Short course on
Large-Scale Matrix Computations for Scientists and Engineers
IIT Kharagpur

Speaker: Prof. Biswa Nath Datta, IEEE Fellow, Northern Illinois University, USA

Date	Time	Venue
Thursday (04/02/16)	16:00 - 18:00 Hrs.	BR Seth Seminar Hall (Department of Mathematics)
Friday (05/02/16)	16:00 - 18:00 Hrs.	BR Seth Seminar Hall (Department of Mathematics)
Wednesday (10/02/16)	16:00 - 18:00 Hrs.	BR Seth Seminar Hall (Department of Mathematics)
Thursday (11/02/16)	16:00 - 18:00 Hrs.	BR Seth Seminar Hall (Department of Mathematics)

Registration. Number of participants is limited to 40 (FCFS). Grab a seat by **sending an email to bibhas.adhikari@gmail.com before 03/02/16 afternoon**. Postgraduate (Integrated M.Sc/ M.Tech/ PhD) students are preferred.

Abstract. Large-scale problems arise in a wide variety of science and engineering applications. Power Systems, Aerospace, Large-space structures, Fluid Dynamics, Heat Transfer, Structural Dynamics, Signal and Image Processing, Chemical Engineering are just a few of such applications areas.

Most of the large problems are sparse and indeed, sparsity is an asset which is conveniently exploited during the computations. The traditional and widely used methods for matrix computations, such as the Gaussian elimination and QR factorizations methods for linear systems problems, QR-iterations methods for eigenvalue problems and SVD methods based on bi-diagonal reductions, etc., though numerically stable and computationally efficient, are well-known to lose the sparsity during the process of transformations to computationally convenient forms.

In recent years, a class of iterative methods, known as Krylov subspace methods, which are based on matrix-vector multiplications only, have been developed to handle large-scale computations. These methods are now routinely used in applications involving very large and sparse computations.

Purpose. The purpose of this short course is to give an over-view of some of the widely-used Krylov subspace methods both for large-scale linear systems and eigenvalue problems, and discuss how these methods can be applied to solve selected engineering and applied science problems. The course will be of interests to post-graduate students and researchers in mathematics, computer science, physics, chemistry, electrical, mechanical, chemical, aerospace and industrial engineering.

References

[1] B. N. Datta, *Numerical Linear Algebra and Applications*, SIAM, 2010.