

UNIVERSITY of HOUSTON

CULLEN COLLEGE of ENGINEERING

Department of Civil & Environmental Engineering

Special Seminar

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Wastewater treatment plants as chemical observatories to assess environmental and population health

Wednesday, March 1, 2017

3:00 pm – 4:00 pm
Engineering Building 2 E132

Abstract: Most chemicals used in consumer products, their transformation products and human metabolites are ultimately washed down the drain and are collected in municipal sewers. Efficient chemical monitoring at wastewater treatment plants (WWTPs) thus can provide up-to-date information on chemical usage rates and human exposures for epidemiological assessments of sewage-borne chemicals. My PhD research explored the use of WWTPs as chemical observatories to conveniently identify and prioritize persistent and bioaccumulative contaminants of emerging concern (CECs). Nationally representative samples of sewage sludge (biosolids) were analyzed for 239 CECs, of which 130 were detected. Ten of the top 11 most abundant CECs in sewage sludge were found to be high-production volume chemicals, eight of which representing priority chemicals. A literature based analysis of pollutants detected in nationally representative samples of sewage sludge and humans demonstrated that 70% of chemicals occur in both matrices. This observed co-occurrence of contaminants in both matrices suggests that the analysis of sewage sludge can inform human health risk assessments by providing current information on consumption and exposures in human populations and associated body burdens of harmful environmental pollutants. My future research plans are aimed at analyzing water/wastewater treatment process flows and aquatic environments to: (i) determine the occurrence and likely fate of CECs (e.g. disinfection byproducts); (ii) determine the performance and effectiveness of treatment systems in removing CECs from waters; (iii) inform on chemical exposures in populations;

and to (iv) assess mixture toxicity in streams and drinking water through a combination of chemical screening and biological assays. In addition, system dynamics modeling will be incorporated to test policies and scenarios for sustainable management of water resources in urban environments. A combination of such analytical and systems modeling approaches in my future research program will inform on best practices to meet urban water quality and sustainability challenges.

About the speaker:



Dr. Arjun Venkatesan is currently an Associate Research Scientist at the School of Sustainable Engineering and Built Environment at Arizona State University (ASU). He received his Ph.D. at ASU in 2013 and his Master of Science at the University of Nevada, Las Vegas in 2009, in the field of Environmental Engineering. His PhD research was focused on the identification of emerging contaminants and the role of human society and the built environment in the distribution of these potentially harmful substances in the environment. He is currently exploring novel hyphenated analytical techniques and monitoring approaches to characterize nutrients and nanoparticles in the environment to further our understanding of their occurrence and cycling in natural and built systems.