

Graduate Education/Training – Proposals and Projects

1. “Advanced Training for Learning State of the Art Instrumentation for Measuring Environmentally Hazardous Organic and Inorganic Contaminants in Water,” University of Cincinnati Faculty Development Council, Accepted March 2001 (Dionysios D. Dionysiou, PI; George Sorial and Daniel B. Oerther, Co-PIs), \$7,500.
2. “Advanced Laboratory Series for Environmental Engineering and Science Education, Integrating Discipline-Based Labs in Cross-Cutting Education,” Department of Civil and Environmental Engineering, University of Cincinnati (Through Funding from the Ohio Board of Regents), Accepted Jan. 2001, (D. B. Oerther, D. D. Dionysiou, George A. Sorial, Co-PIs), \$ 24,000, Effort 33%.

SUMMARY OF TEACHING PROJECTS:

“Advanced Training for Learning State of the Art Instrumentation for Measuring Environmentally Hazardous organic and Inorganic Contaminants in Water”

University of Cincinnati Faculty Development Council
Dionysios D. Dionysiou, George A. Sorial, Daniel B. Oerther (34%/33%/33%)
\$ 7,500

The objective of this initiative was to achieve advanced training for faculty in using modern instrumentation to detect the presence and quantify the concentration of organic and inorganic contaminants in water. By obtaining an advanced understanding and learning of the instrument and new software, the faculty of the Water Quality Program can be able to perform state of the art research in cutting edge water treatment processes. This will enable the evaluation of the efficiency of important conventional and innovative treatment technologies including activated sludge, biofiltration, advanced oxidation technologies, electrocatalysis, membrane filtration, adsorption, and extraction. The training included advanced features of Atomic Absorption Spectroscopy and Specialized Environmental Analysis Using GC/MS techniques. Several Ph.D. and M.S. students were also trained using these specialized methods. Special parts of the training are also included in newly developed series of laboratory courses (CEE 658, Environmental Instrumentation; CEE, 724, Advanced Unit Operations in Water Treatment; CEE 725, Molecular Methods in Environmental Engineering) which are offered in the Spring of each academic year, starting from year 2001. Details of the instrumentation training, impact of training on research experience of the faculty, and benefits obtained by the graduate students are summarized in a report submitted to UC Faculty Development Council in March 2002.

“Advanced Laboratory Series for Environmental Engineering and Science Education, Integrating Discipline-Based Labs in Cross-Cutting Education”

Department of Civil and Environmental Engineering, University of Cincinnati
Daniel B. Oerther, Dionysios D. Dionysiou, George A. Sorial, (34%/33%/33%)
\$ 24,000

The purpose of this project is to develop advanced laboratory courses to improve the interdisciplinary education of the next generation of Environmental Engineers and Scientists. During the Spring

Quarter of 2001, three new laboratory courses, CEE659 Unit Operations and Process Monitoring, CEE658 Environmental Instrumentation, and CEE725 Molecular Methods in Environmental Engineering, were established in our Department. The goals of these three courses include exposing advanced graduate students to cutting-edge, discipline-based technology in the fields of process engineering, analytical chemistry, and analytical biology, and to demonstrate to students the fundamentals of integrating disciplinary-based technology to solve open-ended questions in processes related with quality and treatment of drinking water, wastewater, and air. These three courses provide a critical link between courses in the Principles Series (CEE653 Phys., CEE647 Chem., and CEE646 Biol.) and advanced courses in water and air treatment. To maximize the impact of these advanced, discipline-based laboratory courses on our students, we developed a cutting-edge approach. In CEE659 Unit Operations, students learn fundamentals of design and operation of advanced treatment processes and how to generate samples for chemical and biological analyses. Analytical techniques in CEE658 Environmental Instrumentation are used to identify chemical pollution in the environment and to monitor the performance (e.g., removal efficiencies) of treatment systems. Molecular Methods (CEE725) are used to develop molecular biology-based tools for monitoring microbial biocatalysts and to link the design and operation of unit operations with the structure and function of microbial communities.