

<b>COURSE TITLE</b>	<b>MATRIX ALGEBRA AND VECTOR CALCULUS</b>
<b>COURSE CODE</b>	<b>01CT0112</b>
<b>COURSE CREDITS</b>	<b>4</b>

**Objective:**

- 1 This subject aims to provide fundamentals of matrix algebra and vector calculus. The topics delivered in the paper are essential for almost all science and engineering disciplines.

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Understand the linear independence of vectors, basis and dimensions of different vector space.
- 2 Apply Gauss methods to solve linear system of equations and to find rank and inverse of matrix.
- 3 Apply the concept of Eigen values and vectors in the field of engineering.
- 4 Determine gradient of scalar function and divergence, curl of vector function.
- 5 Apply Green's theorem, Stoke's theorem, Divergence Theorem.

**Pre-requisite of course:..**

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
3	1	0	50	30	20	25	25

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Vector space</b> Vector space, Linear independence of vectors, Basis and dimension of vector space.	6
2	<b>Matrix Algebra - I</b> Rank and nullity of a matrix, Determination of rank by row operations, system of linear equations and its' solutions, Consistency of system of linear equations, Inverse of a matrix by row operations	8
3	<b>Matrix Algebra -II</b> Matrices, Determinants, Eigen values and eigen vector of matrix	8
4	<b>Vector differential Calculus</b> Vectors and scalars, vector operations, gradient of a scalar point function, divergence and curl of a vector point function, directional derivatives, Irrotational and solenoidal function	10

Contents : Unit	Topics	Contact Hours
5	<b>Vector Integral calculus</b> Line integrals, Path Independence of Line Integrals, Concept of surface integrals, Green's theorem, Stoke's theorem and Divergence theorem	10
<b>Total Hours</b>		<b>42</b>

#### Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	<b>Tutorial</b> Tutorial 1, Tutorial 2, Tutorial 3, Tutorial 4, Tutorial 5	5
<b>Total Hours</b>		<b>5</b>

#### Textbook :

- 1 Calculus, M. D. Weir et al : Thomas, Pearson Education, 2008

#### References:

- 1 Advanced Engineering Mathematics, Advanced Engineering Mathematics, Wylie & Barrett, McGraw-Hill , 2010

#### Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
20.00	20.00	30.00	15.00	10.00	5.00

#### Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc
- 2 The internal evaluation will be done based on continuous evaluation of students in the laboratory and class -room.
- 3 Practical examination will be directed toward the completion of semester for assessment of performance of understudies in laboratory.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

**Supplementary Resources:**

- 1 [http:// mathworld.wolfram.com](http://mathworld.wolfram.com)
- 2 [http://en .wikipedia.org /wiki /math](http://en.wikipedia.org/wiki/math)