Chen Greif (UBC)
Numerical Solution of Linear Eigenvalue Problems

Résumé/Abstract: We review numerical methods for computing eigenvalues and singular values of matrices. We start by considering the computation of the dominant eigenpair of a general dense matrix using the power method, and then generalize to orthogonal iterations and the QR iteration with shifts. We also consider divide-and-conquer algorithms for tridiagonal matrices. The second part of the course involves the computation of eigenvalues of large and sparse matrices. The Lanczos and Arnoldi methods are developed and described within the context of Krylov subspace eigensolvers. The Golub-Kahan bidiagonalization is also described, for computing or approximating singular values. The algorithms are illustrated by numerical experiments, using Matlab.