MTH 812 Advanced Engineering Mathematics (3-0)

Textbook: Linear Algebra and Its Applications, by Gilbert Strang, 3rd Edition, 1988.

ISBN-10: 0155510053, ISBN-13: 978-0155510050

Reference Book: Advanced Linear Algebra (Graduate Texts in Mathematics), by Steve Roman, Springer; 3rd edition, 2007.

ISBN-10: 0387728287, ISBN-13: 978-0387728285

Objective:

To train graduate students in applied mathematics in such a manner that enables them to apply their knowledge in complex engineering subjects.

Course Outcome:

This course will impart the students with advanced level mathematics in engineering in order to enable them to tackle modern day problems in robotics and machine intelligence. **Course Outline:**

Topics	Allocated Periods
Introduction to Linear Algebra Linear Equations and their Geometry Gauss Elimination and Gauss Jordan Methods Decomposition of Matrices into Triangular Factors Row Exchanges and Permutation Matrices Inverse and Transposes of Matrices Special Matrices and Applications Vector Spaces and Subspaces The Solution of m Equations in n unknowns Linear Independence: Basis and Dimensions Four Fundamental Subspaces Networks and Incidence Matrices Linear Transformations	45

Perpendicular Vectors and Orthogonal Subspaces Inner Products and Projections Least Square Approximations Orthogonal Bases, Orthogonal Matrices and Gram-Schmidt Orthogonalization Fourier and Fast Fourier Transform	
Introduction and Properties of the Determinant Applications of Determinants Introduction to Eigen Values and Eigen Vectors Diagonal Form of a Metric, Difference Equations and Power A^K Differential Equations and the Exponential e^{Ai} Complex Matrices, Symmetric and Orthogonal Similarity Transformations Minima, Maxima and Saddle Points Positive Definiteness of Matrices The Finite Element Method Semi-definite and Indefinite Matrices $Ax=\lambda Mx$	