

**DEPARTMENT OF MATHEMATICS**

**SRM UNIVERSITY**

**UMA15401-VECTOR CALCULUS AND FOURIER SERIES YEAR**

**LECTURE SCHEME/PLAN**

The objective is to equip the under graduate students the knowledge of Mathematics and its applications so as to enable them to apply them for solving real world problems.

The list of instructions (provided below) may be followed by a faculty relating to his/her own schedule includes warm-up period, controlled/free practice, and the respective feedback of the classes who handle. The lesson plan has been formulated based on high quality learning outcomes are as follows.

Each subject must have a minimum of 56 hours, which in turn, 45 hours for lecture and rest of the hours for tutorials.

<b>UNIT I : VECTOR CALCULUS</b>			
L 1.1	Introduction scalar and vector products	<ul style="list-style-type: none"> <li>Students will be able to understand scalar and vector products</li> <li>Students will be able to solve problems</li> </ul>	1
L 1.2	Gradient of a vector, normal and unit vector ,div f, curl f		2
L 1.3	Angle between two vectors, Directional derivatives		3
L 1.4	Solenoidal and irrotational field		4
L 1.5	Scalar potential function		5
L 1.6	Problems in div f and curl f		6
L 1.7	Tutorials		7
<b>UNIT II: LINE AND VOLUME INTEGRALS</b>			
L 2.1	Line integral- introduction	<ul style="list-style-type: none"> <li>Students will be able to understand line and surface integrals.</li> <li>Students will be able to solve problems in volume integrals.</li> </ul>	13
L 2.2	Simple problems in line integrals		14
L 2.3	Surface integrals		15,16
L 2.4	Simple problems in surface integrals		17
L 2.5	Green theorem		18
L 2.6	Application Green theorem and Gauss divergence theorem		19,20
L 2.7	Stoke theorem and its application		
L 2.8	Tutorials		
<b>UNIT III: LINE AND VOLUME INTEGRALS</b>			
L 3.1	Introduction to Euler formula	Students become familiar with fourier series	23
L 3.2	Full Range series		24
L 3.3	Problems in Full range		25
L 3.4	Change of interval in full range		26
L 3.5	Problems in change of interval		27
L 3.6	Convergence Analysis		28
L 3.7	Simple problems		29
L 3.8	RMS value , Parseval identity		30
L 3.9	Tutorials		31,32

UNIT IV: HALF RANGE SERIES			
L 4.1	Half range series	To understand concepts in half range series	33
L 4.2	Sine series		34
L 4.3	Simple problems		35
L 4.4	Sine series problems with deduction		36
L 4.5	Cosine series		37
L 4.6	Simple problems		38
L 4.7	Cosine series problem with deduction		39
L 4.8	Harmonic Analysis		40
L 4.9	Simple problems		41
L 4.10	Tutorials		42,43

UNIT V: FOURIER TRANSFORM			
L 5.1	Definition of transform pair	Students will be able to understand fourier transform and its technique to evaluate complex integrals.	44
L 5.2	Fourier transform		45,46
L 5.3	Simple problems		47
L 5.4	Fourier sine transform		48
L 5.5	Simple problems		49,50
L 5.6	Parseval identity – simple problems		51, 52
L 5.7	Tutorials		53,54,56
MODEL EXAM		(DURATION 3 Hours)	