TYPES: Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Value to Variables, Scope of variables, Symbolic Constants, Type casting, Getting Value of Variables, Standard Default values; Operators & Expressions.

UNIT – II:

DECISION MAKING & BRANCHING: Introduction, Decision making with if statement, Simple if statement, if. Else statement, Nesting of if. else statements, the else if ladder, the switch statement, the conditional operator.

DECISION MAKING & LOOPING: Introduction, The While statement, the do-while statement, the for statement, Jumps in loops

CLASSES, OBJECTS & METHODS: Introduction, Defining a class, Adding variables, Adding methods, Creating objects, Accessing class members, Constructors, Method overloading, Static members, Nesting of methods.

UNIT – III:

INHERITANCE: Extending a class, Overloading methods, Final variables and methods, Final classes, Finalizer methods, Abstract methods and classes.

ARRAYS, STRINGS AND VECTORS: Arrays, One-dimensional arrays, Creating an array, Two – dimensional arrays, Strings, Vectors, Wrapper classes.

MULTIPLE INHERITANCE: Introduction, Defining interfaces, Extending interfaces, Implementing interfaces, Assessing interface variables.

UNIT – IV:

MULTITHREADED PROGRAMMING: Introduction, Creating Threads, Extending the Threads, Stopping and Blocking a Thread, Lifecycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the „Runnable“ Interface.

MANAGING ERRORS AND EXCEPTIONS: Types of errors : Compile-time errors, Runtime errors, Exceptions, Exception handling, Multiple Catch Statements, Using finally statement

UNIT – V:

PACKAGES: Introduction, Java API Packages, Using System Packages, Naming conventions, Creating Packages, Accessing a Package, using a Package.

MANAGING INPUT/OUTPUT FILES IN JAVA: Introduction, Concept of Streams, Stream classes, Byte Stream Classes, Input Stream Classes, Output Stream Classes, Character Stream classes: Reader stream classes, Writer Stream classes, Using Streams, Reading and writing files.



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124

TEXT BOOKS:

1. E. Balagurusamy, *Programming with Java*. Fourth Edition, 2010, Tata McGraw-Hill
Unit I : Chapters 1 – 5
Unit II : Chapters 6 , 7 and 8.1–8.10
Unit III : Chapter 8.11–8.18, Chapters 9 and 10
Unit IV : Chapter 12 and 13
Unit V : Chapter 14, 11.1–11.7 and 16.
2. P Radha Krishna, *Object Oriented Programming through Java*. Second Edition, 2007, Universities Press.

REFERENCE BOOKS:

1. K. Arnold and J. Gosling, “*The Java Programming Language*”, Second Edition, 1996, Addison Wesley
2. P. Naughton and H. Schildt, “*Java2 (The Complete Reference)*”, Eight Edition, 2005, Tata McGraw Hill
3. Kathy Sierra and Bert Bates, “*Head First Java*”, Second Edition, 2003, Oreilly

DIGITAL TOOLS:

<https://www.learnjavaonline.org/> – Free Interactive Java Tutorial

<https://www.educative.io/courses/learn-java-from-scratch> – Free online tutorial

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	3	1	2	2
CO2	3	2	3	1	2	1
CO3	3	3	3	3	3	1
CO4	3	3	3	3	3	1
CO5	3	3	3	3	3	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level



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125

PROGRAMMING IN JAVA **PRACTICAL**

PROGRAM LIST

1. Programs using constructor and destructor.
2. Creation of classes and use of different types of functions.
3. Count the number of objects created for a class using static member function.
4. Write programs on interfaces.
5. Write programs on packages.
6. Write programs using function overloading.
7. Programs using inheritance.
8. Programs using IO streams.
9. Programs using files.
10. Write a program using exception handling mechanism.
11. Programs using AWT
12. Programs on swing.

The following distribution of marks for Computer related subjects/Mathematical related subjects which have both theory and practical (Syllabus combined both theory and practical in each paper together) in B.Sc., Mathematics to be followed.

Paper	Internal	External	Total
Theory	25	75	100
Practical	25	75	100

Finally, theory marks (100) to be reduced to 60% and practical marks (100) to be reduced to 40%.



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B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

126

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSS31	WEB DESIGNING	SEC	1	–	1

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

Curriculum Design and Development	Employability	✓	Skill Oriented		✓	Entrepreneurship		
	National	✓	Local		Regional		Global	
Curriculum Enrichment	Professional Ethics		Gender		Environment and Sustainability		Human Values	Other Values ✓

COURSE DESCRIPTION:

This course is designed to learn various concepts of Web Designing using HTML, CSS, JS.

COURSE OBJECTIVES:

To make the students

- understand the fundamentals of web design and electronic publishing
- learn how to create lists and nested lists using HTML
- learn how to create web page layouts and designs using CSS
- learn how to work with block elements, objects, lists, and tables using CSS
- understand the usage of themes, div, span, tables, and frames in web design

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	design and publish their own web pages using HTML	Upto K3
CO 2	define styles using pseudo-elements and link a style sheet to an HTML document	Upto K3
CO 3	create web page layouts and designs using CSS, and style various elements such as background, text, and font	Upto K3
CO 4	design and implement forms and form elements in their web pages	Upto K3
CO 5	create a well-structured web site with appropriate titles and themes	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

127

WEB DESIGNING

UNIT – I:

Introduction to Web Design & HTML Basics – WWW, Website, Working of Websites, Web pages, Front End, Back End, Client and Server Scripting Languages, Responsive Web Designing, Types of Websites (Static and Dynamic Websites) – Free Editors – Notepad ++

UNIT – II:

HTML Basics : Introduction, Basic Structure of HTML Formatting Tags – HTML Tables – HTML Lists – HTML Forms – HTML – HTML 5 Introduction – HTML embed multimedia – HTML Layout.

UNIT – III:

Introduction to CSS: Types of CSS, CSS Properties, Border Properties.

UNIT – IV:

Block properties, Positioning Properties, CSS Lists, CSS Tables, CSS Menu Design CSS Image Gallery.

UNIT – V:

Introduction to Client Side Scripting Language, Variables in Java Script, Operators in JS, Conditions Statements, JS Popup Boxes, JS Events, Basic Form Validations in JavaScript.

TEXT BOOKS:

Web Designing & Publishing – Satish Jain, M. Geetha Iyer, BPB Publications –2022

Unit I : Chapter 1 – 1.4 to 1.7:

Unit II : Chapter 2 – 2.1 to 2.12

Unit III : Chapter 3 – 3.1 to 3.5

Unit IV : Chapter 3 – 3.6 to 3.11

Unit V : Chapter 5 – 5.1 to 5.9

REFERENCE BOOKS:

Hirdesh Bharadwaj, *Web Designing*, Paper Back, 2016.

Brain D Miller, *Principles of Web Design*, Allworth Publications, 2022.

DIGITAL TOOLS:

- <https://digital.com/wp-content/uploads/html-cheat-sheet.pdf>
- <https://tutorial.techaltum.com/webdesigning.html> – Web Designing Tutorial
- <https://www.w3schools.com/html/> – HTML tutorial
- <https://www.w3schools.com/css/default.asp> – CSS Tutorial
- <https://www.w3schools.com/css/default.asp> – Javascript Tutorial

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	1	2	1	3	1
CO2	1	3	1	3	1	1
CO3	2	2	2	2	2	1
CO4	1	2	2	1	3	1
CO5	1	3	1	3	3	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

128

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSS32	E – COMMERCE AND TALLY	SEC	1	–	1

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

Curriculum Design and Development	Employability	✓	Skill Oriented		✓	Entrepreneurship	
	National	✓	Local	Regional		Global	
Curriculum Enrichment	Professional Ethics		Gender	Environment and Sustainability		Human Values	Other Values ✓

COURSE DESCRIPTION:

To gain knowledge on the basic concepts of E –commerce and understand the GST in Tally Essentials

COURSE OBJECTIVES:

To make the students

- acquire the basic concept of E – Commerce
- understand the GST in Tally Essentials
- identify the accounting treatments in tally prime essentials
- explore the reports in Tally

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	illustrate the basic concept of E – Commerce	Upto K3
CO 2	illustrate the Tally essentials	Upto K3
CO 3	enumerate the accounting treatments in tally	Upto K3
CO 4	describe the inventory information in tally	Upto K3
CO 5	describe the extraction of report in tally	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

129

E – COMMERCE AND TALLY

UNIT – I: INTRODUCTION TO E-COMMERCE

Defining E – Commerce – features of E – Commerce – Benefits of E – Commerce – Components of E – Commerce – Functions of Electronic Commerce – Process of E-Commerce – Types of E-Commerce

UNIT – II: FUNDAMENTALS OF TALLY ERP 9

Features of Tally – opening Tally ERP 9 – Components of Tally ERP 9

– creating company – company info menu

UNIT – III: ADVANCED INVENTORY INFORMATION IN TALLY ERP 9

Stock Groups, Stock categories, items ,type – Introducing Groups, Ledgers, Purchase order, sales order and invoices – capital account, current assets, current liabilities, Loans

UNIT – IV:

Revenue, – Primary groups, Net debit/credit balance for reporting – creating multiple groups – process of creation ledger – orders – invoicing– vouchers – inventory vouchers.

UNIT – V: DISPLAY / REPORTS IN TALLY ERP 9

Generating Basic Reports in Tally – Trial balance Report – Accounting Books and registers – Inventory Books and Registers – working with stock summary report – understanding ratio analysis – Principle ratio

TEXT BOOKS:

1. *E-Commerce* – Dr. V. Vidya, Dr. U. Umesh & others – Redshine Publications Pvt Ltd. [Unit –1].
2. *Tally ERP 9 (Power of Simplicity)* , SHRADDHA SINGH · 2015, V.S.Publishers. Unit II , III, IV : Chapter 3 UNIT V : Chapter 4.

REFERENCE BOOKS:

1. *Official Guide To Financial Accounting Using Tally ERP 9 With GST* by Tally Education Pvt.Ltd.
2. Asok.Nadhani–*Tally Erp9 Training Guide– 4th Edition*, BPS Publications.

DIGITAL TOOLS:

- <https://www.tutorialkart.com/tally/tally-tutorial/> – Tally Tutorial
- <https://sscstudy.com/tally-erp-9-book-pdf-free-download/>
- [https://egyankosh.ac.in/bitstream/123456789/15151/1/UNIT – 7.pdf](https://egyankosh.ac.in/bitstream/123456789/15151/1/UNIT-7.pdf)<https://www.sarkarirush.com/tally-erp-9-book-pdf-download/>
- <https://egyankosh.ac.in/bitstream/123456789/10325/1/Section-3.pdf>
- <https://tallysolutions.com/learning-hub/#gref> – Tally Learning Hub
- <https://www.tutorialkart.com/accounting/> – Basic Accounting Tutorial
- <https://www.javatpoint.com/e-commerce-definition> – E Commerce Tutorial

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	2	2	2	2	3	1
CO3	2	2	1	2	2	1
CO4	1	2	2	1	1	2
CO5	2	3	2	2	2	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

130

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSN31	MATHEMATICS FOR COMPETITIVE EXAMINATIONS	SEC NME	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

Curriculum Design and Development	Employability	✓	Skill Oriented		✓	Entrepreneurship	
	National	✓	Local	Regional		Global	
Curriculum Enrichment	Professional Ethics		Gender	Environment and Sustainability		Human Values	Other Values ✓

COURSE DESCRIPTION:

This course is designed to improve computational skills.

COURSE OBJECTIVES:

To make the students

- develop problem-solving skills for competitive examinations
- understand the concepts of averages, simple interest, compound interest, time and work, profit and loss, and problems on numbers
- apply mathematical concepts to solve problems related to competitive examinations

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	apply simplification and average skills to solve problems in competitive examinations	Upto K3
CO 2	understand the concepts of problems on Numbers	Upto K3
CO 3	use formulas to calculate profit/loss percentages	Upto K3
CO 4	understand the concepts of time and work	Upto K3
CO 5	solve problems related various types of interest	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

131

MATHEMATICS FOR COMPETITIVE EXAMINATIONS

UNIT – I:

Simplifications – Averages – concepts – problems (Example Problems Only)

UNIT – II:

Problems on numbers – short cuts – concepts – Problems (Example Problems Only)

UNIT – III:

Profit and Loss – short cuts – concepts – problems (Example Problems Only)

UNIT – IV:

Time and work – short cuts – concepts – problems (Example Problems Only)

UNIT – V:

Simple Interest – Compound interest – concepts – problems (Example Problems Only)

TEXT BOOK:

Quantitative Aptitude by R.S.Aggarwal, S.Chand & Company Ltd., Ram Nagar, New Delhi (2007)

Unit I: Chapter 4 & 6 (Example Problems Only)

Unit II: Chapter 7 (Example Problems Only)

Unit III: Chapter 12 (Example Problems Only)

Unit IV: Chapter 17 (Example Problems Only)

Unit V: Chapter 22 & 23 (Example Problems Only)

REFERENCE BOOKS:

1. U. Mohan Rao, **Quantitative Aptitude for Competitive Examinations**, Scitech Publications, 2016.
2. Dr. M. Manoharan, Dr. C. Elango and Prof K. L. Eswaran, **Business Mathematics**, Palani Paramount Publications, Reprint 2013.

DIGITAL TOOL:

<https://tamilnaducareerservices.tn.gov.in/>

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	1	3	1	3	2
CO2	1	3	1	3	1	2
CO3	3	2	2	2	2	2
CO4	1	1	1	1	1	2
CO5	2	3	3	3	3	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

132

COURSE STRUCTURE – IV SEMESTER

S. No.	Course Code	Part	Course Title	Hrs. / Week	Exam (Hrs.)	CA	SE	Total Marks	Credits
1	24UACT41	I	Tamil – பொதுத் தமிழ் – IV	6	3	25	75	100	3
	24UACH41		Hindi – General Hindi – IV						
	24UACS41		Sanskrit – Alankara, Didactic & Modern Literature and Translation						
2	24UACE41	II	English – General English – IV	6	3	25	75	100	3
3	24UMSC41	III	Core-7: Industry Module – Industrial Statistics	5	3	25	75	100	4
4	24UMSC42		Core-8: Elements of Mathematical Analysis	5	3	25	75	100	5
5	24UMSA41		Elective/Allied – 4*: Mathematical Statistics	4	3	25	75	100	4
	24UMSA42		Transformation Techniques						
6	24UMSS41	IV	SEC **:: Introduction to Data Science	2	3	25	75	100	2
	24UMSS42		Mathematical Finance						
7	24UMSN41		SEC: NME: Basic Data Analysis using Excel	2	3	25	75	100	2
8		V	Extension Activity	–	–	–	–	100	1
			TOTAL	30				800	23

*Choose any one subject from Elective/Allied – 4

**Choose any one subject from SEC

***All students will do internship after IV Semester. The evaluation will be done in the beginning of V Semester and marks will be included in the V Semester mark sheet.

CA – Class Assessment (Internal)

SE – Summative Examination

SEC – Skill Enhancement Course

NME – Non –Major Elective

T – Theory

P – Practical

Passed in the BoS Meeting held on 27/02/2025

Signature of the Chairman



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

133

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSC41	INDUSTRY MODULE – INDUSTRIAL STATISTICS	CORE – 7	5	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

Curriculum Design and Development	Employability		✓	Skill Oriented		✓	Entrepreneurship		
	National	✓	Local		Regional		Global		
Curriculum Enrichment	Professional Ethics		Gender		Environment and Sustainability		Human Values		Other Values
									✓

COURSE DESCRIPTION:

To gain knowledge about using various transform techniques including their general principles and specific techniques. They include Fourier series, Fourier transforms and Laplace transforms.

COURSE OBJECTIVES:

- To solve certain types of differential equations using Laplace Transforms.
- To discuss the basic concepts relating Fourier series.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	gain knowledge about time series and measurement	Upto K3
CO 2	know about one way and two way classification in Analysis of variance	Upto K3
CO 3	learn about Attributes	Upto K3
CO 4	learn about advantages and uses of statistical quality control	Upto K3
CO 5	know about mean chart and R chart	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

134

INDUSTRY MODULE – INDUSTRIAL STATISTICS

UNIT – I:

Analysis of Time Series: Components of 2 TS – Measurement of Trends – Measurement for seasonal variation and simple problems only.

Chapter 10: Section 10.1, 10.2, 10.3 Pages 258 to 270 Textbook 1.

UNIT – II:

Analysis of Variance – Introduction – one criterion of classification – Two criteria of classification and simple problems only

Chapter 17: Section 17.0 to 17.2 Pages 481 to 498 Textbooks 1.

UNIT – III:

Theory of Attributes – Introduction – Attribute – class frequency of order n (positive & negative class frequency) 2 x 2 contingency table for the attributes A & B – consistency of data – Independence and Association of data and simple problems only.

Chapter 8: Section 8.0 to 8.3 Pages 196 to 225 Textbook 1

UNIT – IV:

Statistical Quality Control – Introduction – Definitions – origin – Advantages of Statistical Quality Control – Causes of Variation – Types of Quality Control – Techniques used – process control – control chart – Advantages of the use of a control chart.

Chapter 21: Sections 21.1 to 21.9.1 Pages 21.1 to 21.8 Textbook 2.

UNIT – V:

Types of control chart – Mean chart ($\bar{X}$ chart) – Range chart (R chart) – Interpretation of $\bar{X}$ and R chart and simple problems only.

Chapter 21: Sections 21.9.2 to 21.10, 21.11 & 21.12 Pages 21.9 to 21.14

TEXT BOOKS:

1. *Statistics* by Arumugam Isaac
2. *Statistics (Theory, Methods & Applications)* by V.K. Kapoor & Shan Cheti D.C., Sultan Chand & Sons.

REFERENCE BOOK:

Fundamentals of Applied Statistics by S.C. Gupta and V. K. Kapoor 4th edition, Sultan Chand and Sons.

DIGITAL TOOLS:

1. <https://www.opemintro.org/book/stat/>
2. <http://spcchartonline.com/> – Statistical Quality Control Tutorial Control Charts (Online tutorial)
3. <https://www.spcforexcel.com/knowledge/control-chart-basics/control-charts>
4. <https://www.analyticsvidhya.com/blog/2018/01/anova-analysis-of-variance/> ANOVA tutorial

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	2	2	2	2	3	1
CO3	2	2	1	2	2	2
CO4	1	2	2	1	1	1
CO5	2	3	2	2	2	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

135

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSC42	ELEMENTS OF MATHEMATICAL ANALYSIS	CORE – 8	5	–	5

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

Curriculum Design and Development	Employability	✓	Skill Oriented		✓	Entrepreneurship			
	National	✓	Local	Regional		Global			
Curriculum Enrichment	Professional Ethics		Gender	Environment and Sustainability		Human Values		Other Values	✓

COURSE DESCRIPTION:

This course is designed to learn various concepts of Sequences and series

COURSE OBJECTIVES:

- To define sequences
- To express the behavior of sequences
- To explain sub sequences
- To discuss various test
- To identify different series

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	solve problems based on sequences	Upto K3
CO2	prove theorems using concept of algebra of limits	Upto K3
CO3	define sub sequences and Cauchy sequences	Upto K3
CO4	find solution for problem by applying suitable test.	Upto K3
CO5	test the convergence of series	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

136

ELEMENTS OF MATHEMATICAL ANALYSIS

UNIT – I:

Introduction – Sequences– Bounded Sequences–Monotonic Sequences–Convergent sequences – Divergent and Oscillating sequences.

UNIT – II:

Algebra of limits – Behaviour of Monotonic sequences

UNIT – III:

Some theorems on limits – Sub sequences– Cauchy sequences

UNIT – IV:

Series of positive terms– comparison test– Kummers test

UNIT – V:

Root test and condensation test –Alternating series–Absolute convergence.

TEXT BOOK:

Sequences and Series – Arumugam and Issac, New Gamma publishing House.

UNIT I – sec 3.1 to 3.5 (page no 39 to 51)

UNIT II – sec 3.6 – 3.7 (page no. 56 to 82)

UNIT III – sec 3.8– 3.11 (page no. 82 to 103)

UNIT IV – sec 4.1– 4.3(page no. 112 to 144).

UNIT V – sec 4.4, 5.1 – 5.2 (page no. 145 to151) (page no. 157 to 166)

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	3	3	2	2
CO2	3	3	2	3	2	1
CO3	3	3	2	3	2	1
CO4	3	3	3	2	2	2
CO5	2	2	2	2	2	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

137

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSA41	MATHEMATICAL STATISTICS	ELECTIVE/ ALLIED – 4	4	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

Curriculum Design and Development	Employability	✓	Skill Oriented		✓	Entrepreneurship		
	National	✓	Local		Regional		Global	
Curriculum Enrichment	Professional Ethics		Gender		Environment and Sustainability		Human Values	Other Values ✓

COURSE DESCRIPTION:

This course is designed to gain knowledge about Probability and Statistics.

COURSE OBJECTIVES:

- To provide an understanding of the fundamental concepts of probability theory and statistical inference
- To develop skills in applying probability theory and statistical inference to solve real-world problems
- To introduce students to various probability distributions and their applications in statistical inference
- To provide a solid foundation for advanced courses in probability theory and statistical inference

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	define Probability and Conditional probability	Upto K3
CO 2	define random variables, probability density function, expectation and moment generating function	Upto K3
CO 3	understand and apply the Binomial, Poisson and Normal distributions to solve real-world problems	Upto K3
CO 4	understand the concept of sampling distribution and to calculate the mean, standard deviation of the sampling distribution	Upto K3
CO 5	use the chi-square distribution, student's t-distribution, and F-distribution to test hypotheses for small samples	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

138

MATHEMATICAL STATISTICS

UNIT – I: PROBABILITY

Probability – Conditional probability

Chapter – 11 Sections 11.1 – 11.2 Page no. 274 – 303

UNIT – II: RANDOM VARIABLES

Introduction – Discrete Random variables – Continuous random variable – Mathematical Expectations – Moment Generating Function – Characteristic function

Chapter – 12 Sections 12.1 – 12.6 Page no. 304 – 342

UNIT – III: DISCRETE AND CONTINUOUS DISTRIBUTION

Introduction – Binomial distribution – Simple problems – Poisson distribution – Simple problems – Normal distribution – Simple problems

Chapter – 13 Sections 13.1 – 13.3 Page no. 343 – 389

UNIT – IV: SAMPLING DISTRIBUTION & TEST OF SIGNIFICANCE

Introduction – Sampling – Sampling Distribution – Testing of Hypothesis – Procedure for Testing of Hypothesis for Large Samples – Test of significance for Large Samples – Test of significance for proportions and percentages – Tests of significance for means – Tests of significance for difference of sample means

Chapter – 14 Sections 14.1 – 14.5, Page no. 396 – 425

UNIT – V: TESTS OF SIGNIFICANCE FOR SMALL SAMPLES

Test of significance based on t-distribution – Test of significance based on F-test – Chi-square for population variance – Chi-square to test the goodness of fit

Chapter – 15, 16 Sections 15.1 – 15.2, 16.1 – 16.2 Page no. 434 – 451, 455 – 466

TEXT BOOK:

Statistics by Arumugam & Isaac, New Gamma Publishing House, July 2013.

REFERENCE BOOKS:

1. *Fundamentals of Mathematical Statistics* by S.C .Gupta & V.K .Kapoor, Sultan & sons (2007 Edition)
2. H.C.Saxena *Elementary Statistics*, Abhiror Prakashan ,New Delhi ,2008.
3. T.Veerarajan ,*Fundamental of Applied Statistics*, Yesdee Publishing Private Limited, 2017.
4. Kapoor, *Mathematical statistics*, second edition, Delhi Pusthk Sadan, 1961.
5. P.R. Vittal, *Mathematical Statistics*, Margham Publications, Chennai, 2004.

DIGITAL TOOLS:

- <https://www.zweigmedia.com/RealWorld/Summary7.html>
- <https://wise.cgu.edu/wp-content/uploads/2015/04/StatWISE1110p.xls>

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	3	2	2
CO2	3	2	1	3	2	1
CO3	3	2	1	3	2	2
CO4	3	2	1	3	2	1
CO5	3	2	1	3	2	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

139

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSA42	TRANSFORMATION TECHNIQUES	ELECTIVE/ ALLIED – 4	4	–	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

Curriculum Design and Development	Employability	✓	Skill Oriented		✓	Entrepreneurship		
	National	✓	Local		Regional		Global	
Curriculum Enrichment	Professional Ethics		Gender		Environment and Sustainability		Human Values	Other Values ✓

COURSE DESCRIPTION:

To gain knowledge about using various transform techniques including their general principles and specific techniques. They include Fourier series, Fourier transforms and Laplace transforms.

COURSE OBJECTIVES:

- To solve certain types of differential equations using Laplace Transforms.
- To discuss the basic concepts relating Fourier series.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	find the Laplace transform for the given function.	Upto K3
CO 2	find the inverse Laplace transformation for the given function.	Upto K3
CO 3	solve the differential equations using Laplace transforms...	Upto K3
CO 4	find the Fourier sine and cosine integrals for the given function.	Upto K3
CO 5	convolute the given transformations	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

140

TRANSFORMATION TECHNIQUES

UNIT – I:

The Laplace transforms: Definitions, Piecewise continuity — Sufficient condition for the existence of the Laplace Transform— results derived from the definitions — Laplace Transform of Periodic functions — Some General theorems –Using Laplace Transforms evaluate certain integrals.

T1: Chapter IX– Sections – 1.1, 1.2 and Sections 2 – 5

UNIT – II:

The Inverse transforms – Modifying the results to get the inverse Laplace transforms.

T1: Chapter IX– Sections – 6, 7

UNIT – III:

Laplace transformation can be used to solve ordinary differential equations with constant coefficients — Solving system of differential equations– solving differential equations with variable coefficients–Solving equations involving integrals by Laplace transforms.

T1: Chapter IX– Sections – 8 to 11

UNIT – IV:

Fourier Transforms: Fourier integral theorem – Fourier sine and cosine integrals – Complex form of Fourier integral – Inversion formula for complex Fourier Transform – Fourier sine and cosine Transform.

T2: Chapter VIII – Pages 8.1 – 8.8

UNIT – V:

Properties of Fourier Transform – Convolution Theorem – Parsavel's identity

T2: Chapter VIII – Pages 8.8 – 8.19

TEXT BOOKS:

1. S. Narayanan and T. K. Manickavasagam Pillai, *Differential Equations and its Applications*, (Reprint Oct 2014 – 2015), S. Viswanathan (Printers and Publishers) Private Ltd, Chennai– 600003.
2. P.R. Vittal, *Differential Equations, Fourier and Laplace Transforms, Probability* – (3rd Edition, Reprint 2012), Margham Publications, Chennai – 600017.

REFERENCE BOOK:

George F. Simmons, *Differential Equations with Applications and Historical Notes*, (12th Reprint) Tata Magraw–Hill Publishing Company Ltd., New Delhi.

DIGITAL TOOLS:

- <https://mathworld.wolfram.com/LaplaceTransform.html>
- <https://mathworld.wolfram.com/FourierSeries.html>

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	2	2	2	2	3	1
CO3	2	2	1	2	2	2
CO4	1	2	2	1	1	2
CO5	2	3	2	2	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

141

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSS41	INTRODUCTION TO DATA SCIENCE	SEC	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

Curriculum Design and Development	Employability	✓	Skill Oriented		✓	Entrepreneurship	
	National	✓	Local	Regional		Global	
Curriculum Enrichment	Professional Ethics		Gender	Environment and Sustainability		Human Values	Other Values
							✓

COURSE DESCRIPTION:

This course emphasizes the students to learn the basics of data science including key terms and concepts.

COURSE OBJECTIVES:

To make the students

- understand the importance of data science in today's world.
- build models for prediction and classification.
- implement supervised and unsupervised machine learning algorithms.
- understand the Hadoop framework.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	identify the different facets of data and explain the data science process.	Upto K3
CO 2	retrieve and transform data, perform exploratory data analysis, and build models.	Upto K3
CO 3	evaluate and compare machine learning algorithms and apply them to real– world data science problems.	Upto K3
CO 4	understand the Hadoop framework and use it for big data processing	Upto K3
CO 5	explain the concepts of NoSQL databases and apply them to solve data management problems.	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

142

INTRODUCTION TO DATA SCIENCE

UNIT – I: DATA SCIENCE IN A BIG DATA WORLD

Benefits and uses – Facets of data – Data science process – Big data ecosystem and data science.

Chapter 1 – 1.1 – 1.4

UNIT – II: THE DATA SCIENCE PROCESS

Overview – research goals – retrieving data – transformation – Exploratory Data Analysis – Model building.

Chapter 2 – 2.1 – 2.6

UNIT – III: ALGORITHMS

Applications of Machine learning in Data Science – Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised.

Chapter 3 – 3.1 – 3.3

UNIT – IV: INTRODUCTION TO HADOOP

Hadoop framework – Spark – replacing MapReduce

Chapter 5 – 5.1

UNIT – V: INTRODUCTION TO NOSQL

NoSQL – ACID – CAP – BASE – types

Chapter 6 – 6.1

TEXT BOOK:

Davy Cielen, Arno D. B. Meysman, Mohamed Ali, *Introducing Data Science*, Manning Publications 2016.

REFERENCE BOOKS:

1. *Introduction to Data Science* – B. Uma Maheswari, R. Sujatha – WILLEY– 2021.
2. MurtazaHaider, *Getting Started with Data Science – Making Sense of Data with Analytics*, IBM press, E–book.

DIGITAL TOOLS:

1. <https://jakevdp.github.io/PythonDataScienceHandbook/>
2. *An Introduction to Machine Learning by Alpaydin*
<https://www.cmpe.boun.edu.tr/~ethem/i2ml2e/>
3. <https://www.open.edu/openlearn/science-maths-technology/learn-code-data-analysis/content-section-overview?active-tab=content-tab> – Learn to code for data analysis – Free Cours
4. <https://www.w3schools.com/datascience/> – Data Science Tutorial
5. <https://www.kaggle.com/code/helgejo/an-interactive-data-science-tutorial> – Free data Science Tutorial
6. <https://www.nbshare.io/> – Data science learning

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	2	2	2	2	3	1
CO3	2	2	1	2	2	2
CO4	1	2	2	1	1	2
CO5	2	3	2	2	2	1

3. Advanced Application 2. Intermediate Development 1. Introductory Level



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

143

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSS42	MATHEMATICAL FINANCE	SEC	2	–	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

Curriculum Design and Development	Employability	✓	Skill Oriented		✓	Entrepreneurship	
	National	✓	Local	Regional		Global	
Curriculum Enrichment	Professional Ethics		Gender	Environment and Sustainability		Human Values	Other Values ✓

COURSE DESCRIPTION:

To gain knowledge of Microsoft Excel and its functions

COURSE OBJECTIVES:

This course is designed for the students to

- understand the concept of time value of money and its applications in finance
- analyze different types of annuities and calculate their present and future values
- understand the principles of bond valuation and pricing
- analyze different types of stocks and evaluate their performance
- understand the principles of option valuation and hedging

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	apply mathematical concepts and techniques to solve financial problems	Upto K3
CO 2	analyze different types of financial instruments and evaluate their risks and returns	Upto K3
CO 3	construct investment portfolios and manage risks	Upto K3
CO 4	communicate financial information effectively to stakeholders	Upto K3
CO 5	understand the ethical and professional standards in the finance industry	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



SOURASHTRA COLLEGE, MADURAI – 625004

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B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

144

MATHEMATICAL FINANCE

UNIT – I:

The concept of interest – Simple interest – Compound Interest – Rate of interest – Accumulation factors – present values – capital gains and losses.

Chapter 1 & 2

UNIT – II:

Basic compound Interest– Functions – Interest rate quantitative – Annuities – Varying Annuities

Chapter 3

UNIT – III:

Future Derivatives: Swaps and options – option payoff and profit – European option Pricing — Black – Scholes models — Trading strategies

Chapter 11

UNIT – IV:

Stochastic Interest Rate models – Introductory – Independent annual rates of return – the log – normal distribution

Chapter 12 – 12.1 to 12.3.

UNIT – V:

Simulation techniques – Random number generation – dependent annual rate of return – Application of Brownian motion.

Chapter 12: 12.4 to 12.7

TEXT BOOKS:

An Introduction to the Mathematics of Finance: A Deterministic Approach by Stephen Garrett.

REFERENCE BOOKS:

1. *An Elementary Introduction To Mathematical Finance* by Sheldon M. Ross
2. *Mathematics for Finance* by M Capinski and T Zastawniak, Springer (International Edition), 2003.
3. *The Calculus of Finance* by Amber Habib, Universities Press, 2011.
4. *Options, Futures and Other Derivatives* 7th edition by John Hull and Sankarshan Basu, Pearson 2009.

DIGITAL TOOLS:

1. Financial Theory: <https://ocw.mit.edu/courses/economics/14-03-financial-theory-fall-2008/>
2. Investopedia – Financial Education: <https://www.investopedia.com/financial-education-4689775> EC – Financial Mathematics
3. <https://www.edx.org/course/financial-analysis-decision-making-0>

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	2	2	2	2	3	2
CO3	2	2	1	2	2	2
CO4	1	2	2	1	1	1
CO5	2	3	2	2	2	2

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SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

(For the students admitted from the academic year 2024 – 2025 onwards)

145

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
24UMSN41	BASIC DATA ANALYSIS USING EXCEL	SEC NME	2	-	2

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
I	II	25	75	100

Curriculum Design and Development	Employability	✓	Skill Oriented		✓	Entrepreneurship		
	National	✓	Local		Regional		Global	
Curriculum Enrichment	Professional Ethics		Gender		Environment and Sustainability		Human Values	Other Values ✓

COURSE DESCRIPTION:

To gain knowledge of Microsoft Excel and its functions.

COURSE OBJECTIVES:

This course is designed for the students

- understand the basic features of Microsoft Excel
- understand basic data analysis using Excel
- learn basic Excel functions and formulas

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	able to analyze data using Excel	Upto K3
CO 2	able to create basic Excel formulas and functions	Upto K3
CO 3	understand the basic concepts of using formulas in Excel	Upto K3
CO 4	able to apply data handling functions	Upto K3
CO 5	able to create a data chart in excel	Upto K3

K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING



SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

B.Sc. MATHEMATICS – SYLLABUS

(Under CBCS based on OBE)

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146

BASIC DATA ANALYSIS WITH EXCEL

UNIT – I: INTRODUCTION TO EXCEL FOR DATA ANALYSIS

Introduction of Data Analysis – Data Analysis process – Understanding Worksheet Basics – Editing Data – Insert, delete – Formatting cells.

Chapter 1 – 1.8 – 1.8.1, 1.8.2, 1.8.3 & 1.8.5.8

UNIT – II: DATA HANDLING WIZARDS

Data tools – Data grouping & cleansing – Sort, Filter, Remove Duplicates, conditional formatting, Consolidate – Data Validation – Quick analysis.

Chapter 1 – 1.8.4 [1.8. 4.1, 1.8.4.2]

UNIT – III: DATA ANALYSIS FUNCTION

Formula & functions – Sum, Average, if, Count, max, min, Proper, Upper, Lower, AutoSum, Concatenate, Vlookup, Hlookup, Match, Countif, Text, Trim, Len, Days, Network days, sumifs, Averageifs, Countsifs, Counta, iferror, Find/search, left/right, Rank.

Chapter 3 – 3.1, 3.5, 3.9 – 3.13

UNIT – IV: CHARTS

Chart types and uses – Different types of chart, – Waterfall chart, Histogram and Pareto chart.

Unit IV: Chapter 4 – 4.1, 4.2, 4.3, 4.4

UNIT – V: PIVOT TABLES

Creating Pivot Tables, Manipulating a Pivot Table, Using the Pivot Table Toolbar, Changing Data Field, Properties, Displaying a Pivot Chart, Setting Pivot Table Options, Adding Subtotals to Pivot Tables

Unit V: Chapter 7 – 7.1, 7.2, 7.3 – 7.7

TEXT BOOKS:

Data Analysis with Excel – Manish Nigam – BPB publications, 2019

REFERENCE BOOKS:

1. *Excel 2022 Bible* by John Walken Bach
2. *Excel 2022 All-In-One For Dummies* by Greg Harvey

DIGITAL TOOLS: -

1. Excel Data Analysis https://www.w3schools.com/EXCEL/excel_sort.php
2. Excel Easy: <https://www.excel-easy.com>
3. Excel for Data Analysis: <http://home.ubalt.edu/ntsbarsh/excel/excel.htm>

Mapping of CO with PSO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2
CO2	2	2	2	2	3	1
CO3	2	2	1	2	2	1
CO4	1	2	2	1	1	2
CO5	2	3	2	2	2	2

3. Advanced Application 2. Intermediate Development 1. Introductory Level