CT501 - System and Signal Theory

Aditya Tatu

1. Objective: To introduce abstract mathematical concepts associated with linear system and signal theory.

2. Content:
   Functional analysis: Metric space, normed space, linear space, inner product space, completeness, convergence, continuity, differentiability, Gram-Schmidt orthogonalization, $L^p$ spaces, orthogonal projection.
   Linear transformations: Solvability of linear equations, Diagonalization, Singular value decomposition, eigenvectors and eigenvalues.
   Linear operators: Operator norm, matrix norm.
   Variational problems: First variation, Euler-Lagrange equation.

3. References:
   (b) Optimization by vector space methods, David Luenberger, John Wiley & Sons.
   (c) Signal theory, L.E.Franks, Prentice Hall Inc.
   (d) Linear Algebra and its applications, Gilbert Strang, Brooks Cole.

4. Expected outcome: The concepts covered in the course are prerequisites for understanding a lot of research papers in the areas of signal processing and communications. This course will help build a foundation after which the student can be expected to take up advanced courses and pursue research in signal and image processing, communications, pattern recognition etc.

5. Grading scheme:
   Internal 1 :30 %
   Internal 2 :30 %
   Finals :40 %