

Air Quality Modelling

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Visibility is a dynamic and complex local/urban phenomena. Fine particles and gaseous air pollution affect visibility in the ambient environment by creating haze through complex dispersion mechanisms. This course has been designed to give attendees a basic understanding of fundamental principles of contaminant dispersion including meteorological parameters affecting pollutant dispersion, principle of Gaussian plume theory, types of air quality models and their uses and techniques of model validation and verification and adjustments. Participants shall also be taught as to how visibility acts as a *surrogate* for air pollution impact on the environment followed by the theory of visibility prediction models using air quality relationship on increasing extinction coefficient or decreasing visibility.

Course Agenda (Full Day)

Session	Topic	Instructor
L1	Introduction to air quality modelling approaches: contaminant flux; dispersion; advection; diffusion; Frame of reference; random vs turbulent motions; Diffusion coefficient (σ) and eddy diffusivity (K)..	Mukesh Khare
L2	Air Pollution Meteorology- forces causing atmospheric motion; scale of atmospheric motion. Boundary layer meteorology, atmospheric stability concepts: dry and wet adiabatic lapse rates; stability classification; plume shapes.	Mukesh Khare
	Break	
L3	Introduction to mathematical modelling in Environment; Air Quality Modelling- physical principles; Theory of Gaussian Plume model.	Mukesh Khare
L4	Types of air quality models and their uses; model validation, verification and adjustment. Criteria for model selection, uncertainty and sensitivity analysis.	S.M. Shiva Nagendra
	Lunch Break	
L5	Modelling scenarios- case studies (i) near and far field dispersion (ii) PM and CO ₂ emissions from heterogeneous traffic	S.M. Shiva Nagendra
L6	Modelling of air emissions from open burning: assessment of impacts on local air quality, visibility and human health	S.M. Shiva Nagendra
	Break	
L7	Visibility as a surrogate of air pollution impact assessment: visibility measurement, data characteristics, air quality vs visibility	Mukesh Khare
L8	Visibility prediction model-concept, assumptions, modelling approaches, quality control and model application case study	S.M. Shiva Nagendra
	Discussions	

Course Materials:

We will provide course notes, lecture handouts (ppt slides) and a document containing step-by-step procedure for air quality modelling to all the registered participants.