APPLIED LINEAR ALGEBRA

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TYPE OF COURSE : Rerun | Core | UG/PG
COURSE DURATION : 12 Weeks (24 Jan' 22 - 15 Apr' 22)
EXAM DATE : 23 Apr 2022

PRE-REQUISITES : Basic Calculus, Should have done a basic (or a first) course in Linear Algebra

INTENDED AUDIENCE : Senior level Undergraduate and First year Postgraduate/PhD

INDUSTRIES APPLICABLE TO : Communications, Artificial Intelligence, Analytics

COURSE OUTLINE :
Introduce the fundamentals of vector spaces, inner products, linear transformations, and eigenspaces to electrical engineering students.

ABOUT INSTRUCTOR :
Prof. Andrew Thangaraj received his B.Tech in Electrical Engineering from the Indian Institute of Technology (IIT), Madras, India in 1998 and a PhD in Electrical Engineering from the Georgia Institute of Technology, Atlanta, USA in 2003. He was a post-doctoral researcher at the GTL-CNRS Telecom lab at Georgia Tech Lorraine, Metz, France from August 2003 to May 2004. From June 2004, he has been with the Department of Electrical Engineering, IIT Madras, where he is currently a professor. From Jan 2012 to Jan 2018, he served as Editor for the IEEE Transactions on Communications. Since July 2018, he has been serving as an Associate Editor for Coding Techniques for the IEEE Transactions on Information Theory.

Since Oct 2011, he has been serving as NPTEL coordinator at IIT Madras. He has played a key role in initiating and running NPTEL online courses and certification. He is currently a National MOOCs Coordinator for NPTEL in the SWAYAM project of the MHRD.

COURSE PLAN :

Week 1: Vectors and vector spaces

Week 2: Linear maps I: Definition, Spaces associated with a map, Matrices

Week 3: Linear maps II: Invertible linear maps, Elementary row/column operations, Solving linear equations, Quotient space

Week 4: Linear maps III: Four fundamental spaces, Rank of a matrix, Determinants, Change of basis

Week 5: Eigenvalues and eigenvectors of linear operators

Week 6: Applications of eigenvalues

Week 7: Inner product spaces

Week 8: Projection and least squares

Week 9: Adjoint of linear maps and operators

Week 10: Self-adjoint and normal operators

Week 11: Positive operators, isometries

Week 12: Polar and singular value decompositions