



## **CSIR C-MMACS's PhD Programme, August 2012 under AcSIR**

**CSIR C-MMACS** is a premier research institute with expertise in mathematical modelling and computer simulation in Scientific and Engineering areas. CSIR C-MMACS is one of the youngest research institutes to undertake major tasks in modelling and simulation in selected Scientific and Engineering areas and to strengthen ongoing similar activities in the CSIR Laboratories/Institutes. CSIR C-MMACS has made significant contributions in the areas of climate modeling, Carbon Cycle and Ocean modeling, Solid Earth Modeling, Network and Cyber security, Nonlinear Dynamical System and Industrial Computational Mechanics.

### **Academy of Scientific and Innovative Research (AcSIR):**

The Academy of Scientific & Innovative Research (AcSIR) is established with a view to maximize the number of qualified researchers and professionals in the domain of science & engineering, who will be equipped with the skills of innovation and interdisciplinary integration. AcSIR is envisaged to emerge as a world-class institution of national importance. The AcSIR would impart course instructions and award degrees in frontier areas of science and technology. The Academy will use the infrastructure facilities, scientific manpower and other resources of CSIR for teaching and research. Taking advantage of CSIR's state of the art infrastructure and unique human resource, the AcSIR would work towards bridging the gap that exists today between academics and societal applications.

As part of the academic programme of AcSIR, students are required to undertake a project for 6-8 weeks, related to rural areas and the theme of the project should be related to the CSIR-800 programme. The aim of the project is to interact with people from rural areas, understand their problems and suggest ways for improvements in the areas of energy, education, environment, agriculture, health, food, water, etc. In addition, two project proposals to be prepared by selecting topics of high relevance and novelty, and will have state-of-the art review, methodologies, recommendations etc. One of the proposals can be related to a research topic leading to PhD and the second proposal in related areas. Students must pass a comprehensive examination designed to test the overall comprehension of the student in the various subjects. More details can be found at <http://acsir.res.in>

### **Research Areas at CSIR C-MMACS:**

#### **High Performance Computing and Cyber security**

CSIR C-MMACS has made significant enhancement to both the supercomputing and communication infrastructure with the state of art supercomputing facility. The interested topics of research are:

- Cryptography and secure communication
- Cryptanalysis
- Cyber security and ethical hacking
- Denial-of-Service attacks
- Parallel algorithms

### **Solid Earth Modelling Programme**

Solid Earth Modelling group is focused on precise GPS based quantification and modelling of inter, co- and post-seismic surface deformation in Indian subcontinent. In addition to this, the group works on modeling and simulation of ground motion for deterministic seismic hazard, site specific ground motion from scenario earthquakes and crustal and mantle structure by lithosphere modeling. The interested topics of research are:

- [Crustal Deformation](#)
- Modelling of GNSS signal propagation delays
- [Earthquake hazard assessment](#)
- [Site effects and and microzonation](#)
- Lithosphere modelling

### **Climate and Environmental Modelling Programme**

The Climate and Environmental Modelling Programme (CEMP) addresses multi-disciplinary modelling issues in combining climate simulation, process modelling (energy, disease, crop etc) in a hierarchical (global to regional models) and multi-scale (downscaling, neural networks etc) modelling platform.

The interested topics of research are:

- Climate Simulation
- Monsoon Simulation
- [Cyclone Simulation](#)
- [Extreme Events](#)
- Process models
- Algorithms

### **Carbon Cycle and Ocean Modelling Programme**

For the first time in India, carbon flux has been estimated by inverting the data from CO<sub>2</sub> measurement stations at Hanle and Pondicherry which has reduced the posteriori uncertainties of these estimates significantly. The group focuses on in-house developed ocean biogeochemistry model, which integrates physics, chemistry and biology of the marine system. The interested topics of research are:

- [Carbon cycle modelling and measurements for climate change mitigation](#)
- [Ocean biogeochemical modelling](#)

### **Multiscale Modeling and Simulation Programme**

Multiscale Modeling and Simulation Group (MMSG) seeks to develop and apply this framework in various disciplines including weather and climate change. The current research areas in this field are:

- [Global CRM Simulation of Diurnal Variation](#)
- [High Performance Computing for Meteorological Applications](#)
- [Multiple time and spatial scale phenomena](#) (e.g. aerosol-cloud interaction)

### **Computational Mechanics**

Computational Mechanics Group contributed in development of FINEART an indigenous finite element software code jointly with few other CSIR Laboratories. Molecular Simulation study of Carbon Nanotube and work on Lattice-Boltzmann method, which is eminently suited to parallel computation, has been initiated. The work on periodically forced suspensions is also of

significance. Sophisticated mathematical modelling aided by powerful computing and visualization has the potential to provide the cutting-edge to industry in a number of areas. The interested topics of research are:

- Computational nano-mechanics
- Finite element modelling
- Numerical algorithms
- Optimization and visualization
- Low Reynolds number fluid mechanics

CSIR-CMMACS has an active research program leading to Ph.D. degree in all the above-mentioned areas. It provides a stimulating atmosphere, which fosters creativity and encourages innovative thinking and research. The PhD program consists of flexible course work, computational training tutorials and research project to demonstrate attainment of a high degree of scientific ability, which is followed by advanced research leading to a PhD thesis on a specific topic. The PhD program is normally completed in 4-5 years. During the first year, the students have to go through a course work covering basic and advanced topics. The students are encouraged to take courses in inter-disciplinary areas. As part of the PhD program, the PhD student is expected to give at least two seminars.

Next admission for the PhD program in science and engineering will be done in the month of June-July, 2012. CSIR C-MMACS is looking for young, bright and motivated students for admission to full time Ph.D. programs in Science and Engineering under AcSIR with the following eligibility criteria.

#### ***Ph.D. in Engineering:***

- Candidates with a Master's degree in Engineering/Technology with a good academic record or a Master's degree by Research in Engineering/Technology with a good academic record and with a valid GATE score or UGC/CSIR NET/NBHM or valid CSIR-SRF award or equivalent qualification in the relevant area tenable for the year of registration
- Candidates with Master's degree in Sciences or Pharmacy with a good academic record and of exceptional merit where eligible and with a valid GATE score or UGC/CSIR NET/NBHM or equivalent qualification in the relevant area tenable for the year of registration
- Candidates who have qualified for the award of Bachelor's degree in Engineering/Technology with exceptionally good academic record with a valid GATE score in an eligible discipline will be considered for direct admission to Ph.D. Program as a regular full time scholar subject to selection through interview.
- Those in the final year of their qualifying examination and awaiting results are also eligible to apply. However, they should have completed all the requirements for the award of their qualifying degree, including all examinations, dissertation projects, viva-voce, etc., by the time of joining
- Candidates who register initially for an M.S (Research) may be permitted to convert to a Ph.D degree program subject to academic assessment
- Candidates who join initially for the M.E/ M.Tech Program may be permitted to transfer to the Ph.D Program, subject to academic assessments

#### ***Ph.D. in Science:***

- Master's degree in Physics, Mathematics, Statistics, Geophysics, Meteorology, Atmospheric Sciences, Oceanography, Geoinformatics and Environmental Sciences with a good academic record with valid UGC/CSIR NET/ NBHM /DBT/ INSPIRE or equivalent

fellowship or having relevant research experience Master's degree in Engineering/Technology/Pharmacy is eligible with a good academic record or UGC/CSIR NET/NBHM or equivalent qualification in the relevant area tenable for the year of registration.

*Those in the final year of their qualifying examination and awaiting results are also eligible to apply. However, they should have completed all the requirements for the award of their qualifying degree, including all examinations, dissertation projects, viva-voce, etc., by the time of joining.*

Project assistants working in CSIR Institutes who have worked for a minimum of one year in the Institute are also eligible to apply. Such candidates will have to submit a statement of purpose along with recommendation of the proposed guide.

Please see <http://acsir.res.in> for detailed information on AcSIR. The reservation policy will be followed as per Govt. act.

The students will go through the selection process after initial screening for final selection. **The selected candidates are required to join for research on or before August 14, 2012.** No TA/DA will be paid for attending the interview.

Interested candidates should apply online using URL ([csir-phd.csio.res.in](http://csir-phd.csio.res.in)) and send the hard copy of the form (duly signed with photo affixed) to:

**Coordinator, AcSIR**

**CSIR Centre for Mathematical Modelling and Computer Simulation (C-MMACS)**

**NAL Belur Campus, Bangalore 560037.**

**LAST DATE FOR RECEIPT OF COMPLETED ONLINE APPLICATION FORM IS MAY 18, 2012.**