CODE	COURSE TITLE
18MSUA101/19MCUA101	**STATISTICS FOR MATHEMATICS – I**

Category	CIA	ESE	L	T	P	Credit
ALLIED	20	55	70	5	-	4

Preamble

To acquire knowledge in the fundamentals of statistics such as random variables, distribution of the discrete and continuous types, bivariate distributions and functions of random variables

Prerequisite

❖ Must know the concepts in probability theory such as properties of probability, independent events, conditional probability and Baye's theorem

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	learn the concept of random variables	K1
CO2.	exercise the problem solving ability in statistics	K3
CO3.	study the characteristics of discrete and continuous distributions	K2
CO4.	acquire knowledge in of bivariate distributions	K2
CO5.	make use of random variables to find the distributions of functions of random variables	K3

Mapping with Programme Outcomes

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

S- Strong; M-Medium; L-Low

SEMESTER – I

Allied – I: STATISTICS FOR MATHEMATICS – I

Syllabus

UNIT I (16 hrs.)

Discrete Distributions : Random Variables of the Discrete Type – Mathematical Expectation – Special Mathematical Expectation – Binomial Distribution – Negative Binomial Distribution - The Poisson Distribution

UNIT II (14 hrs.)

Continuous Distributions : Random Variables of Continuous Type – Exponential, Gamma and χ^2 Distributions – Normal Distribution

UNIT III (15 hrs.)

Bivariate Distributions: Bivariate Distributions of the Discrete type – Correlation Coefficient - Conditional Distributions – Bivariate Distributions of the Continuous Type – The Bivariate Normal Distributions

UNIT IV (15 hrs.)

Distributions of Functions of Random Variables: Functions of One Random Variable – Transformations of Two Random Variables – Several Random Variable – The Moment Generating Function Technique

UNIT V (15 hrs.)

Distributions of Functions of Normal Random Variables: Random Functions Associated With Normal Distributions – The Central Limit Theorem – Approximation for Discrete Distributions - Chebyshev's Inequality – Convergence in Probability

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Robert V. Hogg, Elliot A. Tanis, Dale L.Zimmerman	Probability and Statistical Inference	Pearson Education Inc.	2015, 9th Edition

Unit	Chapter	Sections	Page No.
I	2	2.1 to 2.6	41 - 72, 79 - 85
II	3	3.1 to 3.3	87 - 113
III	4	4.1 to 4.5	125 - 153
IV	5	5.1 to 5.4	163 - 179, 187 – 191
V	5	5.5 to 5.8	192 – 216

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Presanna Sahoo	Probability and Mathematical Statistics	University of Louisville, USA	2013
2	Barbara Illowsky, Susan Dean	Introductory Statistics	Rice University, Texas	2014, Last Edition
3	Robert V. Hogg, Joseph W. McKean, Allen T. Craig	Introduction to Mathematical Statistics	Pearson	2018, 8th Edition.
4	S.C. Gupta and V.K. Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & Sons	Reprint 2014

Pedagogy

- Lecture, PPT, Seminar, Subject Viva, Videos

- Question Paper setters are asked to confine to the above **text book** only.

CODE	COURSE TITLE
18MSUAP01/19MCUAP01	**MATHEMATICAL SOFTWARE – I**

Category	CIA	ESE	L	T	P	Credit
ALLIED	-	25	-		30	1

Preamble

To apply the statistical knowledge acquired through the theory course

Prerequisite

To be familiar with the basic statistical concepts of measures of central tendency, measures of dispersion, descriptive statistics, correlation, regression & testing of hypothesis

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	be equipped with the professional competency through learning Free Open Source Software - R	K3
CO2.	create the database, visualizing and analyzing the data using R	K2
CO3.	make inferences through the results obtained	K4

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1.	S	S	M	S	S
CO2.	S	S	M	S	S
CO3.	S	S	M	S	S

List of Practical

1. Use R as a calculator using basic Commands in R.
2. Data entry, manipulation and retrieval.
3. Creating frequency and relative frequency distribution in R.
4. Creating data frame, matrices.
5. Descriptive statistics, Graphics - pie diagram, box plot, histogram, bar plot.
6. Creating functions.
7. To find mean, median, geometric mean, harmonic mean of numerical data and edit the output.
8. To determine standard deviation, variance and checking the consistency of the given data and edit the output.
9. Bivariate data- scatter plot, correlation co-efficient, fitting linear regression line and interpreting the result.
10. Multiple linear regression models.
11. Computation of probabilities in various distributions.(Binomial, Poisson, Normal)
12. Drawing the graph of probability mass and density functions.
13. One and two sample '*t*' test and paired' test.
14. One way and two way Analysis of Variance tests.

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	W. John Braun and Duncan J. Murdoch	A First Course in Statistical Programming with R	Cambridge University Press, Newyork	Reprint 2007
2.	J H Maindonald	Using R for Data Analysis and Graphics: Introduction, Code and Commentary	*https://cran.r-project.org/doc/contrib/usingR.pdf*	Online
3.	Kim Seefeld and Ernst Linder	Statistics Using R with Biological Examples	*https://cran.r-project.org/doc/contrib/Seefeld_StatsRBio.pdf*	Online

CODE	COURSE TITLE
18MSUC204/19MCUC204	**TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES**

Category	CIA	ESE	L	T	P	Credit
CORE	20	55	42	3	--	3

Preamble

- To focus on conceptual understanding
- To introduce logarithm of a complex quantity
- To prepare students to succeed in upper level math, science, engineering and other courses which require trigonometry and vector calculus
- To impart the application of sine and cosine functions in signals using Fourier series

Prerequisite

- Students must know the basics of trigonometric identities, complex number system and the difference between scalars and vectors

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1.	expand sines and cosines of multiples of theta and powers of theta	K2
CO2.	find logarithm of a complex number and summation of trigonometric series	K1
CO3.	understand the relation between directional derivative, gradient, divergence and curl	K1
CO4.	make use of theorems to study relation between line, surface and volume integrals	K3
CO5.	evaluate line, surface and volume integrals	K3

Mapping with Programme Outcomes

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

S- Strong; M-Medium; L-Low

Core – IV: TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES

Syllabus

UNIT I **(9 hrs.)**

Expansions: Expansion of $\cos n\phi$, $\sin n\phi$, $\cos^n \phi$, $\sin^n \phi$ – **Hyperbolic functions** – Separation of real and imaginary parts of $\sin(\alpha + i\beta)$, $\cos(\alpha + i\beta)$, $\tan(\alpha + i\beta)$, $\sinh(\alpha + i\beta)$, $\cosh(\alpha + i\beta)$, $\tanh(\alpha + i\beta)$, $\tan^{-1}(\alpha + i\beta)$

UNIT II **(8 hrs.)**

Logarithm of a Complex Number and Summation of Series: Logarithm of a Complex Number – Summation of Trigonometric Series – Method of Differences – When Angles are in A.P.

UNIT III **(9 hrs.)**

Scalar and Vector Point Functions– Directional Derivative, Gradient, Divergence, Curl – Summation notation for Divergence and Curl – Laplacian Differential Operator – Problems

UNIT IV **(10 hrs.)**

Integration of Vectors : Line, Surface and Volume Integrals – Theorems of Gauss, Green, Stokes (Statements only) – Verification

UNIT V **(9 hrs.)**

Fourier Series : Definition – Finding Fourier Coefficients for a Given Periodic Function with Period 2π – Odd and Even Functions – Half Range Series

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	S. Narayanan and T.K.Manicavachagom Pillay	Trigonometry (Units I, II)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	Reprint 2015
2	P.Duraipandian, Kayalal Pachaiyappa	Vector Analysis (Units III, IV)	S.Chand & Company Pvt.Ltd, New Delhi	Reprint 2015
3	S. Narayanan and T.K.Manicavachagom Pillay	Calculus, Vol. III (Unit V)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	Reprint 2015

Unit	Chapter	Sections
I	III	1 & 4
	IV	1 & 2
II	V	5
	VI	1 & 2
III	II	2.1 – 2.9, 2.13
IV	III	3.1, 3.5 – 3.8
	IV	4.1 – 4.6, 4.8
V	VI	2, 3 & 4

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Robert E Moyer, Frank Ayres JR	Schaum's Outlines Trigonometry	Tata McGraw Hill Publishing Company, New Delhi	2013, 5th Edition
2	M.D.Raisinghania, H.C.Saxena, H.K.Dass	Trigonometry	S.Chand & Sons, New Delhi	Reprint 2002
3	James Stewart	Calculus: Early Transcendentals	Thomson Brooks/Cole, USA	2008, 6th Edition
4	Peter V.O'Neil	Advanced Engineering Mathematics	Cengage Learning India Pvt. Ltd., New Delhi	2012, 7th Edition

Pedagogy

- Lecture, PPT, Subject Viva, Seminar and Videos

- Question paper setters are asked to confine to the above **text books** only.

CODE	COURSE TITLE
18MSUCP01/19MCUCP01	MATHEMATICAL SOFTWARE – II

Category	CIA	ESE	L	T	P	Credit
CORE	--	25	--	--	30	1

Preamble

- To give hands-on experience in the Free Open Source Software SageMath which will be highly useful for future teachers and researchers
- To visualize the mathematical concepts for better understanding

Prerequisites

- Students must know the basic concepts of number theory, calculus, theory of equations and differential equations

Course Outcomes

On the successful completion of the course, students will be able to

	CO Statement	Knowledge Level
CO6.	use Geogebra to draw geometrical shapes	K2
CO7.	use SageMath as a calculator	K3
CO8.	solve number theory problems	K3
CO9.	make use of theoretical concepts to solve problems and visualize the output	K3

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5
CO6.	S	S	S	S	S
CO7.	S	S	S	S	S
CO8.	S	S	S	S	S
CO9.	S	S	S	S	S

S- Strong; M-Medium; L-Low

SEMESTER – II

Core Practical : MATHEMATICAL SOFTWARE – II

List of Practical – SAGEMATH

1. Use Sage Math as a calculator – A Financial Example.

2. Use Sage for Trigonometry.

3. Use Sage to Graph 2-Dimensionally.

4. Superimposing Multiple Graphs in One Plot.

5. Solve a Linear System of Equations

$$3481x + 59y + z = 0{:}87$$
$$6241x + 79y + z = 0{:}61$$
$$9801x + 99y + z = 0{:}42$$

6. Making Own Functions and Plotting in Sage.

7. Solving Linear and Non-Linear Systems of Equations.

8. Use Sage as a Numerical Solver.

9. Use Sage to find Derivatives & Plot f(x) and f'(x) Together and find Higher-Order Derivatives.

10. Use Sage to Calculate Integrals.

11. Labeling the Axes of Graphs.

12. Graphing an Integral.

13. Parametric 2D Plotting.

14. Vector Field Plots, Gradients and Vector Field Plots.

15. Working with the Integers and Number Theory.

16. Combinations and Permutations.

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Gregory V. Bard	Sage for Undergraduates	online version	--

Programme No	Page No
1	6
2	7 – 8
3	8 – 11
4	14
5	24
6	30
7	39 – 40
8	43
9	49 – 50
10	51 – 58
11	91 – 94
12	95 – 97
13	112 – 114
14	114 – 115
15	145 – 147
16	153

CODE	COURSE TITLE
18MSUA202/19MCUA202	**STATISTICS FOR MATHEMATICS – II**

Category	CIA	ESE	L	T	P	Credit
ALLIED	25	75	98	7	-	5

Preamble

To learn the theory of estimation and testing of statistical hypothesis

Prerequisite

- Must have the basic knowledge about the characteristics of statistical measures

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO4.	learn the theory of estimation	K1
CO5.	acquire knowledge about confidence intervals	K2
CO6.	formulate the statistical hypothesis	K3
CO7.	enhance the statistical knowledge by applying the techniques learned in testing of statistical hypothesis	K2
CO8.	analyze and draw inferences based on the results of the testing of hypothesis	K4

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO4.	M	S	M	S	M
CO5.	M	S	M	S	M
CO6.	S	S	S	S	S
CO7.	M	S	M	S	S
CO8.	S	S	M	S	S

S- Strong; M-Medium; L-Low

Allied – I: STATISTICS FOR MATHEMATICS – II

Syllabus

UNIT I   **(20 hrs.)**

Point Estimation : Maximum likelihood estimation – A simple regression problem – Sufficient Statistics – Descriptive Statistics

UNIT II   **(21 hrs.)**

Interval Estimation : Confidence Intervals for Means – Confidence Intervals for the Difference of Two Means – Confidence Intervals of Proportions– Sample Size.

UNIT III   **(22 hrs.)**

Test of Statistical Hypothesis : Tests About One Mean – Tests of the Equality of Two Means – Tests About Proportions – Power of a Statistical Test – Best Critical Regions.

UNIT IV   **(21 hrs.)**

Some more Parametric Tests : Chi-Square Goodness of Fit – Contingency Tables – Tests Concerning Regression – Correlation.

UNIT V   **(21 hrs.)**

Analysis of Variance : One – Factor Analysis of Variance – Two Way Analysis of Variance.

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Robert V. Hogg, Elliot A. Tanis, Dale L. Zimmerman	Probability and Statistical Inference	Pearson Education Inc. New York	2015, 9th Edition

Unit	Chapter	Sections	Page No
I	6	6.1, 6.4, 6.5, 6.7	225 – 237, 256 – 275, 280 – 287
II	7	7.1 to 7.4	301 - 330
III	8	8.1 to 8.3, 8.5, 8.6	355 - 381, 392 - 405
IV	9	9.1, 9.2, 9.6	415 - 433, 462 - 467
V	9	9.3 to 9.4	435 – 455

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Presanna Sahoo	Probability and Mathematical Statistics	University of Louisville, USA	2013
2.	Barbara Illowsky, Susan Dean	Introductory Statistics	Rice University,Texas	2014 , Last Edition
3.	Robert V. Hogg, Joseph W. McKean, Allen T. Crag	Introduction to Mathematical Statistics	Pearson Education Inc. New York	2018, 8th Edition
4.	S.C. Gupta and V.K. Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & Sons, New Delhi	Reprint 2014

Pedagogy

- Lecture, PPT, Seminar, Subject viva, Videos
- Question paper setters are asked to confine to the above **text book only.**

CODE	COURSE TITLE
18MCUC305	ANALYTICAL GEOMETRY

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	85	5	--	5

Preamble
- To focus on conceptual and practical understanding
- To discuss the ideas of polar equations quite fully
- To illustrate the shapes sphere, cone and cylinder through conceptually and problematically
- To introduce students the concepts of quadric cones

Prerequisites
- Students must know the basics of geometry and equations of geometrical figures in both Cartesian and polar forms.

Course Outcomes
On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Find the polar form of straight lines, circle and conic sections and also to understand the properties	K1
CO2	Gain more profound knowledge on Planes and Straight lines	K2
CO3	Identify the characteristics of sphere	K2
CO4	Enhance the fundamental concepts of cone and cylinder	K3
CO5	Apply the concept of cone and straight line	K3

Mapping with Programme Outcomes

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

S- Strong; M-Medium; L-Low

UNIT I   **18 Hrs.**

Polar Equations : Polar co-ordinates – Polar equations of straight line, circle, conic – Some properties of the general conic – Simple problems.

UNIT II

                                                                                                            19 Hrs.

Plane : The Equation of a Plane - Angle between two planes – Equation of a plane through the line of intersection of two given planes - Length of perpendicular – Simple problems.

Straight line : The Straight line – Equation of a straight line passing through two given points - The plane and the straight line.

UNIT III   **17 Hrs.**

Straight line : Coplanar lines -The intersection of three planes – Volume of tetrahedron.

Sphere: Definition – Equation of a circle on a sphere – The equation of the tangent plane to the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ at a point (x_1, y_1, z_1) - Simple problems.

UNIT IV   **18 Hrs.**

Cone and Cylinder : Cone – Right Circular Cone – Tangent plane and normal – Cylinder – Enveloping cylinder.

UNIT V   **18 Hrs.**

Central Quadrics : Definition – The intersection of a line and a quadric - Tangents and tangent planes – Polar planes and polar lines - Normal at the point $\left(x_1, y_1, z_1\right)$ to the conicoid $ax^2 + by^2 + cz^2 = 1$ - Some properties of the concurrent normals to the ellipsoid.

Text Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Manicavachagom Pillay T.K. and Natarajan T.	Analytical Geometry (Part- I – Two Dimensions)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	Reprint 2014
2.	Manicavachagom Pillay T.K. and Natarajan T.	Analytical Geometry (Part- II – Three Dimensions)	S.Viswanathan Printers and Publishers Pvt. Ltd., Chennai	Reprint 2016

Unit	Chapter	Sections	Page No
I	IX	1 - 15	325 - 366
II	II	1 - 11	24 - 45
	III	1 – 6	46 - 61
III	III	7 - 11	61 - 91
	IV	1 - 8	92 - 114
IV	V	1 – 8.3	115 - 140
V	V	9 - 14.2	140 - 167

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	P.Duraipandiyan Kayalal Pachaiyappa	Analytical Geometry 2- D	Muhil Publishers, Chennai	Reprint 2010
2	P.Duraipandiyan Kayalal Pachaiyappa	Analytical Geometry 3- D	Muhil Publishers, Chennai	Revised Edition 2009

Web Resourses

1. https://www.khanacademy.org/math/basic-geo/basic-geo-lines/parallel-perp/v/parallel-and-perpendicular-lines-intro.

2. https://www.youtube.com/watch?v=cStx9_eWD5Y

3. https://www.brainkart.com/article/Three-Dimensional-Analytical-Geometry_6453/

Pedagogy

- Lecture, PPT, Quiz, Group Discussion, Seminar

- Question paper setters are asked to confine to the above **text books** only.

CODE	COURSE TITLE
18MCUC306	MECHANICS

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	85	5	-	5

Preamble

- The objective of this course is to study about the Type of Forces, Kinematics and Projectile
- To illustrate Coplanar forces, Relative velocity and Time of Flight

Prerequisite

- Students must know the basics of force, velocity and couples

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Define Resolution of a force	K1
CO2	Evaluate like and unlike forces	K2
CO3	Illustrate couples and coplanar forces	K3
CO4	How to find relative velocity and relative angular velocity	K3
CO5	Analyze the concept of range on an inclined plane	K4

Mapping with Programme Outcomes

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

S - Strong; M - Medium; L – Low

UNIT I   **12 Hrs.**

Forces Acting at a Point: Parallelogram Law – Triangle Law – Lami's Theorem - ($\lambda - \mu$) Theorem – Polygon of Forces – Conditions of Equilibrium. **Parallel Forces:** Composition of Parallel Force (Like and Unlike) – Conditions of equilibrium of three coplanar parallel forces.

UNIT II   **11 Hrs.**

Moments: Moment of a Force about a Point and about a Line – Varignon's Theorem. **Couples** : Equilibrium of two couples – Equivalence of two couples – Resultant of coplanar couples – Resultant of a couple and a force

UNIT III   **13 Hrs.**

Equilibrium of Three Forces Acting on a Rigid Body: Rigid body subjected to any three forces - Three coplanar Forces – Two Trigonometrical Theorem. **Coplanar Forces:** Reduction of any number of coplanar forces – Conditions for a system of forces to reduce to a single force or to a couple – Equation to the line of action of the resultant.

UNIT IV   **12 Hrs.**

Kinematics: Velocity – Acceleration –Composition of Velocities and Accelerations – Relative Velocity – Angular Velocity – Relative Angular Velocity – Equations of Motion, Acceleration of Falling Bodies – Vertical Motion under Gravity – Motion down a Smooth Inclined Plane.

UNIT V   **12 Hrs.**

Projectile: Path of a Projectile – Greatest Height – Time of Flight – Range on an Inclined Plane through the Point of Projection – Maximum Range on the inclined plane-down the plane.

Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Venkataraman M.K.	Statics	Agasthiar Publications, Trichy	2016, 18th Edition
2	Venkataraman M.K.	Dynamics	Agasthiar Publications, Trichy	2014, 16th`Edition

Unit	Chapter	Sections	Page No
I	2	2.1 - 2.16	6 – 51
	3	3.1 - 3.6	52 – 61
II	3	3.7 - 3.14	61 – 83
	4	4.1 - 4.10	84 – 97
III	5	5.1 - 5.6	98 - 116(upto example 5)
	6	6.1 - 6.9	143 - 166(upto example 9)
IV	3	3.1 - 3.35	14 – 76
V	6	6.1 - 6.16	139 – 200

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Manickavachagam Pillai T.K.	Statics	The National Publishing Company, Chennai	1978, 3rd Edition
2.	Narayanan S.	Dynamics	S.Chand & Company Ltd, New Delhi	1980, 4th Edition
3.	Ray M.	A Text Book On Dynamics	S.Chand and Company, New Delhi	1972, 8th Edition

Web Resources

1. https://nptel.ac.in/courses/112105164/lec2.pdf
2. https://nptel.ac.in/courses/122102004/3
3. https://www.khanacademy.org/science
4. https://www.khanacademy.org/science/ap-physics-1

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

- Question paper setters are asked to confine to the above **text book** only.

CODE	COURSE TITLE
18MCUC307	C – PROGRAMMING (THEORY)

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	40	5	-	2

Preamble

- The objective of this course is to develop the Programming Skill in the Computer Language C.
- This enhances the Job Opportunities to the student in the IT field

Prerequisite

- Knowledge of Constant, Variables and Operators

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Define the basic concepts of Data Types and Operators	K1
CO2	Demonstrate the fundamentals of C Branching and Looping	K2
CO3	Demonstrate the concepts of Arrays and Structure	K3
CO4	Apply the concepts of Functions	K3
CO5	Analyze the concepts of Pointers	K4

Mapping with Programme Outcomes

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

S - Strong; M - Medium; L - Low

UNIT I   **9 Hrs.**

Constant, Variables, Data Types and Operators : Introduction – Character Set – C Tokens – Keywords & Identifiers – Constants – Variables – Data types – Declaration of Variables and Storage Class – Symbolic Constants. **Operators:** Arithmetic, Relational, Logic, Assignment, Increment and Decrement, Conditional, Bitwise and Special Operators – Arithmetic Expression – Precedence of Operators – Type Conversions – Mathematical Functions.

UNIT II   **9 Hrs.**

Looping and Branching: IF Statement - IF…ELSE Statement – Nesting of IF…ELSE Statement – ELSE IF Ladder- SWITCH Statement – Conditional Operator – GO TO Statement – WHILE Loop – DO…WHILE Loop – FOR Loop – Jumps in Loop.

UNIT III   **10 Hrs.**

Formatted I/O Operations: Reading and Writing a Character – Formatted Input and Output. **Arrays:** One Dimensional Array – Declaration and Initialization of One Dimensional arrays - Two Dimensional Arrays - Multi Dimensional Arrays. **Structures**: Defining and Declaring a Structure – Accessing Structure Members – Structure Initialization – Arrays of Structures – Arrays within Structures – Structures within Structures – Structures and Functions.

UNIT IV   **8 Hrs.**

Function: Introduction – Multi - Function Program – Function Definition – Return Values and their types – Function Call – Function Declaration – **Categories of Functions:** No Arguments and No Return Values - Arguments but No Return Values - Arguments with Return Values - No Arguments but Returns a Value – Functions that Return Multiple Values- Nesting of Functions– Recursion – Passing Arrays and strings to Functions.

UNIT V   **9 Hrs.**

Pointers : Introduction – Accessing the Address of a Variable – Declaring and Initializing Pointer Variables – Accessing Variables Through Pointers – Chain of Pointers – Pointer Expressions – Pointer Increments – Pointers and Arrays – Pointers and Character Strings – Array of Pointers – Pointers as Function Arguments – Functions Returning Pointers – Pointer to Functions – Pointers and Structures.

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Balagurusamy E.	Programming in ANSI C	Tata McGraw-Hill, Publishing Company Limited, New Delhi	2017, 7th Edition

Unit	Chapter	Page No
I	2	22 – 43
	3	51 – 72
II	5	111 – 135
	6	149 – 173
III	4	81 – 101
	7	189 – 213
	10	320 – 338
IV	9	267 – 298
V	11	353 – 379

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Byron S.Gottfried	Programming with C	Tata MC Graw – Hill, New Delhi	1995, 11th Edition
2.	Ravichandran D.	Programming in C	New Age International (P) Limited, Publisher, New Delhi,	Reprint 2006
3.	Thamarai Selvi S. Murugesan R.	C for All	Anuradha Agencies, Kumbakonam,	1999, 1st Edition
4.	Gupta S.C. Kapoor V.K.	Fundamentals of Mathematical Statistics	Sultan Chand & Sons, New Delhi	Reprint 2014

Web Resources

1. https://swayam.gov.in/course/1388-introduction-to-programming-in-c
2. https://onlinecourses.nptel.ac.in/noc17_cs43/
3. https://onlinecourses.nptel.ac.in/noc18-cs10/
4. https://www.khanacademy.org/computing/computer-programming

Pedagogy

Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar

- Question paper setters are asked to confine to the above **text book** only.

CODE	COURSE TITLE
18MCUC408	LINEAR ALGEBRA

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	72	3	--	4

Preamble

- To acquaint students with the fundamental and important topics of linear algebra
- To inculcate and instill the concepts of vector spaces with illustrated examples
- To emphasize the symbiotic relationship between linear transformations, matrices and determinants
- To impart the concepts of inner product space and norms

Prerequisites

- Students must know the basics of vector algebra, matrices and determinants

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concept of vector spaces	K1
CO2	Identify the linear transformation and integrate it with matrices	K2
CO3	Compare the ideology of matrices and systems of linear equations	K2
CO4	Demonstrate determinants and its properties	K3
CO5	Utilize the concepts of inner product spaces and norms	K3

Mapping with Programme Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus

UNIT I   **15 Hrs.**

Vector spaces : Vector spaces – Subspaces – Linear Combinations and Systems of Linear Equations – Linear Independence and Linear dependence – Bases and Dimension – Maximal Linearly Independent subsets.

UNIT II   **14 Hrs.**

Linear transformations: Linear transformations, Null spaces and Ranges – The matrix representation of a linear transformation – Composition of linear transformation and matrix multiplication- Isomorphism and Dual Spaces - Invertibility and Isomorphisms – The change of coordinate matrix – Dual spaces.

UNIT III   **15 Hrs.**

Elementary Matrix Operations : Elementary Matrix Operations and Elementary matrices – The rank of a matrix and matrix inverse – Systems of Linear Equations – Theoretical aspects – Systems of Linear Equations – Computational aspects.

UNIT IV   **15 Hrs.**

Determinants: Determinants of order 2 – Determinants of order n – Properties of Determinants – Important facts about Determinants – A characterization of the Determinant.

UNIT V   **16 Hrs.**

Inner product spaces : Inner products and norms - Gram-Schmidt orthogonalization process and Orthogonal complements.

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Stephen. H.Friedberg, Arnold.J. Insel, Lawrence.E.Spence	Linear Algebra	Pearson India Education Service Pvt. Ltd, India	2015, 4th Edition

Unit	Chapter	Sections
I	I	1.1 – 1.7
II	II	2.1 – 2.6
III	III	3.1 – 3.4
IV	IV	4.1 – 4.5
V	VI	6.1 – 6.2

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Kenneth.M.Hoffman, Ray Kunze	Linear Algebra	Prentice Hall India Learning Private Limited, New Delhi	2015, 2nd Edition
2.	Gilbert Strang.	Introduction to Linear Algebra	Wellesley – Cambridge Press, Taiwan	2009, 4th Edition
3.	Kumaresan S.	Linear Algebra	Prentice Hall of India Pvt. Ltd, New Delhi	2000, 1st Edition

Web Resources

1. http://www.math.toronto.edu/gscott/WhatVS.pdf
2. https://www.khanacademy.org/math/linear-algebra/matrix-transformations/linear-transformatio v/linear-transformations
3. https://www.youtube.com/watch?v=APPY30xZb0w
4. https://www.toppr.com/guides/maths/determinants/determinant-of-a-matrix/
5. https://brilliant.org/wiki/inner-product-space/

Pedagogy

- Lecture, PPT, Quiz, Group Discussion, Seminar

- Question paper setters are asked to confine to the above **text books** only.

CODE	COURSE TITLE
18MCUC409	FOUNDATION COURSE IN MATHEMATICS

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	86	4	-	5

Preamble

- To introduce the concept of statements and logic, sets and functions, relation and basic principles.
- To study about the order relation and real number system.

Prerequisite

- Knowledge in sets, functions, induction principles and real fields.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Acquire the knowledge of Quantifier statements and some proofs in Mathematics	K2
CO2	Apply the concept of basic terminologies, family of sets and Cartesian product of sets	K3
CO3	Demonstrate the basic definitions of functions, composition of functions and inverse image of subsets under functions	K4
CO4	Analyze the relation on sets, types of relations, induction principles, well-ordering principle and equivalence of the three principles	K4
CO5	Determine the concept of partial and total orders, bounds and maximal elements, axiom of choice and its equivalents and determine the real number system concept LUB, Absolute value and Triangle inequality	K2,K3

Mapping with Programme Outcomes

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

S - Strong; M - Medium; L – Low

Syllabus

UNIT I   **18 Hrs.**

Statements and Logic: Statements-Statements with Quantifiers-Compound Statements-Implications-Proofs in mathematics.

UNIT II   **17 Hrs.**

Sets: Basic terminologies-Operations on sets- Family of sets- Power sets-Cartesian product of sets.

UNIT III   **18 Hrs.**

Functions: Basic definitions- One-one, Onto functions and Bijections- Composition of functions-Inverse of a function- Image of subsets under functions- Inverse image of subsets under functions.

UNIT IV   **19 Hrs.**

Relation and Induction principles : Relations on sets-Types of relations-Equivalence relations- Equivalence classes and partitions of a set. The Induction principle- The Strong Induction principle- The well-ordering principle - Equivalence of the three principles.

UNIT V   **18 Hrs.**

Order Relations and Real Number System: Partial and Total orders-Chains, Bounds and Maximal elements-Axiom of choice and its equivalents. Algebra of the real number system – Upper and lower bounds-LUB property and its applications- Absolute value and Triangle Inequality.

Web Resourses
1. https://nptel.ac.in/courses/111105098/
2. https://www.class-central.com/course/nptel-introductory-course-in-real-analysis-7941
3. https://math.stackexchange.com/questions/593303/online-course-for-real-analysis
4. https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-linear-equations-functions/cc-8th-function-intro/v/relations-and-functions
5. https://www.youtube.com/watch?v=_5t1IkCkdW0

Pedagogy
- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar
- Question paper setters are asked to confine to the above **text book** only.

CODE	COURSE TITLE
18MCUC410	OBJECT ORIENTED PROGRAMMING WITH C++ (THEORY)

Category	CIA	ESE	L	T	P	Credit
CORE	25	75	55	5	-	3

Preamble

- The aim of this course is to explore the programming skill of the high level language C++

- This course helps the student to be employed in the Software Companies

Prerequisite

- Knowledge of Classes, Functions and Inheritance

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate basic concepts and application of OOP	K1
CO2	Revise the concept of classes and objects	K2
CO3	Illustrate the Functions and Pointers	K3
CO4	Discuss about Constructors, Destructors and Operator overloading	K3
CO5	Analyze the concepts of Inheritance	K4

Mapping with Programme Outcomes

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

S - Strong; M - Medium; L – Low

Syllabus

UNIT I   12 Hrs.

Principles of Object- Oriented Programming : Software crisis – Software evolution – A look at procedure–oriented programming – Object–oriented Programming Paradigm – Basic concept of Object–Oriented Programming – Benefits of OOP – Applications of OOP – Basic data types – User defined and derived data types – Reference variables – Operators in C++ - Scope resolution operator – Memory management operator.

UNIT II   12 Hrs.

Classes and Objects : Introduction – C structures revisited – Specifying a class – defining member functions – A C++ program with class – making an outside function Inline – nesting of member functions – Private member functions – Arrays within a class – Memory allocation of objects – Static data members – Static member functions – Arrays of objects – objects as function arguments – Friendly functions – Returning objects – pointers to members – Console I/O operations: Formatted console I/O operations – managing output with manipulators.

UNIT III   13 Hrs.

Functions: Introduction – The main function – Function Prototyping – Call by reference – Return by reference – Inline functions – Default arguments – Const arguments – Function overloading**. Pointers:** Introduction – Pointers – Pointers to objects – 'this' pointer – Pointers to derived classes – Virtual functions – Pure virtual functions.

UNIT IV   12 Hrs.

Constructors and Destructors : Introduction – Constructors – Parameterized constructors – Multiple Constructors in a class – Constructors with default arguments – Dynamic initialization of objects – Copy Constructors – Dynamic Constructors – Constructing two dimensional arrays – Const objects – Destructors. **Operator Overloading:** Defining operator overloading – Overloading unary and binary operators – Overloading binary operators using friend function – Manipulation of strings using operators – Rules for overloading operators.

UNIT V   11 Hrs.

Inheritance: Introduction – Defining derived classes – Single inheritance – Making a private member inheritable – Multilevel inheritance – Multiple inheritances – Hierarchical inheritance – Hybrid inheritance – Virtual base classes – Abstract classes – Constructors in derived classes – Member classes – Type conversions.

Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Balagurusamy E	Object Oriented Programming in C++	Tata McGraw-Hill, Publishing Company Limited, New Delhi	2014,6th Edition

Unit	Chapter	Sections
I	1	1.1 – 1.8
	3	3.5 – 3.8, 3.13 - 3.17
II	5	5.1 – 5.18
	10	10.5 – 10.6
III	4	4.1 – 4.10
	9	9.1 – 9.7
IV	6	6.1 – 6.11
	7	7.1 – 7.8
V	7	7.9
	8	8.1 – 8.12

Reference Books

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Balagurusamy E.	Programming in C++	Tata MCGraw – Hill Publishing Company Ltd, New Delhi	2017,6th Edition
2.	Bjarne Stroustrup	The C++ Programming Language	Pearson Education Pvt.Ltd, New Delhi	9th Impression 2012
3.	Ashok N. Kamthane	Object Oriented Programming with ANSI & Turbo C++	Pearson Education Pvt.Ltd, New Delhi	3rd Indian Reprint, 2005

Web Recourses

1. https://swayam.gov.in
2. https://onlinecourses.nptel.ac.in

3. https://nptel.ac.in

4. https://www.lynda.com/computing/computer-programming

Pedagogy

- Lecture, PPT, Quiz, Assignment, Group Discussion, Seminar
- Question paper setters are asked to confine to the above **text book** only**.**

CODE	COURSE TITLE
18MCUCP02/19MCUCP03	OBJECT ORIENTED PROGRAMMING WITH C++ (PRACTICAL)

Category	CIA	ESE	L	T	P	Credit
CORE	40	60	--	5	40	2

Preamble

- The main objective of this course will enable the students to identify, formulate all techniques of software development in C++ programming

Prerequisites

- Students must know the basic concepts of C++ Programming

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Explain concept of objects and classes	K2
CO2	Use the concepts of classes	K2
CO3	Construct C++ programs using pointers	K3
CO4	Make use of constructors and destructors	K3
CO5	Write programs implementing inheritance for an application domain	K3

Mapping with Programme Outcomes

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

S- Strong; M-Medium; L-Low

List of Practical

Objects and Classes

1. Create a class to implement the data structure stack. Write a constructor to initialize the top of the stack to zero. Write a member function Push( ) to insert an element and member function Pop( ) to delete an element. Check for overflow and underflow conditions.

2. Create a class Arith which consists of a float and an integer variable. Write member functions Add( ), Sub( ), Mul( ), Div( ), Mod( ) to perform addition, subtraction, multiplication, division and modulus respectively. Write member functions to get and display values.

Operator Overloading

3. Create a class mat has a 2–D matrix and R & C represents the rows and columns of the matrix. Overload the operators +, -, * to add, subtract and multiply two matrices. Write member function to get and display mat object values.

4. Create a class string. Write member function to initialize, get and display strings. Overload the operator + to concatenate two strings, = = to compare two strings and a member function to find the length of the string.

Inheritance

5. Create a class shape which consists of two virtual functions Cal area ( ) and Cal peri ( ) to calculate area and perimeter of various figures. Derive three classes Square, Rectangle and Triangle from the class Shape and calculate Area and Perimeter of each class separately and display the result.

6. Create two classes which consist of two private variables, one integer and one float variable in each class. Write member functions to get and display them. Write a friend function common to both classes which takes the object of the above two classes as arguments and the integer and float values of both the objects separately and display the result.

Console I/O

7. Write a user-defined function Userfun( ) which has the formatting commands like setw( ), showpoint( ), showpos( ), precision( ). Write a program which prints a multiplication table and uses Userfun( ) for formatting.

Files

8. Write a program which takes a file as argument and copies into another file line numbers using command line arguments.

Reference Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Balagurusamy E	Object Oriented Programming in C++	Tata McGraw-Hill, Publishing Company Limited, New Delhi	2014,6th Edition

Reference Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
		Object Oriented Programming in C++	Tata McGraw-Hill, Publishing Company Limited, New Delhi	

CODE	COURSE TITLE
18MCUA301	**ALLIED PAPER- BASIC MATHEMATICS** **(For Bio-Chemistry)**

Category	CIA	ESE	L	T	P	Credit
ALLIED	20	55	85	5	--	3

Preamble

- To develop the knowledge about Diagrams & Graphs
- To focus on the concepts of Matrices, Differentiation and Integration
- To discuss the ideas of Exponential, Logarithmic and Trigonometric functions

Prerequisites

- Students must know the basics of geometry Matrices and Trigonometric functions

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Recall knowledge about graphs and diagrams	K1
CO2	Compute Mean & Standard deviation	K2
CO3	Understand the concepts of Correlation and Regression	K2
CO4	Illustrate the fundamentals of Matrices	K3
CO5	Demonstrate the concepts of Differentiation & Integration	K3

Mapping with Programme Outcomes

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

S- Strong; M-Medium; L-Low

Syllabus

UNIT I   **17 hrs.**

Diagrams & Graphs: Diagrams - Rules for Construction – Types of Diagrams – Drawing diagrams – Graphs – Graphs of Frequency Distribution.

UNIT II   **18 hrs.**
Measures of Central Tendency: Mean – Median – Mode.
Measures of Dispersion: Range – Quartile Deviation – Mean Deviation – Standard Deviation.

UNIT III   **19 hrs.**

Simple Linear Correlation: Methods (Univariate Frequency Only) – Scatter Diagram – Karl Pearson's Coefficient of Correlation – Spearman's Rank Correlation.
Simple Linear Regression: Two Regression Lines – Methods of Forming the Regression Equations.

UNIT IV   **18 hrs.**

Matrices: Definition – Order of a Matrix – Types of Matrices – Matrix Operations I.
Determinants: Properties – Cramer's Rule – Product of Determinants – Minor & Cofactor – Matrix Operations II – Inverse of a Matrix – Matrix method – Elementary operations – Rank.

UNIT V   **18 hrs.**

Differentiation: Derivatives of Standard Functions from First Principle – Certain Rules of Differentiation – Simple problems – Chain Rule – Differentiation of Implicit Functions – Parametric Form – Value of a Derivative at Specified Values of **x** – Successive Differentiation.

Integration: Indefinite Integrals – Standard Forms – Determination of c – Definite Integrals – Method of Substitution – Method of Partial Fractions – Method of Integration by parts.

Text Book

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Navnitham P.A.	Business Mathematics & Statistics	Jai Publishers, Trichy	April 2012

Unit	Page No
I	98 – 128 & 131 – 146
II	159 – 250 & 301 – 340
III	503 – 521 & 540 – 553
IV	147 – 190
V	247 – 275 & 303 – 318

Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Singaravelu A.	Allied Mathematics	Meenakshi Traders, Chennai	2001, First Edition
2	Vittal P.R.	Allied Mathematics	Margham Publications, Chennai	3rd Revised Edition Reprint 2003
3.	Vittal P.R.	Business Statistics	Margham Publications, Chennai	Reprint 2004

Web Resources

1. https://www.khanacademy.org/math/precalculus/precalc-matrices/intro-to-matrices/a/intro-to-Matrices
2. https://www.nptel.ac.in/courses/111104074/

Pedagogy

- Lecture, PPT, Quiz, Group Discussion, Seminar

- Question paper setters are asked to confine to the above **text books** only.