



# ENVIRONMENTAL QUALITY MONITORING & ANALYSIS

**PROF. RAVI KRISHNA R**

Department of Chemical Engineering  
IIT Madras

**TYPE OF COURSE** : Rerun | Elective | UG/PG

**COURSE DURATION** : 12 weeks (24 Jan' 22 - 15 Apr' 22)

**EXAM DATE** : 24 Apr 2022

**PRE-REQUISITES** : Basic Mathematics; Physics; Chemistry; Environmental Engineering; Chemical Engineering.

**INTENDED AUDIENCE** : Interested Learners

**INDUSTRIES APPLICABLE TO** : Environmental Consulting

**COURSE OUTLINE :**

The course is directed at measuring, modeling and assessing the parameters of environmental quality for the purpose of environmental risk assessment. The course introduces readers to the concept of environmental fate and transport and the methods to apply them in environmental risk assessment. The course also discusses the monitoring methods in the context of environmental fate and transport.

**ABOUT INSTRUCTOR :**

Prof. R. Ravikrishna is a Professor in Indian Institute of Technology Madras. He was a Research Associate (2000-2006) Louisiana State University, Baton Rouge, USA

**COURSE PLAN :**

**Week 1:** Introduction; Definition of Environment; Link between source/environment/receptor; Exposure; Health effects; Toxicology; Defining the need for fate and transport.

**Week 2:** Chemicals of concern; relevant properties for environmental fate and transport; Definition of Equilibrium – partition constants, solubility, vapor pressure, Henry's constant, K<sub>oc</sub>, K<sub>ow</sub> etc. Equilibrium partitioning of chemicals between different phases of the environment.

**Week 3:** Parameters for environmental water/ air / soil / sediment – screening parameters, priority air pollutants – definitions of PM

**Week 4:** Monitoring of environmental parameters – screening parameters – BOD, COD, TOC, TDS; Environmental sampling – definition and synthesis of a monitoring/sampling/analysis method. Quality Assurance and quality control (QA/QC).

**Week 5:** Methods for sampling/processing/analysis of organic and inorganic constituents in air/water/soil/sediment.

**Week 6:** Introduction to environmental transport – BOX Models and the application to multimedia transport of pollutants

**Week 7:** Atmospheric Dispersion – Gaussian Dispersion model

**Week 8:** Fundamentals of mass transport – definition of intraphase and inter-phase chemical flux; interphase mass transport, diffusion coefficient and convection mass transfer coefficients.

**Week 9:** Chemical Exchange between air-water

**Week 10:** Chemical Exchange between sediment-water

**Week 11:** Chemical exchange between soil-air

**Week 12:** Overall transport model and scenarios