KALASALINGAM UNIVERSITY

ANAND NAGAR, KRISHNANKOIL – 626 126

COURSE PLAN

Subject/Code	**:**	**Mathematics – II/MAT104**
Semester/Branch	**:**	**Second/ALL Branches**
Name of the Staff	**:**	**Faculties of Mathematics**

PRE-REQUISITE:

Basic differential and integral concepts, vectors and complex variable.

OBJECTIVES:

1. To familiarize the students with the concept and techniques of the calculus of several variables and vector calculus and their applications to engineering problems**.**
2. To study the multiple integrals, vector calculus.
3. To grasp the basics of complex integration and the concepts of contour integration which is an important tool for evaluation of certain integrals encountered in practice.
4. To apply the ordinary differential equations in various engineering concepts.

COURSE LEARNING OUTCOMES AND END USE

1. Find the derivatives and integrals of vector-valued functions and use them to describe motion in space via the vector components of velocity and acceleration
2. Graphically illustrate what a line integral represents and evaluate these line integrals using appropriate techniques such as parameterization, Fundamental Theorem of Line Integrals and Green's Theorem.

TEXT BOOKS:

1. Kreyszig, E, Advanced Engineering Mathematics, John Wiley and Sons (Asia) Limited, Singapore, 8th Edition, 2001.
2. Arumugam, S., Thangapandi Isaac, A., Somasundaram, A., Mathematics for Engineers, Scitech Publications (India) Pvt. Ltd., Chennai, 1st Edition., Reprint 2011.

REFERENCE BOOKS:

1. Grewal, B.S., Grewal, J.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi, 37th Edition, 5th Reprint 2004.
2. Venkataraman, M. K., Engineering Mathematics First Year, the National Publishing Company, Chennai, 2nd Edition, Reprint 2001.
3. Venkataraman, M. K., Engineering Mathematics –IIIA, he National Publishing Company, Chennai, 11th Edition, Reprint 2002.

Web resources*:*

1) www.maths.leeds.ac.uk/~wilsonh/MATH2420/Ch0-2.pdf
2) www.esam.northwestern.edu/~silber/ 215/syllabus-215.html
3) oregonstate.edu/dept/math/CalculusQuestStudyGuides/ vcalc/vcalc.html

S. No.	Topic	No. of periods	Cumulative Hours
	MULTIPLE INTEGRALS		
1	Review of Integration – Double integration	1	1
2	Cartesian and polar coordinates	1	2
3	Change of order of integration	2	4
4	Change of variable between Cartesian and polar coordinates - Area	2	6

	as a double integral		
5	Triple integration in Cartesian coordinates	1	7
6	Cylindrical and spherical polar coordinates – volume as triple integral	2	9
	VECTOR CALCULUS		
7	Gradient, divergence and curl	1	10
8	Directional Derivative – Irrotational and Solenoidal vector field	1	11
9	Vector integration	1	12
10	Statement of Green's Theorem, verification and applications	2	14
11	Statement of Gauss divergence Theorem, verification and applications	2	16
12	Statement of Stokes Theorem, verification and applications	2	18
	ANALYTIC FUNCTIONS AND CONFORMAL MAPPINGS		
13	Functions of a complex variable	1	19
14	Analytic functions, Necessary condition: Cauchy – Riemann equations in Cartesian coordinates (Proof not included)	1	20
15	Sufficient condition (Proof not included) – Properties of analytic functions	1	21
16	Harmonic conjugate – Construction of analytic functions.	2	23
17	Conformal mappings: $w=a+z$, az, $1/z$, e^z, $\sin z$, $\cos z$	2	25
18	Bilinear transformation – Fixed Points – Cross ratio	2	27
	COMPLEX INTEGRATION		
19	Statements and Applications of Cauchy's integral theorem and integral formula	2	29
20	Taylor and Laurent's Expansions	2	31
21	Singularities – Residues	1	32
22	Cauchy's residue theorem	2	34
23	Contour integration over unit circle and semi - circular contours (excluding poles on the real axis) – Evaluation of real integrals using contour integration	2	36
	APPLICATIONS OF ORDINARY DIFFERENTIAL EQUATIONS		
24	Differential Equations related to Electric circuits	3	39
25	Bending of Beams	2	41
26	Motion of a particle in a resisting medium	2	43
27	Simple Harmonic Motion	2	45

SESSIONAL EXAM	TOPIC NO
1	1 – 12
2	13 – 20
3	21 - 27

Course Coordinator **HOD/Mathematics**