



# BASIC ENVIRONMENTAL ENGINEERING AND POLLUTION ABATEMENT

## PROF. P. MONDAL

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IIT Roorkee

**INTENDED AUDIENCE :** B.E/B.Tech./ M.Sc students and industry professionals working in environmental pollution control area

**INDUSTRY SUPPORT :** All red category industries may value this course

### COURSE OUTLINE :

The course deals with the fundamentals of environmental engineering and its application in pollution control. It is intended to impart the fundamental knowledge of environmental engineering along with the design aspect of some pollution control equipment. It will also help the young scientific professionals to keep their knowledge upgraded with the current thoughts and newer technology options along with their advances in the field of the environmental/industrial pollution abatement.

### ABOUT INSTRUCTOR :

Prof. Prasenjit Mondal, is presently working as Professor in the Department of Chemical Engineering and Joint faculty in Biotechnology Department, Indian Institute of Technology Roorkee, India. He joined the institute in 2009 as Assistant Professor. He has also worked as Process Engineer in industry for two years and as Scientist in Centre for Scientific and Industrial Research, India for three years before joining IIT Roorkee. His area of research is Energy and Environmental Engineering (Water /wastewater treatment through adsorption, electrocoagulation and biological processes including phytoremediation, microbial fuel cells, oil from algae, energy from coal, biomass and wastes, life cycle assessment). He has handled number of R&D projects sponsored by Industry, Govt. of India and International Agencies & has applied for two patents. He has published two books and more than 180 papers in international journals and conference proceedings. He is the recipient of NTSE scholarship, MHRD fellowship, Govt. of India and S.J. Jindal Trust's scholarship, 3-year membership award of American Chemical Society. He has been appointed as Adjunct Professor in Saskatchewan University, Canada for five years (2021-25). He is a reviewer for several international journals including Environmental Progress and Sustainable Energy. He is a life member of the Indian Institute of Chemical Engineers, fellow member of Institution of Engineers (India) and founding member of Biological Engineering Society, India.

### COURSE PLAN :

**Week 1:** Introduction; Ecology, environment and biodiversity; Ecosystem services and its risk 1; Ecosystem services and its risk 2; Tutorial 1.

**Week 2:** Pollution types and sources ; Impact/consequences of pollutants; Transmission of pollutants in environment 1; Transmission of pollutants in environment 2; Tutorial 2.

**Week 3:** Ambient air quality and standards; Water quality and standards 1; Water quality and standards 2; Industrial pollution and standards; Tutorial 3.

**Week 4:** Sampling and Characterization of gas/air/emission; Sampling and Characterization of water/waste water; Characterization of solid wastes and soil; Environmental law and regulatory framework; Tutorial 4.

**Week 5:** Pollution prevention strategies and processes 1; Pollution prevention strategies and processes 2; Pollution prevention by using optimum water 1; Pollution prevention by using optimum water 2; Tutorial 5.

**Week 6:** Air pollution control 1; Air pollution control 2; Air pollution control 3; Air pollution control 4; Tutorial 6.

**Week 7:** Treatment of surface and ground water for drinking water generation; Treatment of domestic and industrial waste water: Schemes; Primary treatment equipment; Secondary treatment process; Tutorial 7.

**Week 8:** Secondary treatment equipment 1; Secondary treatment equipment 2; Advances in secondary treatment process 1; Advances in secondary treatment process 2; Tutorial 8.

**Week 9:** Tertiary treatment 1; Tertiary treatment 2; Sludge management; Pollution control in industry; Tutorial 9.

**Week 10:** Industrial pollution control in GPI 1; Industrial pollution control in GPI 2; Industrial pollution control in GPI 3; Industrial pollution control in GPI 4; Tutorial 10.

**Week 11:** Industrial pollution control in GPI 5 Solid waste management schemes; Solid waste transformation 1(incineration); Solid waste transformation 2 (gasification); Tutorial 11.

**Week 12:** Solid waste transformation 3 (Pyrolysis); Solid waste transformation 4 (Anaerobic digestion); Hazardous waste management; Management of special category wastes ; Tutorial 12.