



Advanced Training in Mathematics Schools

Supported by *National Board for Higher Mathematics*

Advanced Instructional School on Numerical Linear Algebra

Venue: IIT Guwahati, Assam

2 - 22 Dec., 2010

Conveners: Rafikul Alam & Shreemayee Bora

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A Brief Description of ATM Schools

Advanced Training in Mathematics (ATM) Schools are a joint effort of a large number of mathematicians in the country for training mathematics research scholars and teachers with generous support from the National Board for Higher Mathematics. The programmes are conducted in reputed mathematics departments in Summer and Winter each year. In these Schools, the emphasis is on problems solving and on understanding inter-relations of basic subjects in mathematics. At the initial stage, ATM Schools consist of two Annual Foundation Schools (AFS I & II) in algebra, analysis, and topology. At a later stage, Advanced Instructional Schools (AIS) and workshops (ATMW) in all major areas are organised. Several advanced instructional schools (ATML) are organized each year exclusively for young lecturers in colleges and universities

Advanced Instructional School on Numerical Linear Algebra

Following topics will be covered:

1. Overview of matrix computations. Floating point arithmetic. Analysis of round-off errors.
2. Solution of linear systems. Sensitivity and perturbation analysis. Gaussian elimination with partial pivoting, Cholesky factorization, and their stability.
3. Singular Value Decomposition (SVD).
4. QR factorization. Householder triangulation. Solution of least squares problems by QR method and SVD. Sensitivity analysis.
5. Eigenvalue problems. Sensitivity and perturbation analysis. Power, inverse power, Rayleigh quotient and subspace iterations. QR algorithm with shifts and its convergence. Other eigenvalue algorithms.
6. Pseudospectra of matrices; their analysis and applications.
7. Numerical functional analysis. Approximation by finite rank operators.

Resource persons

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|--------------------|-------------------|--------------|
| Balmohan V. Limaye | Rekha P. Kulkarni | IIT Bombay |
| Madhu N. Belur | Harish. K. Pillai | IIT Bombay |
| Sudhir H. Kulkarni | | IIT Madras |
| Daniel Kressner | | ETH, Zurich |
| Shreemayee Bora | Rafikul Alam | IIT Guwahati |

U. M. Lectures

R. B. Bapat (ISI Delhi) S. D. Agashe (IIT Bombay)

Eligibility for Participation

The school will admit 30 students in their first and second years of Ph.D. programme, and a few young university lecturers and college teachers. Students who have attended AFS-I/II before will be given preference to attend this school.

Financial Support

Selected participants will be paid III-AC return train fare from their place of work/home town to the venue by shortest route and provided with accommodation and local hospitality.

How to Apply

The syllabus, application form and other information about the programme is available on the website:

<http://www.bprim.org/atm>

Applications may also be made on plain paper, giving the following information: Name, Date of Birth, Age, Gender, Institute/Department, Areas of interest, Address for correspondence, email address, City, State, Pincode, Academic Record: B.Sc./M.Sc. with names of the Institutes. These should be attested by Head/Principal of the institute.

Completed application form should reach

Rafikul Alam, Shreemayee Bora
Coordinators, AIS
Department of Mathematics, IIT, Guwahati,
Guwahati, Assam, PIN: 781 039

Phone:

(O): 0361 2582602 (R. Alam), 0361 2582610 (S. Bora)
(R): 0361 2584602 (R. Alam), 0361 2202494 (S. Bora)
(M): 09435 403 234 (R. Alam), 09864 100 182 (S. Bora)
Fax: 0361 2582649

by **Saturday, 2nd Oct., 2010.** List of selected candidates will be posted on the website of ATM Schools on **Wednesday, 6th Oct., 2010.**

NBHM Committee for the ATM Programme

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| Prof. S. A. Katre | Pune U., Pune |
| Prof. S. Kesavan | IMSc, Chennai |
| Prof. Shobha Madan | IIT, Kanpur |
| Prof. N. Nitsure | TIFR, Mumbai |
| Prof. J. K. Verma (<i>Convener</i>) | IIT, Bombay |