

Systems Thinking for Enhanced Water Security in Urban India

Overview of the course:

India is a diverse country with complex water management problems affecting the quality of life of the masses. With an urban population of 31%, India is at a point of transition where the pace of urbanization is in an acceleration mode. However rapid urbanization and population growth combined with climate change are leading to water-related problems like water scarcity, flooding, pollution of water bodies and consequent adverse impacts on human health and the environment. The Prime Minister of India has a vision of developing and the Government of India's publications documents duly acknowledge the need to provide a high quality of life and building resilience to climate change. Holistic water management is a vital element to be integrated into such planning and provisions so as to build resilience to changing climate and provide a better quality of life, including preparedness for mitigating disasters.

Australian expertise in holistic water management can train water professionals and thereby prepare them to think of innovative solutions to current water management challenges faced by rapidly growing cities in India. Australia has proven leadership worldwide in development, implementation, and monitoring of customized sustainable, reliable and efficient urban water services.

The proposed 2-week course of about 30 hours is aimed at developing participant skills on systems-based thinking through a problem and project-based learning using case studies. This symbiotic arrangement between faculty and participants will enable them to comprehend the multi-disciplinary facets of urban water management using a systems-thinking approach. This course is comprised of lectures and tutorial exercises to enable participants to acquire specialized skills and expertise in the field of Urban Water Management, specifically catered for the development of water smart cities for the 21st century.

This course is designed to develop skills and knowledge among future and current water professionals to meet some of these water management challenges. The aspects of alternative water resources, water quality & quantity, hydrology, hydraulics, water treatment and associated economics are covered in this course. The course will enable participants to acquire advanced theoretical knowledge and critical analysis skills and apply these to real world problem solving environment. The course will also enhance participants learning through practical work-related activity learning.

The main objectives of the course are towards exposing the participants to

- Explain systems thinking and cause-effect analysis methods
 - Discuss different multi-disciplinary aspects of water resource management using case studies
 - Developing understanding of systems things in context of water management, climate change, and water security issues
 - Understanding role of governance, technology, policy making and institutions in context of water security
 - Understanding role of different stakeholders and economic instruments used in water management
 - Understanding of advanced techniques and current best management practices of storm-water including Water Sensitive Urban Design (WSUD)
 - Understanding Australian water sensitive urban design technologies
 - Understanding statistical analysis of data on different water management aspects and interpreting it for decision making
 - Understanding tools such as life cycle assessment for decision making in this context
- Undertaking economic analysis for water management projects

Modules	This course consists of two modules. 03rd December 2018 to 15th December 2018
You should attend if you are	<ul style="list-style-type: none"> ▪ Student of B. Tech, M.Tech, Ph.D. research scholar, or faculty member of academic institutions or technical institutions. ▪ Executives, engineers and researchers from utilities, service and government organizations, including R&D laboratories.
Registration Fees	<p>The participation fees for attending the course is as follows:</p> <p>Overseas Participants: US\$ 200 Industry/Research Organizations: Rs. 5000 Participants from Academic Institutions: Rs. 2000 Research Scholars/Students/Alumni: Rs. 1000</p> <p>After registration on GIAN portal http://www.gian.iitkgp.ac.in/GREGN/index, the candidates are advised to submit the prescribed fee in the form of DD in favor of “Registrar, DTU” payable at Delhi along with printout of online submitted application form to Dr. A. K. Haritash, Course Coordinator (GIAN), Assistant Professor, Department of Environmental Engineering, Delhi Technological University, Bawana Road, Delhi-110042 on or before 20.11.2018. The short listed participants will be informed through e-mail.</p> <p>The above fee includes all instructional materials, computer use for tutorials and assignments and laboratory equipment usage charges. The course fee does not include boarding and lodging.</p>

Teaching Faculty



Dr. Harpreet Singh Kandra is an academician with extensive experience in water management; environmental management; environmental reporting; data management; and policy analysis, teaching, and training. He is currently teaching courses on hydraulics, hydrology, water and wastewater engineering, water resources management, environmental design and research projects. He has successfully supervised 10+ honours and postgraduate students on themes related to water engineering and management. He is currently supervising 10+ students on projects

related to exploring the use of alternative sources of water; reuse of treated stormwater; assessing clogging in filters, and investigating implementation challenges and opportunities for integrated water management in regional towns and developing countries. Harpreet has demonstrated experience of working in many projects involving multi-disciplinary teams and has worked in leadership positions as Program co-ordinator and Program manager. He has previously worked on subjects of sustainability, environmental management and performance measurement on projects funded by different donor agencies like UNEP, UNDP, UN Habitat, Government of India and different academic institutes etc. He has advanced skills in application softwares like MS Office, MS Project, SimaPro, MUSIC, SPSS, and MATLAB. Harpreet was awarded international scholarships to pursue research degree at Monash University on stormwater treatment and management. He has also received grants for consultancy and research in fields of education, environmental management and reporting and stormwater management. He has published over 25 reports and publications and presented at many international conferences.

Host Faculty



Prof. S. K. Singh

Prof. S K Singh obtained his Ph.D. from BITS, Pilani and M. Tech. from IIT-BHU, Varanasi. He is recipient of numerous awards and honours. He is engaged in teaching, research, administration and consultancy for the last 29 years. Dr. Singh has published more than 180 research papers in the national and international journals, He has also authored 03 books. He has guided more than 65 master's thesis and 12 Ph.D. Scholars. He has provided consultancy to various Govt. and Private organisations and industries. Dr. Singh is Life fellow of various prestigious bodies like Institution of Engineers, Institution of Environmental Engineers; Geological Society of India; Indian Chemical Society; New York Academy of Sciences; American Society of Civil Engineers; Indian Institute of Bridge Engineers and Indian Water Resources Society . Dr. Singh has received felicitations and awards by professional bodies such as DR. APJ ABDUL KALAM AWARD, 2016; RASHTRIYA SHIKSHA GAURAV PURASKAR 2014; INTERNATIONAL FELICITATION and WEC-IIEE- IAEWP ENVIRONMENTAL AWARD; RASHTRIYA SAMMAN PURASKAR; EXCELLENT SERVICES AWARD; CLEAN UP THE EARTH AWARD and EMINENT PERSONALITY AWARD. He is the youngest professor at the age of 35 years, at Delhi Technological University (Formerly Delhi College of Engineering), selected through Union Public Service Commission (UPSC). He held the positions of Dean, Faculty of Technology, Delhi University (DU), Delhi and Head, Deptt. of Civil Engineering, Delhi University. He has been Dean (Administration), Delhi College of Engineering, Delhi and Founder Chairman, EDUSAT Program for Delhi state.

He is presently Head, department of Environmental Engineering at Delhi Technological University. He is also Member of Board of Governors, CSMRS, Ministry of Water Resources, GOI; Member, Board of Management, Vishvesvaraiya Group of Institutions; Member, Board of Management, Walchand College of Engineering, Sangli (M.S.); Chairman, Departmental DPC, IASRI, ICAR New Delhi; Member, University Court, University of Delhi. He is also member of various high power committees of National Board of Accreditation(NBA), AICTE, UGC and UPSC. He was member of Panel of Judges of Prime Minister's Trophy for Best integrated steel plant in India.



Dr. A.K. Haritash is Assistant Professor in the Department of Environmental Engineering, DTU since August, 2007. His area of interest is environmental monitoring of Polycyclic Aromatic Hydrocarbons (PAHs), water quality assessment, wetland monitoring, and bioremediation. He has around 60 publications in the form of research papers, conference proceedings, articles, and an edited (translated from English to Hindi) book His

research on biodegradation of PAHs has been conferred the status of fast breaking research in Environmental Engineering by Thomson Reuters.

Course Coordinators

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For Registration:

<http://www.gian.iitkgp.ac.in/GREGN/index>

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Course Schedule (03rd December 2018 to 15th December 2018)

Date (Day)	Time	Topic (Lecture details)
Dec 03, 2018 (Monday)	Lecture 1 (11:00AM – 1:00 PM)	Introduction to the course System thinking and analysis
	Lecture 2 (2:00 PM – 4:00 PM)	Water, energy and climate change
Dec 04, 2018 (Tuesday)	Lecture 3 (9:30AM – 11:30 AM)	Introduction to frameworks such as cause effect analysis- environmental management
	Lecture 4 (1:30 PM– 3:30 PM)	Introduction to frameworks such as cause effect analysis- water management
	4:00-5:00 PM	Student consultation and discussion hours
Dec 05, 2018 (Wednesday)	Lecture 5 (9:30AM – 11:30 AM)	Holistic urban water management concepts, tools and assessment frameworks
	Tutorial 1 (1:30 PM – 3:30 PM)	Group activity: Identifying projects for local applications
	4:00-5:00 PM	Student consultation and discussion hours
Dec 06, 2018 (Thursday)	Lecture 6 (9:30AM – 11:30 AM)	Fit for purpose concepts and alternative water resources Centralized, decentralized and hybrid systems
	Tutorial 2 (2:00 PM – 4:00 PM)	Group activity: Application of system thinking concepts for local city scale urban water planning (Identification of local data requirements, drivers, and barriers, policy needs).
	4:00-5:00 PM	Student consultation and discussion hours
Dec 07, 2018 (Friday)	Lecture 7 (9:30AM – 11:30 AM)	Non-structural and economic instruments and analysis in water management
	Tutorial 3 (1:30 PM– 3:30 PM)	Group activity: Life cycle assessment of projects
	4:00-5:00 PM	Student consultation and discussion hours
Dec 10, 2018 (Monday)	Lecture 8 (9:30AM – 11:30 AM)	Life cycle costing of projects
	Lecture 9 (1:00 PM– 3:00 PM)	Water sensitive urban design (WSUD) technologies
	Tutorial 4 (4:00 PM– 6:00 PM)	Group activity: Reviewing performance of projects (selected in previous activities)
Dec 11, 2018 (Tuesday)	Lecture 10 (9:30AM – 11:30 AM)	Water sensitive urban design (WSUD) technologies: adoption drivers and impediments
	Tutorial 5 (1:30 PM– 3:30 PM)	Identification of WSUD technologies for water conservation, water quality and flood mitigation
	4:00-5:00 PM	Student consultation and discussion hours
Dec 12, 2018 (Wednesday)	Lecture 11 (9:30AM – 11:30 AM)	Water and environmental management policies, regulations and reporting
	Tutorial 6 (1:30 PM– 3:30 PM)	Summary of the course and discussion (Q&A) and identifying a road map for implementing learnings from this course
	4:00-5:00 PM	Student consultation and discussion hours
Dec 13, 2018 (Thursday)	Final session (9:30AM – 1:30 PM)	Student presentations Feedback collection Preparing road map for future course needs (tentative activity depending on number of students)
	(2:30 PM – 4:00 PM)	VALEDICTORY FUNCTION