# Urban Air Quality and Climate Modelling

## Overview

Mathematical models are used in all aspects of urban air quality management and urban climate where prediction is a major component i.e. from event forecasting to long term planning. With the rapid advancement in computational technology, mathematical models are being widely used in decision making. Models can be used in several ways namely for (i) conceptualization (ii) problem solving (iii) setting up design parameters and (iv) advanced research leading to application.

There are *three* broad approaches used in modelling of air quality- deterministic, statistical and physical. In *Deterministic* modeling approach problems are solved using a set of differential equations which represent the relevant physical processes. *Statistical* modeling approaches are empirical and they vary from simple contingency tables through regression, time series and hybrid techniques. In *physical* modeling approach, a *real* time process is simulated on a *reduced* scale in the laboratory. The models address the micrometeorological processes occurring in the urban atmosphere.

The course will include the explanation of specific urban phenomena, such as urban heat island (UHI), inversion situations and urban ventilation paths. General concepts are discussed, e.g. urban canopy layer and urban boundary layer, and also measures for adaptation to climate change. This course is organized in the form of 11 hours of lectures and three tutorials spread over five days structured as five modules. Module 1 covers basics of urban air pollution and elements of regulatory control. Module 2 and 3 provides concepts of urban micrometeorology and urban air quality management, respectively. Module 4 discuss urban air quality modelling aspects and module 6 focuses on modelling exercises and case studies particular to Air pollution mitigation and adaptation to climate change.

Course participants will learn these topics through lectures, tutorials and assignments. A graded examination will be conducted on the last day of the course.

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| **Course structure** | **Lectures and tutorials** : ***19-23 December, 2016***<br>**Discussion of assignments** : ***Afternoon session on December 19, 2016***<br>**Examination** : ***23, December, 2016***<br>***Number of participants for the course will be limited to forty (40).*** |
| **Host Institute** | **Indian Institute of Technology Madras, Chennai -600 036** |
| **You Should Attend If…** | ▪ Undergraduate or a Post-graduate student of Civil, Chemical and Mechanical Engineering and Atmospheric Sciences<br>▪ Professionals from research organizations, industries, consultancy firms.<br>▪ Faculty members from recognized engineering colleges and universities |
| **Registration Fees & Course Materials** | **Course Registration Fee:**<br>**Students : Rs. 1000/-**<br>**Faculty members from Academic Institutions: Rs. 5000/-**<br>**Professionals from Industry/ Research Organizations: Rs. 10000/-**<br>The above registration fee includes soft copy of the lecture notes and other documentation. |
| **Accommodation** | The participants will be provided with accommodation on payment basis subject to availability. Request for hostel accommodation may be submitted through the link:<br>http://hosteldine.iitm.ac.in/iitmhostel |
| **Mode of Payment** | **Demand draft in favour of "Registrar, IIT Madras" payable at Chennai** |

# The Faculty

**Prof Dr Uwe Schlink** is a Senior Researcher at the Department of Urban and Environmental Sociology, UFZ and Professor at **University of Leipzig, Institute of Meteorology**. He is heading the Air Quality Research Group in the department. His research areas include Urban climate research, thermal comfort, urban air quality; Personal exposure and vulnerability with extreme environmental situations in urban areas; Statistical modelling and Bayesian inference. He has published around 75 articles in peer-reviewed journals and presented more than 100 conference papers. He is a member of several scientific committees and societies.

**Dr. Shiva Nagendra, SM** is presently working as Associate Professor in Department of Civil Engineering, **Indian Institute of Technology Madras,** Chennai India. He is heading Environmental and Water Resources Engineering Laboratory. He has published more than 40 research publications in international and national refereed journals, one reference book, and 80 papers in conferences. Much of his research interests focus on air quality management which includes monitoring, source apportionment, modelling, emission control, development of air quality management system, environmental impact assessment, outdoor-indoor air pollution relationships and indoor air quality management. He is a professional member of several technical institutions and organizations of India.

## Course Coordinator

**Dr. Shiva Nagendra, SM**
Phone: (044) 2257 4290
E-mail: snagendra@iitm.ac.in

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http://www.gian.iitm.ac.in