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**Department of Science and Technology,
Government of India, New Delhi (DST) sponsored
2010 SERC School at CMS Pala Campus
[8th SERC School at CMS]**

on

Matrix Variable Calculus and Statistical Distribution Theory and Applications in Data
Analysis, Model Building and Astrophysics Problems

Theme for 2010: Stochastic Models

Organized by the

**DST Centre for Mathematical Sciences
South, Pala and Hill Area Campuses (CMS)**

[Arunapuram P.O, Pala, Kerala 686574, India; Phone/fax 04822 216317

E-mail: cmspala@gmail.com; website: www.cmsintl.org]

All-India selection: **30 seats**

Dates : **12th April 2010 to 14th May 2010, five weeks**

Venue : **CMS Pala Campus**

All expenses met by DST

ELIGIBILITY

Young faculty below 35 years at any college or university or other institution in India,
Ph.D degree holders, post-doctoral fellows, others interested in research

Minimum qualification:

B.Sc (Mathematics), M.Sc in Mathematics/ Statistics/ Theoretical Physics/
Theoretical Compute Science – first classes throughout

Closing date of applications: 28th February 2010

Topics to be covered

Multivariable and matrix-variable calculus. Statistical or non-deterministic models.
Regression type and design type models. Stochastic processes, and time series
models. Fundamentals of fractional calculus and its applications. Mathai's pathway
model and its generalizations and applications in various fields including reaction-
diffusion problems. Order statistics and reliability models.

Faculty: Top researchers in these areas will be the faculty.

Proposed main resource persons for the 2010 SERC School: Dr F. Mainardi (Italy), Dr H.J. Haubold (United Nations), Dr A.M. Mathai (Canada/India), Dr R.K. Saxena (Jodhpur), Dr D.V. Pai (IIT Bombay and IIT Gandhinagar), Dr K.K. Jose (India), Dr Yageen Thomas (India), Dr D. Kundu (IIT Kanpur), Dr Ashis SenGupta (ISI, Kolkata) plus others.

Lectures
Monday-Friday

First lecture: 08.30-10.30. Coffee plus first problem session: 10.30-13.00 hrs
Second lecture: 14.00-16.00hrs; Coffee plus second problem session 16.00-18.00hrs

No lectures on Saturdays and Sundays

Attendance in every lecture and every problem-solving session is compulsory. Regular class-tests. For Indian participants, all expenses will be met by CMS, including to and fro second class train travel, local accommodation, food and study materials. Best opportunity to learn the subject matter from the top researchers in the field.

Apply on plain paper (no fees) to the Director, CMS, with full cv, showing date of birth, marital status, educational background, E-mail ID, phone number (mobile, if any) and copies of all certificates starting with high school. Advance application can be sent by e-mail but signed hard copy is needed for final consideration.

Free and voluntary TeX, LaTeX, MAPLE/ MATHEMATICA/ SAS/ SPSS training during weekends.

One to two free educational tours during two Saturdays.

Address for correspondence:



**CENTRE FOR MATHEMATICAL SCIENCES PALA CAMPUS,
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2010 SERC School

on

Multivariable and matrix-variable calculus and statistical distributions theory:

Applications in data analysis, model building and astrophysics problems:

(8th School in the sequence of SERC Schools at CMS)

2010 theme: Stochastic Modeling

Proposed dates and arrangements

Tentative dates: Monday 12th April 2010 to Friday 14th May 2010

Duration: Five weeks

Closing date of applications: 28th February 2010 (Sunday)

Selection committee meeting: 1st March 2010 (Monday)

Information goes out on : 1st March 2010 (Monday)

Arrival of participants 10th, 11th April 2010 (Saturday & Sunday)

Classes start on 12th April 2010 (Monday) at 08.30 hrs

Course coordinator: Dr A.M. Mathai (CMS Pala Campus)

Co-coordinator Dr K.K. Jose (CMS Pala Campus)

Proposed main lecturers: Dr A.M. Mathai (Canada/India), Dr D.V. Pai (India), Dr F. Mainardi (Italy), Dr H.J. Haubold (Austria), Dr K.K. Jose (India), Dr Yageen Thomas (India) plus more

Problem session supervision: The main lecturers plus Dr Joy Jacob, Dr Seemon Thomas, Dr Sebastian George, Dr Sunil Mathew, Dr Vincent Mathew, Dr Shanoja R. Naik, plus more

Proposed tentative timetable



2010 SERC School

at

CMS Pala Campus

12th April to 14th May 2010

PROPOSED TIMETABLE

Saturday 10th, Sunday 11th April 2010: participants arrive and settle

Week 1, Day 1, Monday 12th April 2010

- 08.30-9.00 Informal talk to the participants by the Course Director Dr A.M. Mathai
- 09.00-09.45 **Inaugural session**
1. **Prayer**
 2. **Welcome:**
Dr K.K. Jose (Principal, St. Thomas College Pala)
 3. **About SERC School** and congratulating the national prize winners
Dr A.M. Mathai (Director of 2010 SERC School)
 4. **Presidential address and inauguration**
(to be selected)
Presidential address and inauguration by lighting the ceremonial lamp
 5. **Vote of thanks**
Dr Joy Jacob (Head, Department of Statistics, St. Thomas College Pala)
 6. **National anthem**
- 09.45-10.00 Coffee break
- 10.00-11.00 Library hour
- 11.00-13.00 Lecture 1.1: Dr A.M. Mathai [Model building: deterministic models]
- 13.00-14.00 Lunch
- 14.00-16.00 Lecture 1.2: Dr A.M. Mathai [Model building: deterministic models]
- 16.00-18.00 Tea + problem session (course assistant & Dr A.M. Mathai)

Week 1, Day 2, Tuesday 13th April 2010

- 08.30-10.30 Lecture 1.3: Dr A.M. Mathai [Model building: deterministic models]
- 10.30-13.00 Tea + problem session (course assistnt & Dr A.M. Mathai)
- 13.00-14.00 Lunch
- 14.00-16.00 Lecture 1.4: Dr A.M.Mathai [Model building: deterministic models]
- 16.00-18.00 Tea + problem session (course assistant & Dr A.M. Mathai)

Week 1, Day 3, Wednesday 14th April 2010

- 08.30-10.30 Lecture 1.5: Dr A.M. Mathai [Model building: deterministic models]
- 10.30-13.00 Tea + problem session (course assistant & Dr A.M. Mathai)
- 13.00-14.00 Lunch
- 14.00-16.00 Lecture 1.6: Dr A.M. Mathai [Model building: deterministic models]
- 16.00-18.00 Tea + problem session (course assistant& Dr A.M. Mathai)

Week 1, Day 4, Thursday 15th April 2010

- 08.30-10.30 Lecture 1.7: Dr A.M. Mathai [Statistical preliminaries]

10.30-13.00 Tea + problem session (Dr Joy Jacob & Dr A.M. Mathai)
13.00-14.00 Lunch
14.00-16.00 Lecture 1.8: Dr A.M. Mathai [Statistical preliminaries]
16.00-18.00 Tea + problem session (Dr Joy Jacob & Dr. A.M. Mathai)

Week 1, Day 5, Friday 16th April 2010

0.8.30-10.30 Lecture 1.9: Dr A.M. Mathai [Statistical preliminaries]
10.30-13.00 Tea + problem session (Dr Joy Jacob & Dr. A.M. Mathai)
13.00-14.00 Lunch
14.00-15.30 Lecture 1.10: Dr A.M. Mathai [Statistical preliminaries]
15.30-16.30 Tea + written test 1 (Dr A.M. Mathai)
16.30-18.00 Quiz 1(Dr A.M. Mathai)

Saturday, Sunday: **free, no lectures or problem sessions**

Saturday 17th April 2010:

08.30-21.00 Free conducted educational tour to Vaagamon

Sunday 18th April 2010:

10.00-18.00 Voluntary free TEX training (Dr Joy Jacob)

Week 2, Day 1, Monday 19th April 2010

08.30-10.30 Lecture 2.1: Dr A.M. Mathai [Joint and conditional distributions]
10.30-13.00 Tea + problem session (Dr Joy Jacob & Dr. A.M. Mathai)
13.00-14.00 Lunch
14.00-16.00 Lecture 2.2: Dr A.M. Mathai [Conditional expectation]
16.00-18.00 Tea + problem session (Dr Seemon Thomas & Dr A.M. Mathai)

Week 2, Day 2, Tuesday 20th April 2010

08.30-10.30 Lecture 2.3: Dr A.M. Mathai [Model building: single variable case]
10.00-13.00 Tea + problem session (Dr Seemon Thomas & Dr A.M. Mathai)
13.00-14.00 Lunch
14.00-16.00 Lecture 2.4: Dr A.M. Mathai [Model building: multivariable case]
16.00-18.00 Tea + problem session (Dr Seemon Thomas & Dr A.M. Mathai)

Week 2, Day 3, Wednesday 21st April 2010

08.30-10.30 Lecture 2.5: Dr A.M. Mathai [Regression and correlation]
10.30-13.00 Tea + problem session (Dr Seemon Thomas & Dr A.M. Mathai)
13.00-14.00 Lunch
14.00-16.00 Lecture 2.6: Dr A.M. Mathai [Regression and correlation]
16.00-18.00 Tea + problem session (Dr Seemon Thomas & Dr A.M. Mathai)

Week 2, Day 4, Thursday 22nd April 2010

08.30-10.30 Lecture 2.7: Dr A.M.Mathai [Correlation analysis]
10.30-13.00 Tea + problem session (Shanoja R. Naik & Dr A.M.Mathai)
13.00-14.00 Lunch
14.00-16.00 Lecture 2.8 : Dr A.M. Mathai [Multiple and partial correlations]
16.00-18.00 Tea + problem session (Dr Seemon Thomas & Dr K. K. Jose)

Week 2, Day 5, Friday 23rd April 2010

08.30-10.30 Lecture 2.9: Dr A.M.Mathai [Recent results]
10.30-13.00 Tea + problem session (Shanoja R. Naik & Dr A.M. Mathai)
13.00-14.00 Lunch
14.00-15.30 Lecture 2.10: Dr A.M. Mathai [Recent results]
15.30-16.30 Written test 2 (Dr A.M. Mathai)
16.30-18.00 Quiz 2 (Dr A.M.Mathai)

Saturday, Sunday: free, no lectures or problem sessions
**Saturday 24th April 2010, free voluntary TEX/ Maple training
09.00-18.00hrs (Dr Seemon Thomas)**
**Sunday 25th April 2010, free voluntary TEX/Maple training
10.00-18.00hrs (Dr Joy Jacob)**

Week 3, Day 1, Monday, 26th April 2010

08.30-10.30 Lecture 3.1: Dr D.V. Pai [Multivariable calculus]
10.30-13.00 Tea + problem session (Dr D.V. Pai)
13.00-14.00 Lunch
14.00-16.00 Lecture 3.2: Dr D.V. Pai [Multivariable calculus]
15.30-18.00 Tea + problem session (Dr D.V. Pai)

Week 3, Day 2, Tuesday 27th April 2010

08.30-10.30 Lecture 3.3: Dr D.V. Pai [Multivariable calculus]
10.30-13.00 Tea + problem session (Dr D.V. Pai)
13.00-14.00 Lunch
14.00-16.00 Lecture 3.4: Dr D.V. Pai [Multivariable calculus]
16.00-18.00 Tea + problem session (Dr D.V. Pai)

Week 3, Day 3, Wednesday 28th April 2010

08.30-10.30 Lecture 3.5: Dr D.V. Pai [Multivariable calculus]
10.30-13.00 Tea + problem session (Dr D.V. Pai)
13.00-14.00 Lunch
14.00-16.00 Lecture 3.6: Dr D.V. Pai [Multivariable calculus]
16.00-18.00 Tea + problem session (Dr D.V. Pai)

Week 3, Day 4, Thursday 29th April 2010

08.30-10.30 Lecture 3.7: Dr A.M. Mathai [Matrix variable calculus]/guest
10.30-13.00 Tea + problem session (Dr A.M. Mathai)/guest
13.00-14.00 Lunch
14.00-16.00 Lecture 3.8: Dr A.M. Mathai [Matrix variable calculus]/guest
16.00-18.00 Tea + problem session (Dr A.M. Mathai)/guest

Week 3, Day 5, Friday 30th April 2010

08.30-10.00 Lecture 3.9: Dr A.M. Mathai [Matrix variable calculus]/guest
10.00-12.00 Tea + problem session (Dr A.M. Mathai)/guest
12.00-13.00 Library hour
13.00-14.00 Lunch
14.00-15.30 Lecture 3.10: Dr A.M. Mathai [Matrix variable calculus]/guest
15.30-16.30 Tea + written test 3 (Dr D.V. Pai & Dr A.M. Mathai)/guest
16.30-18.00 Quiz 3(Dr A.M. Mathai)

Saturday, Sunday: **free, no classes or problem sessions**

Saturday 1st May 2010: 08.30-21.00hrs: Conducted educational tour: Kumarakom
Sunday, 2nd May 2010: voluntary Maple, SAS training
10.00-18.00hrs (Dr Joy Jacob)

Week 4, Day 1, Monday 3rd May 2010

08.30-10.30 Lecture 4.1: Dr F. Mainardi [Fractional calculus]
10.30-13.00 Tea + problem session (Dr F. Mainardi)
13.00-14.00 Lunch
14.00-16.00 Lecture 4.2: Dr F. Mainardi [Fractional calculus]
16.00-18.00 Tea + problem session (Dr F. Mainardi)

Week 4, Day 2, Tuesday 4th May 2010

08.30-10.30 Lecture 4.3: Dr F. Mainardi [Fractional calculus]
10.30-13.00 Tea + problem session (Dr F. Mainardi)
13.00-14.00 Lunch
14.00-16.00 Lecture 4.4: Dr F. Mainardi [Fractional calculus]
16.00-18.00 Tea + problem session (Dr F. Mainardi)

Week 4, Day 3, Wednesday 5th May 2010

08.30-10.30 Lecture 4.5: Dr F. Mainardi [Fractional calculus]
10.30-13.00 Tea + problem session (Dr F. Mainardi)
13.00-14.00 Lunch
14.00-16.00 Lecture 4.6: Dr F. Mainardi [Fractional calculus]
16.00-18.00 Tea + problem session (Dr F. Mainardi)

Week 4, Day 4, Thursday 6th May 2010

- 08.30-10.30 Lecture 4.7: Dr F. Mainardi [Fractional calculus] /guest
10.30-13.00 Tea + problem session (Dr F. Mainardi) /guest
13.00-14.00 Lunch
14.00-16.00 Lecture 4.8: Dr F. Mainardi [Fractional calculus] /guest
16.00-18.00 Tea + problem session (Dr F. Maiardi)/guest

Week 4, Day 5, Friday 7th May 2010

- 08.30-10.00 Lecture 4.9: Dr F. Mainardi [Fractional calculus] /guest
10.00-12.00 Tea + problem session (F. Mainardi) /guest
12.00-13.00 Library hour
13.00-14.00 Lunch
14.00-15.30 Lecture 4.10: Dr F. Mainardi [Fractional calculus] /guest
15.30-16.30 Written test 4 (Dr F. Mainardi)
16.30-18.00 Quiz 4 (Dr F. Mainardi)

Saturday, Sunday: **free, no lectures or problem sessions**

**Saturday 8th May 2010: voluntary Maple, SAS training
09.30-17.00hrs (Dr Joy Jacob)**

**Sunday 9th May 2010: voluntary TEX, SAS training
10.00-17.00hrs (Dr Joy Jacob)**

Week 5, Day 1, Monday 10th May 2010

- 08.30-10.30 Lecture 5.1: Dr K.K. Jose [Time series modeling]
10.30-13.00 Tea + problem session (Dr K.K. Jose & Dr Shanoja R. Naik)
13.00-14.00 Lunch
14.00-16.00 Lecture 5.2: Dr K.K. Jose [Time series modeling]
16.00-18.00 Tea + problem session (Dr K.K. Jose & Dr. Shanoja R. Naik)

Week 5, Day 2, Tuesday 11th May 2009

- 08.30-10.30 Lecture 5.3: Dr K.K. Jose [Time series modeling]
10.30-13.00 Tea + problem session (Dr K.K. Jose & Dr Shanoja R. Naik)
13.00-14.00 Lunch
14.00-16.00 Lecture 5.4: Dr K.K. Jose [Time series modeling]
16.00-18.00 Tea + problem session (Dr K.K. Jose & Dr. Shanoja R. Naik)

Week 5, Day 3, Wednesday 12th May 2010

- 08.30-10.30 Lecture 5.5: Dr Yageen Thomas [Order statistic, reliability]
10.30-13.00 Tea + problem session (Dr Yageen Thomas)
13.00-14.00 Lunch
14.00-16.00 Lecture 5.6: Dr Yageen Thomas [Order statistics, reliability]

16.00-18.00 Tea + problem session (Dr Yageen Thomas)

Week 5, Day 4, Thursday 13th May 2010

08.30-10.30 Lecture 5.7: Dr H.J. Haubold [Tsallis statistics and superstatistics]
10.30-13.00 Tea + problem session (Dr H.J. Haubold & Dr Vincent Mathew)
13.00-14.00 Lunch
14.00-16.00 Lecture 5.8: Dr H.J. Haubold [Generalized entropies]
16.00-18.00 Tea + problem session (Dr H.J. Haubold & Dr Vincent Mathew)

Week 5, Day 5, Friday 14th May 2010

08.30-09.30 Written test 5 (Dr H.J. Haubold)
09.30-12.00 Quiz 5 (Dr H.J. Haubold)

Valedictory session

12.00-13.00 Program

1. Prayer

2. Welcome :

(Dr K.K. Jose, Principal, St. Thomas College Palai)

3. Inauguration of the session

(Dr Hans Haubold, by lighting the ceremonial lamp)

4. Felicitation and Distribution of certificates

(Dr Ashok K. Singh (DST, New Delhi))

5. Presidential address and distribution of prizes

(Dr Hans J. Haubold)

6. Remarks by the participants

7. Comments

(Dr A.M. Mathai)

8. National Anthem

13.00-14.00 Lunch

From 14.00 on Friday, Saturday 15th , Sunday 16th , Monday 17th and Tuesday 18th :
departures of participants.

ANNEXURE –I (format of the first circular)

(Format of the proposed first circular to universities, colleges and other institutes all across India)

**Department of Science and Technology,
Government of India, New Delhi (DST) sponsored**

2010 SERC School

on

Matrix Variable Calculus and Statistical Distribution Theory and Applications in Data Analysis, Model Building and Astrophysics Problems

(12th April 2010 to 14th May 2010, five weeks)

Organized by the



Centre for Mathematical Sciences South, Pala and Hill Area Campuses (CMS)

All-India selection: **30 seats**

All expenses met by DST

ELIGIBILITY

Young faculty below 35 years at any college or university or other institution in India, Ph.D degree holders, post-doctoral fellows, others interested in research

Minimum qualification:

B.Sc (Mathematics), M.Sc in Mathematics/ Statistics/ Theoretical Physics/ Theoretical Compute Science – first classes throughout. Desirable: exposure to basic probability and statistics and good background in calculus

Closing date of applications: 28th February 2010

Multivariable and matrix-variable calculus, statistical distribution theory and basic analysis are important tools for tackling serious problems in applied mathematics, physics and engineering. For dealing with more advanced problems in various disciplines it became necessary to develop the theory of generalized functions, and matrix-variable functions. Quadratic forms and bilinear forms in complex Gaussian variables have found many applications in sonar, radar and other communication problems and engineering recently. Matrix variable functions are useful tools for handling generalized quadratic and bilinear forms. For dealing with spherically symmetric and elliptically contoured distributions matrix variable calculus is essential. These generalized distributions have applications in many areas. Currently, during 2000-2009, there is a great revival of the area of generalized special functions and matrix variable functions because they found ready applications in reaction-diffusion problems in physics, stochastic processes (Mittag-Leffler and alpha Laplace processes), Mathai's pathway models, and in the current hot topics of Tsallis statistics and superstatistics. The proposed School will cover the above topics to provide

knowledge to research workers so that they will be fully equipped to deal with stochastic models, which are applied in a wide variety of fields such as biological modeling, financial modeling, demographic modeling, reliability modeling etc.

Topics to be covered

Multivariable and matrix-variable calculus. Statistical or non-deterministic models. Regression type and design type models. Stochastic processes, and time series models. Fundamentals of fractional calculus and its applications. Mathai's pathway model and its generalizations and applications in various fields including reaction-diffusion problems. Order statistics and reliability models.

Venue: The 2010 SERC School will be held in the picturesque Pala (Kerala) area, in calm and quiet atmosphere. Admission is open to all with the minimum qualifications irrespective of nationality, sex, caste or creed.

Apply on plain paper with all the following details (if details are incomplete such applications will not be considered. Advance e-mail applications can be made to open a file but signed hard copies are needed for final consideration.): Name, age, male/female, married /single, full address, e-mail, phone number, copies (not originals) of all certificates, one paragraph detailing why you wish to participate plus permission certificate if employed and a self addressed empty envelope with Rs 5/- stamp affixed if acknowledgement is required.

Faculty

Top researchers in these areas will be the faculty.

Proposed resource persons for the 2010 SERC School: Dr F. Mainardi (Italy), Dr H.J. Haubold (Austria), Dr A.M. Mathai (Canada/India), Dr R.K. Saxena (Jodhpur), Dr D.V. Pai (IIT Bombay and IIT Gandhinagar), Dr K.K. Jose (India), Dr Yageen Thomas (India).

Proposed guest lecturers: Dr G. Rangarajan (IISc, Bangalore), Dr B.N. Bhattacharya (ISI, Kolkatta), Dr D. Kundu (IIT Kanpur), Dr Ashish Sen Gupta (IS, Kolkatta), Dr. M.K. Ghosh (IISc Bangalore), Dr K. Suresh (IIT Bombay).

Lectures

Monday-Friday

First lecture: 08.30-10.30. Coffee plus first problem session: 10.30-13.00 hrs
Second lecture: 14.00-16.00hrs; Coffee plus second problem session 16.00-18.00hrs

No lectures on Saturdays and Sundays

Attendance in every lecture and every problem-solving session is compulsory. No part-time attendance. Class tests in every week, cumulative grades will appear on the certificate. For Indian participants, all expenses will be met by CMS, including to and

fro second class train travel, local accommodation, food, study materials, stationery etc. Foreign participants must come with return international air tickets and valid visas. Their local hospitality and study materials will be met by CMS.

Free and voluntary TeX, LaTeX, MAPLE/ MATHEMATICA/ SAS/ SPSS training during weekends.

One to two free educational tours during two Saturdays.

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CMS Pala
12th September 2009

Dr A.M. Mathai
Director