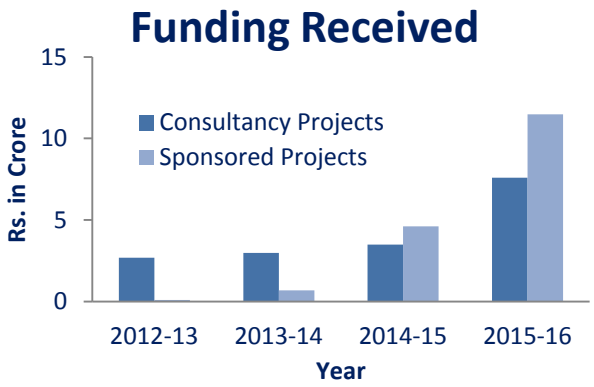
Centre for Environmental Science and Engineering (CESE)

INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

www.cese.iitb.ac.in/

VISION

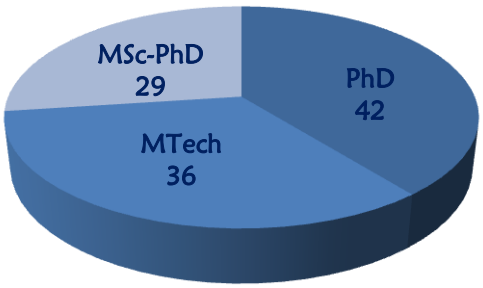


"To be at the forefront of technological research and innovations in environmental science and engineering and to contribute to the nation"

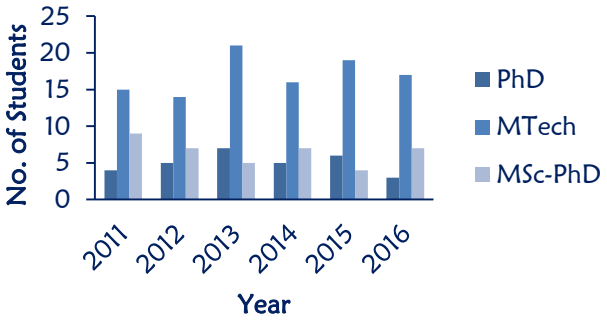
The Centre for Environmental Science and Engineering at IIT Bombay was established in 1985. Prior to this, an "Environmental Science and Engineering Group" comprising of faculty members from various allied disciplines existed on campus since 1977. At present, CESE is one of the leading research and educational centre for Environmental issues in the country with more than 470 alumni spread across the world. The academic programmes and course curriculum are continuously updated with a vision to impart strong fundamentals and sensitize the students towards interdisciplinary nature of environmental issues. The Centre is committed to quality research and technology development in socially relevant areas with national and international significance. Since inception, the Centre has established and maintained strong links with leading industries, institutions, and national and international funding agencies. We welcome your partnership towards addressing the challenging environmental issues of the day, and paving the way for a sustainable future!

ACADEMIC PROGRAMMES

Current Students



Students Admitted



PhD

Aim: To create researchers with strong fundamentals and aptitude to solve an array of environmental related issues

Duration: 3-6 years

Admission: May & Dec; Academic Record and Interview/Written Test

MTech

Aim: To enhance the fundamental engineering education with research exposure of an individual for a successful career in Environmental Engineering

Duration: 2 years

Admission: May: GATE Score and/or Interview/Written Test

MSc-PhD

Aim: To impart Science graduates with strong fundamentals and develop a research aptitude for addressing challanging environmental problems

Duration: 5+ years

Admission: Summer; JAM Score and/or Interview/Written Test

Minor

Undergraduates from other departments at IITB can take courses offered as Minor by the Centre to earn a Minor degree in Environmental Science and Engineering. This is in addition to their Major degree. The aim is to provide a wide exposure to the students.

COURSES


Water
Air
Modeling & Statistics
Management
Biology
Chemistry
Solid Waste
Environment
Water Resources and Open Channel Flow
Design of Wastewater Treatment Systems
Physico-Chemical Treatment Technologies
Municipal Water and Wastewater Systems
Groundwater Flow & Contaminant Transport through Porous Media
Design of Water and Wastewater Systems
Introduction to Fluid Mechanics
Environmental Monitoring Laboratory
Water and Wastewater Engineering
Design of Air Pollution Control Systems
Air Pollution Fundamentals
Air Pollution Science and Engineering
Atmospheric Aerosols
Air Pollution Control Technologies
Aerosol Science and Engineering
Air Pollution Monitoring Laboratory
Mass Transfer Process in Environmental Systems
Environmental Systems Modeling
Environmental Statistics and Experiment Design
Environmental Statistics
Environmental Computational Laboratory
Environmental Impact Assessment
Introduction to Risk Analysis
Energy Conversion and Environment
Environmental Management
Environmental Law and Policy
Environmental Change and Sustainable Development
Environmental Ethics
GIS for Environmental Planning and Management
Industrial Wastewater Management and Reuse
Environmental Studies: Science and Engineering (UG Course)
Environmental Science and Engineering (PG Elective)
Environmental Biotechnology
Design of Biological Treatment Systems
Biological Treatment Processes
Environmental Microbiology and Ecology
Environmental Toxicology and Health
Bioremediation - Principles and Applications
Environmental Microbiology Laboratory
Environmental Chemistry
Environmental Chemistry Lab
Municipal Solid and Biomedical Waste Management
Hazardous Waste Management

FACULTY

Amritanshu Shriwastav	Biological nutrient removal, algal-bacterial photobioreactors, algal biorefinery for biofuel production, water and wastewater treatment, fate and transport of pollutants in natural environment, developing simpler quantification methods of various environmental parameters and pollutants
Anil Kumar Dikshit	Water supply, water & wastewater treatment, urban and industrial solid waste management, environmental management, environmental systems modelling & optimization, GIS for environment, industrial effluent and sludge management
Anurag Garg	Industrial wastewater and leachate treatment - Advanced oxidation processes, catalytic wet oxidation, adsorption, biological processes, and integrated treatment processes, conversion of waste sludge in adsorbent, thermo-chemical treatment of sewage sludge, food waste composting, thermal treatment processes for municipal solid waste derived fuel
Harish Phuleria	Aerosols & air quality characterization with a focus on nano/ultra-fine particles, size-resolved outdoor PM chemical composition, improved cook stoves efficacy, efficiency, longevity and adoption assessment, environmental noise exposures, exposure modelling using GIS, land use, questionnaire data
Munish Chandel	Carbon capture and storage, chemical looping combustion, fluidized bed combustion, greenhouse gas mitigation, solid waste management
Sanjeev Chaudhari	Arsenic and fluoride removal from water, biological nutrient removal from wastewater, application of natural coagulants for water and wastewater treatment, treatment of textile wastewater by biological and physicochemical processes
Shyam R. Asolekar	Hazardous, municipal & biomedical waste management, eco-industrial networking, eco-centric and low-cost wastewater treatment, treatment of leachates and special industrial wastewaters, environmental policy and preventive environmental management
Subhankar Karmakar	Analysis of hydro-climatic extremes and flood management: multivariate flood and drought frequency analyses, non-stationary modeling, mapping vulnerability to natural and human-induced hazards using GIS, flood risk mapping, real-time flood forecasting; Environmental and water resources systems: simulation and optimization; Uncertainty modeling and decision science for environmental systems
Sumathi Suresh	Environmental biochemistry and microbiology, biological treatment processes, enzymology, application of biochemistry for cleaner production technologies, biomonitoring and bioassay for toxicity testing
Suparna Mukherji	Biotransformation and toxicity evaluation of complex organic pollutants, fate and transport of pollutants in aquatic and subsurface systems, physicochemical and biological treatment processes, hazardous waste minimization and pollution prevention, environmental statistics and design of experiments, application of nanomaterials for water treatment, monitoring and removal of micropollutants and monitoring of bioaerosols
Virendra Sethi	Aerosol and air quality, hot gas clean-up (thermal gasification), nano-powder synthesis, satellite remote sensing for air quality

RESEARCH CONTRIBUTIONS

Aerosols & Air Quality

- Monitoring, modeling and control of indoor air quality in various microenvirnments like rural and urban kitchens, schools and malls
- Dispersion modeling of industries, vehicles and urban area of sources
- Regional air quality mapping and assessment using GIS
- Rural energy gasification: Development of small scale clean up systems

Environmental Management

- Application of preventive environmental management by incorporating waste minimization, cleaner and greener technologies, eco-industrial networking and corporate social responsibility (sectors: ship dismantling and recycling yards, ship repairing yards, ports, individual industry, industrial estates, urban bodies, etc.)
- Bacterial production of cellulose: a greener alternative to plant based cellulose production
- Environmental management of toxic metals during reuse and disposal of coal fly ash from thermal plants

Environmental Systems Modeling

- Development of mathematical models for optimizing vehicle routes for MSW collection in an urban area using GIS
- Mapping of vulnerability and risk to hydro-climatic extremes at watershed scale and at national scale to facilitate effective mitigation strategy
- Parametric and non-parametric rainfall, flood and drought frequency analyses for deriving realistic design periods
- Mapping and assessment of human health risk to MSW landfill leachate contamination
- Developing near-real-time flood forecasting system for major Indian cities

Solid & Hazardous Waste Management

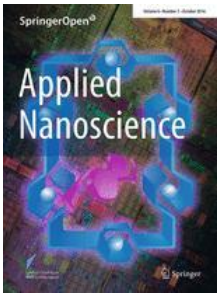
- Utilization options for wastewater treatment plant sludge and industrial sludge: estimating energy recovery potential as cofuel, and preparation of useful materials such as adsorbants
- Prepared integrated solid waste management plan for Aasonsol city
- Developed innovative technologies for hazardous wastes

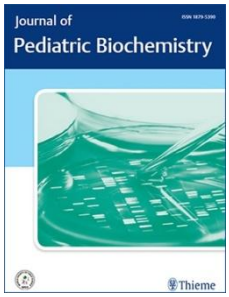
Water & Wastewater Treatment

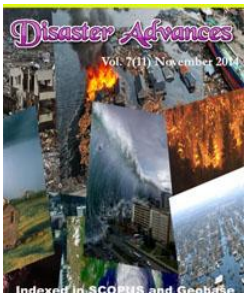
- Developed Community scale Hand-pump attachable arsenic removal filter using indigenous materials to achieve international drinking water standard
- Developed iron removal filter for treatment of groundwater
- Developed treatment schemes for removal of residues of pesticides and herbicides such as endosulfan, atrazine and 2,4-D from water
- Treatment of recalcitrant pollutants present in potable water and industrial wastewater
- Developed economical and efficient method for treatment of Azo dyes from wastewater of textile industries
- Treatment of aqueous effluents containing non-aqueous phase liquids (oil/ tar)
- Treatment of domestic sewage and industrial wastewaters for pollution control and reuse especially through combination of tertiary treatment technologies (advanced solutions) with low cost natural treatment systems (ecological solutions) aimed at reuse of sewage and industrial effluents
- Developed low cost catalyst for catalytic wet oxidation process suitable for industrial wastewater containing refractory compounds like petroleum refinery
- Developed fungal stirred aerobic reactor and fungal sequential batch aerobic reactor for decolourisation of distillery wastewater
- Developed advanced oxidation based biodegradability enhancement for further anaerobic treatment of distillery wastewater

PUBLICATIONS

Journals with Faculty on Editorial Board

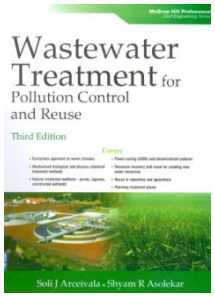


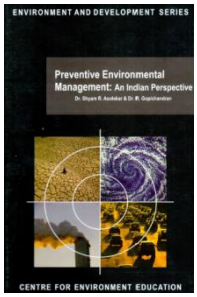


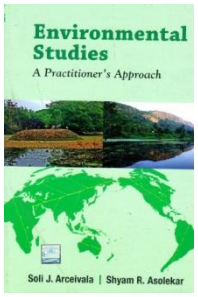


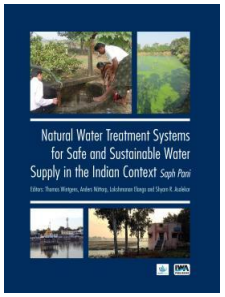
ACS Sustainable Chemistry & Engineering

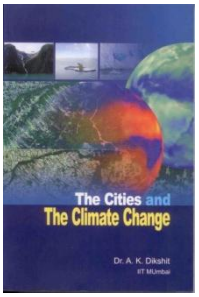
Books by Faculty











Major Journals where CESE Papers have been Published

- Applied Microbiology and Biotechnology
- Applied Nanoscience
- Atmospheric Environment
- Bioresource Technology
- Chemosphere
- Chemical Engineering Journal
- Desalination
- Desalination and Water Treatment
- Ecological Indicators
- Environmental Monitoring and Assessment
- Environmental Science and Pollution Research
- Environmental Science & Technology
- Geophysical Research Letters
- Journal of Chemical Technology and Biotechnology
- Journal of Colloid and Interface Science
- Journal of Environmental Management
- Journal of Flood Risk Management
- Journal of Hazardous Materials
- Nature Scientific Reports
- Separation and Purification Technology
- Science of The Total Environment
- Waste Management
- Water Research
- Water Resources Research

LABORATORIES & RESEARCH FACILITIES

Teaching Laboratory

Computer Laboratory

ICP-AES

TOC-Analyzer

UV-Vis Spectrophotometer

GC

High Volume Sampler

HPLC

IC

SMPS

PCR

AAS

Centre for Environmental Science and Engineering
Indian Institute of Technology Bombay
Powai, Mumbai - 400076
Tel: +91-22-2576-7851
Fax: +91-22-2576-4650
Email: head.cese@iitb.ac.in
Web: www.cese.iitb.ac.in