

**ADVANCED TRAINING PROGRAMME
ON
MATHEMATICAL MODELING
IN
EARTH SYSTEM SCIENCES**



APRIL , 2004

**GOVERNMENT OF INDIA
MINISTRY OF SCIENCE & TECHNOLOGY
DEPARTMENT OF SCIENCE & TECHNOLOGY
(EARTH SYSTEM SCIENCE DIVISION)
TECHNOLOGY BHAWAN
NEW MEHRAULI ROAD
NEW DELHI – 100 016.**

**DST SCHOOLS ON
MATHEMATICAL MODELING
IN
EARTH SYSTEM SCIENCES**

GENERAL INFORMATION



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GENERAL INFORMATION

INTRODUCTION

The Earth System Sciences (ESS) have evolved mainly through imagination, observations and interpretation of the natural processes and naturally occurring or formed materials. There are hypotheses after hypotheses within each theory concerning these phenomena. It has been felt by many in the field that pursuit of this system of science in India has somehow not put adequate efforts towards approaching solution of problems in ESS by rigorous application of laws of natural sciences including mathematics and statistics, causing many to question about the very usefulness of this science.

It is well known that modeling and simulation studies make a significant contribution in solving existing and emerging problems in science, engineering, economics, management, social and behavioral sciences. During the recent past, there have been widespread innovations in application of these methodologies and tools in resolving many problems helping scientists, planners, administrators and decision makers. Earth System Sciences are today at cross roads in India due to dearth in such rigorous approach by the scientific community. There is urgent need to enrich ESS and strengthen it with application of well tested laws of physical sciences. The input of modeling and simulation in ESS would help in establishing and enhancing the usefulness, confidence and trust in these areas, especially in the context of problems in the field relevant to our country. To this end, large numbers of manpower trained in Modeling and Simulation are needed for better appreciation and rationalization of the status of ESS in our country to be at par with the trends across the globe.

OBJECTIVES

To develop manpower in mathematical modeling and computer simulation for better understanding of processes and phenomena in Earth System Sciences (Earth, Atmospheric and Oceanic Sciences), which can fill up the present and future needs of our country, through organizing various types of inter-disciplinary and multi-institutional training activities in different parts of the country.

THRUST AND SCOPE

The thrust will be maintained / implemented in the following inter-disciplinary areas / scope on the subject in two parts indicated as 'A' and 'B' below through organizing various types of **Summer / Winter School(s), Short – Term Training Programmes, International Workshop / Group Discussions (3 –10 days), Contact Programmes, Advanced Lecture Circuit, Hands on Training, Field Based Studies/ Campaign, Talent Search, etc.**

PART –A :

- **Quantitative treatment of Earth System Structure and processes based on a deeper conceptual treatment of the fundamental principles of natural sciences and mathematics, computer simulation, etc. :**
- ❖ Geophysical / Geo-environmental Processes of Earth, Atmosphere and Ocean, Tropical Cyclone and associated Natural Disasters and issues such as Environmental Degradation and sustainable development.
- ❖ Seismology / Earthquake
- ❖ Hydrology/ Geohydrology
- ❖ Geophysical fluids
- ❖ Petrography
- ❖ Structural Geology
- ❖ Paleomagnetism
- ❖ Facies analysis and basin evolution

- ❖ Inversion technique analysis of geophysical data
- ❖ Geological process
- ❖ Shallow Surface Geo- structural Studies
- ❖ Dynamical systems
- ❖ Wave propagation and inverse problems
- ❖ Glacier related Phenomena
- ❖ Anisotropy in Geosciences
- ❖ Geothermics
- ❖ Monsoon prediction/ Climatic changes/ Global Warming Phenomena

PART- B :

- ❑ **Development of Planning and Management Systems for appropriate R&D in Earth System Sciences :**
 - ❖ Natural Resource planning and management (including land use planning and management) on micro/regional/national level.
 - ❖ Delineation type of work for rural, urban and industrial set up on long-term basis at micro /regional / national levels
 - ❖ Use of Satellite data/ Remote Sensing Application
 - ❖ Photometry/Mapping/ Cartography
 - ❖ Application of GIS/GPS
 - ❖ SAR Interferometry
 - ❖ Any other newly emerging area/techniques

IMPLEMENTATION GUIDELINES/TERMS & CONDITIONS

- The proposal should be submitted through the proper channel existing in any recognized educational/R&D Institutions like IITs, Universities, Scientific Semi Government Departments/ Organizations/Centres, R&D Institutions and Labs, Deemed Universities, Post Graduate Colleges and Non Government Organizations (NGO) in the country each with S&T background.
- The concerned can submit the proposal to DST at any time throughout the year in six months advance from the proposed starting date of the same.
- The programme can be organised only in our country .
- Participation by suitable nominees from SAARC countries will be encouraged subject to completion of necessary formalities
- 15 copies of the proposal should be submitted by the **concerned along with endorsement letter + certificate from the Course Coordinators & Co-Course Coordinator(s)** in initial stage through proper channel of the concerned nodal agency to DST for consideration of support.
- Course co-ordinator / Co-course coordinator will be responsible for fruitful completion of all proposed activities related to the proposal within the tenure of the course.
- In case of unforeseen situations/conditions, the concerned nodal body will take the responsibility for successful completion of the approved activities under the proposal within the tenure period of the course .
- The technical and financial approval for implementation of the proposal will be made as per the prescribed norms /mechanisms of DST for this programme. Maximum limit of support under this programme for each proposal will be restricted upto Rs. 8.00 lakh (Rupees eight lakh) and no overhead charges will be entertained .
- Contingencies amount will be allowed as per need on a case to case basis with maximum supporting limit of Rs. 20,000/-.

- Post-Graduate Degree in Earth System Sciences Discipline having working knowledge in relevant field of Mathematical Science (Mathematics, Statistics, Operational Research and Computer Sciences) or its equivalent/Ph.D. with some teaching/research experience on the same discipline is necessary for participation in the programme.
- Maximum age of 35 years should be considered for participation under this programme. In case of SC/ST and women applicants, five years of age relaxation are applicable.
- Selection of the participants will be made through duly constituted committee by the concerned nodal agency including a DST nominee as one of the members of the Committee.
- In case, a retired / near retirement Course – Coordinator is involved, there should be a Co – Course – Coordinator who will be in service during the duration of the programme at the same host institution .
- In case of multi-institutional / foreign collaborative proposal, the course coordinator has to obtain formal consent from the collaborating institutions.
- Foreign travel is not allowed under this programme. Under foreign collaboration/foreign resource persons/participants, will be possible and the restricted budget limit can also be changed as per the need of the proposal and also after proper justification by the concerned.
- In case of foreign collaboration/foreign resource persons and participants involved , the necessary clearance and other required formalities , if any, from the Ministry of Home Affairs and Ministry of External Affairs and other such agencies as per requirement in specific cases, have to be sought by the concerned nodal agency/course co-ordinators themselves. DST will not take any role/responsibilities for completing any such formalities from any where and also from any angles related to the said foreign collaboration /foreigners participation under the programme in India.
- The budget will be finalised after consultation/meeting with the course coordinator / co-course coordinator and IFD within the prescribed budget limit / norms of the programme .
- The release will be made after approval of the Integrated Finance Division (IFD) of DST in favor of the authorised financial authority/Head of the nodal agency specified in the proposal. Maximum 75% of the total approved grant can be considered for release as first installment. Financial implication of the released grants will be made as per the Government of India norms applicable under other programme/scheme of DST , as and when required.
- The release of the next installment will be considered after receiving the technical progress report / financial documents / report of the last completed stages of the programme. Maximum two releases can be considered during a year. The monitoring of the programme would be made by DST as per procedures in vogue from time to time .
- Maximum 6 weeks duration can be considered for support to organise the proposed Courses/Activities (excluding International Workshop / Group Discussions, Advanced Lecture Circuit and Talent Search , etc.) under this programme.
- After successful completion of the proposed Courses /Activities , a certificate will be issued by the concerned host institution to all the participants.
- The position of the appointed / engaged staff (including resource persons) under this programme is co-terminus with the duration of the proposal and DST would have no liability to meet these manpower costs beyond the duration of the programme.
- UC/SE and Final Technical Report related to the programme should be submitted by the host agency to DST at the completion of the same.

- The application and other necessary documents should be addressed to:

Dr. D.R. Ram,
Scientist –F / Director
Earth System Science Division
Ministry of Science & Technology,
Department of Science & Technology,
Technology Bhawan, New Mehrauli Road,
New Delhi – 110 016.

FORMATS

RECORD SHEET

**FORMATS FOR SUBMISSION OF PROPOSALS
(DST SCHOOLS ON MATHEMATICAL MODELING IN EARTH SYSTEM SCIENCES)**

(To be filled by applicant)

101. Title of the Training Course / School / International Workshop / Group Discussion , etc :

102. Broad Area (Please tick the relevant area) :

Earth Sciences :

Atmospheric Sciences :

Oceanic Sciences :

Inter-disciplinary Earth System Sciences (ESS) :

103. Sub Area (Please name the relevant area) :

- 1.
- 2.
- 3.
- 4.

104. Collaboration (please tick mark and also give name and address of each concerned collaborative institution) :

1. Inter Institutional :
2. Multi Institutional :
3. Foreign Collaborative :
4. Others :

105. Total number of participants :

106. Mode of selection of participants :

107. Total number of resource persons :

108. Total number of secretarial staff :

109. Duration, Date and venue :

110. Total cost :

111. Course Category (Please Tick Mark the relevant category) :

1. Summer /Winter School :
2. Short-Term Training Programme :
3. International Workshop / Group Discussion :
4. Contact Programme :
5. Advanced Lecture Circuit :
6. Hands on Training :
7. Field Based Study/ Campaign :
8. Talent Search :
9. Any Other :

112. Course Coordinator :

113. Date of Birth/ Sex (M/F) :

114. Designation :

115. Department :

116. Institute Name :

117. Address :

118. Telephone / Fax / Gram / E.-mail :
119. Co- Course Coordinator :
120. Date of Birth/ Sex (M/F) :
121. Designation :
122. Department :
123. Institute Name :
124. Address :
125. Telephone / Fax / Gram / E-mail :
126. Co-Course Coordinator :
127. Date of Birth/ Sex (M/F) :
128. Designation :
129. Department :
130. Institute Name :
131. Address :
132. Telephone / Fax / Gram / E-mail :
133. Co-Course Coordinator :
134. Date of Birth/ Sex (M/F) :
135. Designation :
136. Department :
137. Institute Name :
138. Address :
139. Telephone / Fax / Gram / E-mail :
140. Course summary (maximum 150 words) :
141. Key Words (Six) :
142. Endorsement letter enclosed (Please tick mark) : Yes / No
143. Certificate from the Course Coordinator /Co-Course Coordinator(s)letter enclosed (Please tick mark) : Yes / No
144. Name of the Experts in the concerned field :
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.
 - 6.
 - 7.
145. How will the experts named in col. 144 be involved / helpful in the proposed proposal :



APPLICATION

200. Technical Details :

210. Introduction :

- 211. Motivation for the proposal :
- 212. Definition of the problem :
- 213. Objectives :

220. Review of Status :

- 221. International / National status :
- 222. Importance of the proposal in the context of current/future need :

230. Work Plan :

- 231. Methodology :
- 232. Time schedule of the proposed activities (hour by hour outline detail of the proposed course activities) :
- 233. Suggested plan to use the outcome :
- 234. Total expected participants :
 - 234.1 Indian :
 - 234.2 Foreigner :
 - 234.3 How will they be selected ? :

300. BUDGET ESTIMATES: SUMMARY

	ITEM	BUDGET (Rs. in Lakhs)	Details alongwith proper justification	Remarks, if any.
	Recurring			
	1. Honoraria 1.1 Course Coordinator 1.2 Co-course coordinator 1.3 In House/local resource persons 1.4 Secretarial staff, etc.			
	2. TA/DA and Boarding/Lodging Expenses 2.1 TA/DA and Boarding/ Lodging Expenses for invited participants. 2.2 TA/DA and Boarding /Lodging Expenses for invited Resource Persons			
	3.Field Expenses (including TA/DA and Boarding/Lodging , etc).			
	4.Consumables (including minor renovation/ updation charges, etc.).			
	5. Working Expenses (including functional folders, stationery, working lunch, tea/coffee, local transport and other misc. expenditure, etc.)			
	6. Contingencies.			
	Grand Total :			

400. Details of the facilities/infrastructure :

410. Expertise available for conducting the course :

(a) Outstation resource persons (Please provide the list with designation and addresses) :

(a).1 Indian :

(a).2 Foreigner :

(b) In House/Local Resource Persons :

411. No. of expected resource persons to be called for participation :

(a) Outstation resource persons :

(a).1 Indian :

(a).2 Foreigner :

(b) In House/Local Resource Persons :

420. Facilities being extended by the host institution(s) for implementation of the Training Programme / Courses , etc. :

A) Infrastructural Facilities:- Infrastructural facilities to be made available :

Sr. No.	Infrastructural Facility	Yes/No	Percentage of time available for the course.	Minimum Percentage of time required for organising the course.
1.	Workshop / Laboratory Facility			
2.	Class room with furniture and necessary facility			
3.	Boarding/lodging facility			
4.	Water and Electricity			
5.	Power Generator			
6.	AC Room or AC			
7.	Telecommunication including e-mail & fax			
8.	Transportation (local)			
9.	Administrative/ Secretarial support			
10.	Information facilities like Internet/ Library			
11.	Computational facilities			
12.	Any other special facility being provided			

Foreign travel is not allowed under this programme. Under foreign collaboration/foreign resource persons/participants, will be possible and the restricted budget limit can also be changed as per the need of the proposal and also after proper justification by the concerned.

B. Equipment available with the Institute/ Course Co-ordinator Group/ Department/ Other Institutes (nearby the organising place) :

	Generic Name of Equipment	Model, Make & year of purchase	Remarks including accessories available and current usage of equipment	Percentage of time available for the course.	Minimum Percentage of time required for organising the course
Equipment available with Course Coordinator / Co Course Coordinator(s) Group					
Concerned Department / Institute					
Other Institute (nearby the organising place)					

430. Detailed Bio-data of the Course Coordinator / Co-Course Coordinator (s) including :

431. Name, Designation, Address, Date of Birth, Institutions' Address etc., Academic Qualifications (University/College from where attained, year of passing, class, Thesis title etc.) Publications list, Employment/Experience Details, Foreign assignments, etc. :

432. Training Courses / School (s) / International Workshop / Group Discussions ,etc., implemented/ organised/ submitted along with list of major results / highlights on the achievements :

433. Awarded fellowship like BOYSCAST etc. along with highlights on the achievements :

440. Detail of the concerned host institution authorised financial authority / head of the institution to whom money will be released :

500.Any other relevant matter :

Name of the Course Coordinator & Signature

Endorsement from the Head of Institution
(To be given on letter head)

Title of the Training Course / School / International Workshop / Group Discussion ,etc :

1. Certified that the Institute welcomes participation of _____ as the Course Coordinator and _____ as the Co-Course Coordinator for the proposal and that in the unforeseen event of discontinuance by the Course Coordinator , the Co-Course Coordinator will assume the responsibility of the fruitful completion of the proposal within its tenure period (with prior permission or due information to DST) .

2. Certified that in the unforeseen situations / conditions, the institute will take the responsibility for successful completion of the approved activities of the proposal within its tenure period .

3. Certified that the equipment and other basic facilities as enumerated in Section 420 (A) & (B) and such other administrative facilities as per terms and conditions of the grant , will be extended to the course coordinator(s) throughout the duration of the programme to the extent committed there in.

4. Certified that after successful completion of the Programme, a certificate will be issued by the host institution to all the participants.

5. Certified that in case of foreign participants /collaboration ,the necessary clearance and formalities ,if any , from Ministry of Home Affairs and Ministry of External Affairs and other such agencies , have to be sought by the concerned host institution /course co-ordinators themselves

6. Certified that Institute assumes to undertake the financial and other management responsibilities of the programme as per approved by DST.

Name and Signature of Head of Institution

Date :

Place :

Certificate from the Course coordinator and Co - course coordinator (s)

Title of the Training Course / School / International Workshop / Group Discussion ,etc :

1. I/ We agree to abide by the terms and conditions of the DST Schools on Mathematical modeling in Earth System Sciences grant .
2. I/ We have not submitted the proposal elsewhere for financial support.
3. I/ We have explored and ensured that equipment and basic facilities [enumerated in Section 420 (A)& (B)] will actually be available as and when required for the purpose of the proposed programme. We shall not request financial support under this programme, for procurement of any items of equipment.
4. I/We have enclosed the following materials:

<u>Items</u>	<u>Number of copies</u>
a) Endorsement from the Head of Institution (on letter head)	One
b) Certificate from Course coordinator(s)/Co-course co-ordinator (s)	One
c) Details of the proposal from Section 101 to 500 (stitched) + one soft copy on 3 1/2" floppy, preferably in MS Word	15
d) Certificate from the concerned institute indicating that in the unforeseen situations / conditions, the Institute will take the responsibility for successful completion of the proposed activities of the proposal within its tenure period .	One
e) Cover sheet by the Course Coordinator	One

**Name and signature of the
Course Coordinator(s)**

**Name and signature of the
Co Course Coordinator (s)**

Date :

Place :

REFEREE'S EVALUATION PROFORMA

Please tick in the boxes and enter your detailed comments in the space provided. You may use additional sheets if extra space is needed. Please be as objective as possible .

Title of the Training Course / School / International

Workshop / Group Discussion ,etc :

DST Reference No.

Course Coordinator :

1. Objectives :

Precise and well formulated		Fair		Vague and fussy	
-----------------------------	--	------	--	-----------------	--

2. Work Plan including Methodology and Time Schedule :

Well Planned		Impractical		Needs Revision	
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3. Budget :

4. Your opinion on Course –Coordinator(s) professional competence with regard to the proposal under review :

5. Comments on proposal and related equipment already with the Course Coordinator / Course Coordinator(s) group / concerned institutions / collaborative & other institutes in the region (nearby the organising place), based on your knowledge / information :

6. General comments (including foreign travel support / foreign collaboration/participants and resource persons) about the proposal , as a whole:

7. Overall final comments on support for the proposal (Please encircle the desired grading):

7.1. As proposed / as proposed with some minor changes : **Yes / No**

7.1.1 If yes for minor changes, brief details of the same:

7.2. Revised /Reformulated proposal : **Yes / No**

7.2.1 If yes ,brief comments / suggestions on the same :

7.3. Rejected : **Yes/No**

8. Overall rating on the proposal (10 being the highest Score):

(PLEASE ENCIRCLE THE DESIRED SCORE)

Score 10 9 8 7 6 5 4 3 2 1

Signature : -----

Name :-----

(Block Letters)

FOR DST USE ONLY

Date proposal sent to the referees :

Date report received :

FORMAT FOR SUBMISSION OF FINAL REPORT

1. Title of the Training Course / School / International Workshop / Group Discussion ,etc
2. Name of the Institute and address :
3. Name of the Collaborative Institute and address :
4. Course-coordinator (name and address) :
5. Co-course coordinator (name and address) :
6. Approved objectives/methodology :
7. Organised activities (hour by hour) :
8. Total approved Budget (Rs. In Lakhs) :
9. Total released amount (Rs. In Lakhs) :
10. Duration :
11. List of participants with addresses :
12. List of the Resource persons (including in house, local and external) with Names and addresses :
13. General excerpts comments of the participants on the programme and methodology followed and its expected outcome :
14. Justification with details of achievements :
15. Justification for releasing the balanced Budget, if any :
16. Progress indicator :
 - a. No. of trained participants :
 - a.1. Indian :
 - a.2. Foreigner :
 - b. No. of publications, if any :
 - b.1. Indian Journal ,etc. :
 - b.2. Foreign Journal, etc. :
 - c. Total no. of engaged resource persons :
 - c.1. Indian :
 - c.2. Foreigner :
 - d. No. of engaged secretarial /supporting staff, etc. :
17. Overall comments on achievement and its future scope and recommendations, if any :

Signature of the Head
of the Department

Signature of the
Course co-ordinator

Signature of the
Co-course Co-ordinator

Date :

Place:

UTILISATION CERTIFICATE (2 COPIES)
FOR THE FINANCIAL YEAR - (ENDING 31ST MARCH)

1. Title of the Training Course / School / International Workshop / Group Discussion ,etc :
2. Name of the Institution:
3. Course Coordinator/ Co course coordinator (Name and address) :
4. Department of Science & Technology sanction order No & date sanctioning the proposal:
5. Head of account as given in the original sanction order:
6. Amount brought forward from the previous financial year quoting DST letter no and date in which the authority to carry forward the said amount was given :
 - i. Amount
 - ii. Letter No
 - iii. Date
7. Amount received during the financial year (Please give DST letter/order no and date) :
 - i. Amount
 - ii. Letter/Order No
 - iii. Date
8. Total amount that was available for expenditure (excluding commitments) during the financial year (Sr. No. 6+7) :
Rs.
9. Actual Expenditure (excluding commitments) incurred during the financial year (upto 31st March) :
Rs.
10. Balance amount available at the end of the financial year:
11. Unspent balance amount refunded, if any (please give details of cheque no etc.):
12. Amount to be carried forward to the next financial year (if applicable):

UTILISATION CERTIFICATE

Certified that out of Rs _____ of grants-in-aid sanctioned during the year _____ in favor of _____ under this Ministry/ Department letter/ order No _____ dated ___ and Rs _____ on account of unspent balance of the previous year, a sum of Rs _____ has been utilised for the purpose of _____ for which it was sanctioned and that the balance of Rs _____ remaining unutilised at the end of the year has been surrendered to Government (vide Challan no _____ dated _____) will be adjusted towards the grants-in-aid payable during the next year i.e. _____.

Signature of the
Course coordinator

Signature of Head
of the department

Signature of Registrar
of the Institution

Signature of the
Finance officer
/ Account
officer of
the institution

Date:

Place :

FINAL STATEMENT OF EXPENDITURE

1. Title of the Training Course / School / International Workshop / Group Discussion ,etc
2. Course Coordinator/ Co course coordinator (Name and address) :
3. Name of the Institute :
4. Sanction Letter/ Order No and date of sanctioning the proposal :
5. Total Proposal Cost:
(Sanctioned/ Revised Project Cost, if applicable)
6. Date of Commencement of Proposal:
7. Date of Completion of Proposal:
8. Grant received in each year (financial year):
 - a. 1st Year :
 - b. 2nd Year:
 - c. Interest, if any:
 - d. Total (a+b):

Statement of Expenditure

(to be submitted financial yearwise, i.e. Date of Start to 31st March of that financial year

)

Sr. No.	Sanctioned Heads	Funds Allocated (indicate sanctioned or revised) (Rs. In Lakhs)	Expenditure (Rs. In Lakhs)		Balance (Rs. In lakhs)	Remarks, if any
			1 st Year	Ind Year		
1.	Honoraria 1.1 Course Coordinator 1.2 Co-course Coordinator 1.3 In House/Local resource persons 1.4 Secretarial Staff, etc.					
2.	TA/DA and Boarding/Lodging Expenses 2.1 TA/DA and Boarding/Lodging Expenses for invited participants. 2.2 TA/DA and Boarding/Lodging Expenses for invited Resource Persons					
3.	Field Expenses (including TA/DA and Boarding/Lodging etc.)					
4.	Consumables (including minor renovation/updation charges,etc.).					
5.	Working Expenses (including functional folders, stationery, working lunch, tea/coffee,local transport and other misc.expenditure, etc.)					
6.	Contingencies					
	Grand Total					

Amount to be refunded/ reimbursed (whichever is appropriate): Rs

Signature of the
Course coordinator

Signature of Head
of the department

Signature of Registrar
of the Institution

Signature of the
Finance officer
/ Account
officer of
the institution

Date:

Place :