Environmental and Facilities Management

Water-Energy Nexus Certificate Program

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University of California, Irvine
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**Water-Energy Nexus Certificate Program**

According to a recent report from the US Department of Energy (DOE), better understanding of the relationship between water availability and energy production (water-energy nexus) and its susceptibility to climate change is a matter of national security. This report was issued after severe droughts affected more than 1/3 of the US and the loss of available water constrained the ability of many power plants to function.

It is hard to imagine not having access to clean water or power – growing population, urbanization, shrinking resources, and increasing standards of living are threatening these indispensable assets even within developed countries. While clean water is the most important factor, access to power is an imperative component of having a safe, productive, and comfortable society.

The goal of this certificate program is to understand the critical interaction between water and energy along with related topics including biological and physical-chemical treatment processes, carbon and energy footprint analysis, and desalination in order to guide future improvements and technical innovations to mitigate future issues with these critical resources.

**Who Should Enroll**

This program is designed for professionals already employed in the workforce and those new to the subject matter who wish to expand their career opportunities and grow professionally by increasing their knowledge of the water-energy nexus and prepare them to make a difference as the world struggles with these key issues.

Professionals in the field of water and wastewater engineering who are interested in the energy intensity, usage, efficiency, and waste of the water treatment processes would benefit from this program including:

- Consultants who are or are planning to work on energy-related projects and want to deepen their knowledge of theoretical and practical aspects of energy efficiency and optimization in the water sector.

For more information:

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Program Fees
Course fees for each 4 unit course are $1,201.00. Additional fees are required for textbooks. Please note course fees are subject to change. Those pursuing a certificate will pay a $125 Candidacy Fee.

Curriculum

Advanced Biological Treatment Processes
ENGRCEE 263 (4 units)
Analysis of natural biological processes in the aquatic environment. Design of biological treatment processes with emphasis on suspended growth systems. Aerobic and anaerobic treatment systems, biodegradation of contaminants in the environment. Construction and use of computer models for process design and operation.

Advanced Physical-Chemical Treatment Processes
ENGRCEE 265 (4 units)
Theory and dynamics of physical and chemical separation processes in water and wastewater treatment. Topics include coagulation, sedimentation, filtration, gas transfer, membrane separations, and adsorption. Prerequisites: CEE161 and CEE162.

Desalination
ENGRCEE 260 (4 units)
Introduction of state of technology, costs and benefits, environmental issues, and implementation issues related to desalination. Emphasis on membrane processes and biofouling prevention.

Carbon and Energy Footprint Analysis
ENGRCEE 264 (4 units)
Mass- and energy-flux balance analysis applied to water and wastewater systems. Case studies include analysis of aeration, membrane separations, disinfection, water supply, and water reclamation processes. Prerequisite: CEE263, CEE265, or consent of instructor.
Advisory Committee

Sunny Jiang, Ph.D., Professor Civil and Environmental Engineering; Professor (Joint Appointment) Ecology and Evolutionary Biology, UC Irvine School of Engineering

Lory Larson, Consulting Engineer, Southern California Edison

Jim Mihelcic, Ph.D., Professor of Civil and Environmental Engineering, University of South Florida College of Engineering

Coenraad Pretorius, Senior Environmental Engineer at CDM Smith

Diego Rosso, Ph.D., Associate Professor, Civil and Environmental Engineering; Associate Professor (Joint Appointment), Chemical Engineering and Materials Science; Director, Water-Energy Nexus Center, UC Irvine School of Engineering

Stephanie Shamblin Gray, Water Engineer at HDR

Reza Sobhani, Ph.D., Consultant, Orange County Sanitation District

Mike Stenstrom, Ph.D., Distinguished Professor in the Civil and Environmental Engineering Department, UCLA

Academic Management

Dave Dimas, Ph.D., Director, Engineering, Sciences and Information Technologies

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