E0 219 Linear Algebra and Applications / August-December 2016

(ME, MSc. Ph. D. Programmes)

Download from : http://www.math.iisc.ernet.in/patil/courses/courses/Current Courses/...

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Lectures : Monday and Wednesday ; 11:00–12:30 **Venue:** CSA, Lecture Hall (Room No. 117)

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Midterms : 1-st Midterm : Saturday, September 17, 2016; 15:00 – 17:00 **2-nd Midterm :** Saturday, October 22, 2016; 15:00 – 17:00

Final Examination : December ??, 2016, 09:00 – -12:00

Evaluation Weightage : Assignments : 20% **Midterms (Two) :** 30% **Final Examination :** 50%

Range of Marks for Grades (Total 100 Marks)						
	Grade S	**Grade A**	**Grade B**	**Grade C**	**Grade D**	**Grade F**
Marks-Range	> 90	76 — 90	61 — 75	46 — 60	35 — 45	< 35

	Grade A$^+$	**Grade A**	**Grade B$^+$**	**Grade B**	**Grade C**	**Grade D**	**Grade F**
Marks-Range	> 90	81 — 90	71 — 80	61 — 70	51 — 60	40 — 50	< 40

Syllabus and References

• • Topics/Syllabus

- **Vector Spaces :** Vector spaces, Subspaces, Linear system of equations, Bases and Dimensions of vector spaces, Affine spaces and affine subspaces.
- **Linear Maps :** Linear Maps, Space of Linear maps, Linear maps and bases, The rank theorem, Dirsct sums and projections, Dual spaces. Quotient spaces, Exact sequences, Operations of groups. Affine maps, Projective spaces and maps.
- **Matrices :** Matrices, Matrix of a Linear map. Rank of matrices, Elementary matrices.
- **Determinants :** Permutations, Multi-linear maps, Determinant functions, Rules for determinants, The determinant of a linear map, Orientations, Determinants and volume.
- **Polynomial algebras :** Polynomials in one variable, Polynomials in several variables.
- **Linear Operators :** Eigenvalues, Characteristic and Minimal polynomials, Triangulable and Diagonalizable operators, Decomposition theorems, Jordon cannocial form.
- **Bilinear and Sesquilinear forms :** Bilinear and sesquilinear forms, Symmetric and complex-hermitian forms. Sylvester's law of inertia, Type of hermitain forms.
- **Inner Product Spaces :** Inner product spaces, Linear and affine isometries.
- **Spectral theorems :** Spectral theorem for self-adjoint and Normal operators. Principal axix theorem.

• • Texts/References

[1] **Artin, M. :** *Algebra*, Prentice-Hall, 1994.
[2] **Greub, W. :** *Linear Algebra*, Springer-Verlag, GTM 97, (4-th edition) 1981.
[3] **Halmos, P. R. :** *Finite-Dimensional Vector Spaces*, Springer-Verlag, 1993.
[4] **Herstein, I.N. :** *Topics in Algebra*, Wiley Eastern, 1987.
[5] **Hoffman, K.** and **Kunze, R. :** *Linear Algebra*, Prentice-Hall, 1972.
[6] **Jacobson, N. :** *Basic Algebra*, Vols. I & II, Hindustan Pub. Co., 1984.