科目：**數值線性代數(Numerical Linear Algebra)**

參考書：1. Atkinson K. E. : An Introduction to Numerical Analysis, 2nd Ed, John Wiley & Sons, 1989.

2. Demmel J. W. : Applied Numerical Linear Algebra, SIAM, 1997.

3. Golub G. H. and Van Loan C. F. : Matrix Computation, John Hopkins Univ. Press, 3rd Ed, 1996.

開設課程：兩年開一次

數值分析（部分）、矩陣計算、稀疏矩陣

Topics：

1. Error analysis.
2. Direct method for linear systems : pivoting and scaling, special linear Systems, iterative refinement, error and stability.
3. Iterative methods for linear systems : convergence analysis, Jacobi, Gauss-Seidel, SOR, SSOR, conjugate gradient methods.
4. Iterative methods for nolinear equation and systems : bisection, secant, Newton, Muller, fixed point iterations, Aitken acceleration.
5. Linear least square problems : orthogonal matrices, numerical methods (normal equation, QR, SVD), rank deficiency.
6. Approximation theory : orthogonal polynomials, minmax and least squares approximation of functions.
7. Matrix eigenvalue problem : power method, QR algorithm, methods for symmetric matrices, computing SVD.
8. Krylov subspace methods : subspace approximation, GMRES, SYMMLQ, Lanczos, Arnoldi methods, etc.