

**Holy Cross College (Autonomous), Nagercoil**  
**Kanyakumari District, Tamil Nadu.**  
**Accredited with A<sup>+</sup> by NAAC - IV cycle – CGPA 3.35**

Affiliated to  
**Manonmaniam Sundaranar University, Tirunelveli**



**Semester I & II**  
**POs, PSOs & COs**

**DEPARTMENT OF MATHEMATICS**



**2023-2026**  
**(With effect from the academic year 2023-2024)**

### Programme Educational Objectives (PEOs)

<b>PEOs</b>	<b>Upon completion of B.Sc. degree programme, the graduates will be able to</b>	<b>Mission addressed</b>
<b>PEO 1</b>	apply appropriate theory and scientific knowledge to participate in activities that support humanity and economic development nationally and globally, developing as leaders in their fields of expertise.	<b>M1&amp; M2</b>
<b>PEO 2</b>	inculcate practical knowledge for developing professional empowerment and entrepreneurship and societal services.	<b>M2, M3, M4 &amp; M5</b>
<b>PEO 3</b>	pursue lifelong learning and continuous improvement of the knowledge and skills with the highest professional and ethical standards.	<b>M3, M4, M5 &amp; M6</b>

### Programme Outcomes (POs)

<b>POs</b>	<b>Upon completion of B.Sc. Degree Programme, the graduates will be able to:</b>	<b>PEOs Addressed</b>
<b>PO1</b>	obtain comprehensive knowledge and skills to pursue higher studies in the relevant field of science.	PEO 1
<b>PO2</b>	create innovative ideas to enhance entrepreneurial skills for economic independence.	PEO2
<b>PO3</b>	reflect upon green initiatives and take responsible steps to build a sustainable environment.	PEO 2
<b>PO4</b>	enhance leadership qualities, team spirit and communication skills to face challenging competitive examinations for a better developmental career.	PEO 1&PEO 3
<b>PO5</b>	communicate effectively and collaborate successfully with peers to become competent professionals.	PEO 2&PEO 3
<b>PO6</b>	absorb ethical, moral and social values in personal and social life leading to highly cultured and civilized personality	PEO 2& PEO 3
<b>PO7</b>	participate in learning activities throughout life, through self-paced and self-directed learning to develop knowledge and skills.	PEO1 & PEO 3

### Programme Specific Outcomes (PSOs)

PSO	Upon completion of B.Sc. Mathematics, the graduates will be able to:	Mapping with POs
<b>PSO – 1</b>	acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.	<b>PO1</b>
<b>PSO – 2</b>	understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.	<b>PO6</b>
<b>PSO - 3</b>	apply Mathematical theories and principles accurately, precisely and effectively including higher research and extensions	<b>PO3 &amp;PO7</b>
<b>PSO – 4</b>	prepare the students who will demonstrate respectful engagement with other’s ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions	<b>PO5 &amp;PO6</b>
<b>PSO – 5</b>	create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations	<b>PO2 &amp;PO4</b>

### Mapping of PO’S and PSO’S

POs	PSO1	PSO 2	PSO3	PSO4	PSO5
<b>PO 1</b>	S	M	M	M	M
<b>PO 2</b>	M	M	M	M	S
<b>PO 3</b>	M	M	S	M	M
<b>PO4</b>	M	M	M	M	S
<b>PO5</b>	M	M	M	S	M
<b>PO6</b>	M	S	M	S	M
<b>PO7</b>	M	M	S	M	M

Strong -S (3), Medium – M (2), Low – L (1)

## Course Outcome

### SEMESTER I

#### CORE COURSE I: ALGEBRA & TRIGONOMETRY

Course Code : MU231CC1

On the successful completion of the course, student will be able to:		
1.	classify and solve reciprocal equations	<b>K2</b>
2.	find the sum of binomial, exponential and logarithmic series	<b>K1</b>
3.	find eigen values, eigen vectors, verify cayley — hamilton theorem and diagonalize a given matrix	<b>K1</b>
4.	expand the powers and multiples of trigonometric functions in terms of sine and cosine	<b>K2</b>
5.	determine relationship between circular and hyperbolic functions and the summation of trigonometric series	<b>K3</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply

### SEMESTER I

#### CORE COURSE II: DIFFERENTIAL CALCULUS

Course Code: MU231CC2

On the successful completion of the course, student will be able to:		
1	recall the definitions and basic concepts of Differential Calculus.	K1
2	understand the concepts of Differentiation, Partial Differentiation, Envelope & Curvature.	K2
3	determine Partial derivatives of a function of two variables and use Lagrange's method of undetermined multipliers.	K2
4	distinguish between partial and ordinary differential equations.	K3
5	Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates.	K3

**K1** - Remember; **K2** - Understand; **K3** – Apply

**SEMESTER I**  
**ELECTIVE COURSE I: ALLIED MATHEMATICS-I**  
**ALGEBRA AND DIFFERENTIAL EQUATIONS**  
**Course Code : MU231EC1**

On the successful completion of the course, student will be able to:		
1	recall the methods of finding the solutions of algebraic equations, differential equations and various formulae of laplace transform	<b>K1</b>
2	understand the theory of algebraic equations, eigen values, differential equations and laplace transform	<b>K2</b>
3	simplify algebraic expressions using various methods, find eigen values, solve initial value problems for odes and find inverse laplace transform	<b>K2</b>
4	analyse various types of first-order odes, relate laplace transform and inverse laplace transform and formulate algebraic equations from real world problems.	<b>K4</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze;

**SEMESTER – I**  
**NON-MAJOR ELECTIVE NME - I**  
**MATHEMATICS FOR COMPETITIVE EXAMINATIONS I**  
**Course Code : MU231NM1**

On the successful completion of the course, student will be able to:		
1	understand the problems and remember the methods to solve problems.	K1 & K2
2	grasp the simplest method to solve problems.	K2
3	apply suitable mathematical method and get solutions to simple real life problems.	K3

**K1** - Remember; **K2** - Understand; **K3** - Apply

**SEMESTER – I**

**FOUNDATION COURSE - BRIDGE MATHEMATICS**

**Course Code: MU231FC1**

On the successful completion of the course, student will be able to:		
1	prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also, solve the related problems.	<b>K2 &amp; K3</b>
2	find the various sequences and series and solve the problems related to them. Explain the principle of counting.	<b>K1 &amp; K3</b>
3	find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations.	<b>K2 &amp; K3</b>
4	explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and submultiple angles, etc. Also, they can solve the problems using the transformations.	<b>K2 &amp; K3</b>
5	find the limit and derivative of a function at a point, the definite and indefinite integral of a function. Find the points of min/max of a function.	<b>K3</b>

**K1-Remember K2- Understand K3 - Apply**

## SEMESTER – I

### SPECIFIC VALUE-ADDED COURSE –WEB DESIGNING USING HTML

Course Code : MU231V01

On the successful completion of the course, student will be able to:		
1	define modern protocols and systems used on the web (such as HTML, HTTP)	<b>K2</b>
2	employ fundamental knowledge on web designing with makeup language	<b>K3</b>
3	gain strong knowledge in HTML	<b>K2</b>
4	use critical thinking skills to design and implement an interactive websites with regard to issues of usability, accessibility and internationalism	<b>K4</b>
5	to pursue future courses in website development and design	<b>K3</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze

## SEMESTER II

### CORE COURSE III: COORDINATE AND SPATIAL GEOMETRY

Course Code : MU232CC1

On the successful completion of the course, students will be able to:		
1.	recall the definitions and formulae of key concepts in coordinate and spatial geometry	<b>K1</b>
2.	describe the relationships between geometric shapes and their equations and summarize the properties of different transformations on the coordinate plane	<b>K2</b>
3.	solve real world problems involving lines, planes and spheres using analytical geometry concepts	<b>K3</b>
4.	analyze the properties of equations of lines, planes and spheres	<b>K4</b>
5.	evaluate complex problems that require the application of coordinate and spatial geometry concepts.	<b>K5</b>

**K1** - Remember; **K2** - Understand; **K3**– Apply**K4**– Analyze**K5**–Evaluate

**SEMESTER II**  
**CORE COURSE IV: INTEGRAL CALCULUS**  
**Course Code : MU232CC2**

<b>On the successful completion of the course, students will be able to:</b>		
1.	determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae.	<b>K1</b>
2.	evaluate double and triple integrals and problems using change of order of integration.	<b>K2</b>
3.	solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution.	<b>K3</b>
4.	explain beta and gamma function and to use them in solving problems of integration.	<b>K2</b>
5.	explain Geometric and Physical applications of integral calculus.	<b>K2</b>

**K1** - Remember; **K2** - Understand; **K3** – Apply

**SEMESTER – II**  
**ELECTIVE COURSE – II : VECTOR CALCULUS AND FOURIER SERIES**  
**Course Code : MU232EC1**

<b>On the successful completion of the course, student will be able to:</b>		
1	remember the formulae of vector differentiation, integration and Fourier series	<b>K1</b>
2	understand various theorems related to vector differentiation, integration and Beta, Gamma functions	<b>K2</b>
3	solve problems on vector differentiation, integration, Beta, Gamma functions and Fourier series	<b>K3</b>
4	compare double and triple integrals, line, surface integrals, Beta, Gamma functions and Fourier series for Even and odd functions	<b>K2</b>

**K1**–Remember **K2** - Understand **K3** - Apply



**SEMESTER – II**  
**Non-Major Elective Course II**  
**Mathematics for Competitive Examinations II**  
**Course Code : MU232NM1**

<b>On the successful completion of the course, student will be able to:</b>		
1.	understand the problems and remember the methods to solve problems.	<b>K2</b>
2.	identify the appropriate method to solve problems.	<b>K1</b>
3.	apply the best mathematical method and obtain the solution in short.	<b>K3</b>
4.	apply fundamental mathematical concepts to calculate simple interest, compound interest	<b>K3</b>
5.	develop problem-solving skills and critical thinking by effectively solving real-world scenarios involving financial calculation	<b>K2</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply

**SEMESTER – II**  
**SKILL ENHANCEMENT COURSE -SEC-I:**  
**INTRODUCTION TO COMPUTATIONAL MATHEMATICS**  
**Course Code : MU232SE1**

<b>On the successful completion of the course, student will be able to:</b>		
CO1	gain an appreciation for the role of computers in mathematics, science, and engineering as a complement to analytical and experimental approaches.	<b>K1 &amp; K2</b>
CO2	acquire a strong foundation in numerical analysis, enabling students to evaluate and analyze numerical solutions for mathematical problems.	<b>K2</b>
CO3	use and evaluate alternative numerical methods for the solution of systems of equations.	<b>K3</b>
CO4	foster critical thinking skills in assessing computational methods for problem solving.	<b>K3</b>
CO5	apply mathematical concepts to practical problems through computational approaches.	<b>K3</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply

**SEMESTER I & II**

**Life Skill Training I: Catechism**

<b>Course Outcome</b>	<b>Upon completion of this course the students will be able to</b>
CO-1	understand the aim and significance of value education
CO-2	develop individual skills and act confidently in the society
CO-3	learn how to live lovingly through family values
CO-4	enhance spiritual values through strong faith in God
CO-5	learn good behaviours through social values

**SEMESTER I & II**

**Life Skill Training I: Moral**

**Course Code: UG232LM1**

<b>Course Outcome</b>	<b>Upon completion of this course the students will be able to</b>
CO-1	understand the aim and significance of value education
CO-2	develop individual skills and act confidently in the society
CO-3	learn how to live lovingly through family values
CO-4	enhance spiritual values through strong faith in God
CO-5	learn good behaviours through social values