

Aquatic pollution and wastewater management

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GENERAL

SCHOOL	School of Environment		
ACADEMIC UNIT	Department of Environment		
LEVEL OF STUDIES	Postgraduate		
COURSE CODE	ENV513	SEMESTER	Spring
COURSE TITLE	Aquatic pollution and wastewater management		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	CREDITS
Lectures		8	
Laboratory exercises			
Course Total		50	2
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE	Skill development		
PREREQUISITE COURSES:	None		
COURSE WEBSITE (URL)			

LEARNING OUTCOMES

Learning outcomes
<p>Knowledge</p> <ul style="list-style-type: none"> Develop critical thinking and critical knowledge on aquatic pollution and wastewater management Recognize key environmental problems that are directly and indirectly related to aquatic pollution <p>Understanding (Comprehension)</p> <ul style="list-style-type: none"> Understand the concepts: aquatic pollution, pollution monitoring, wastewater management, public health effects of contaminants Understand the fundamentals of wastewater treatment, including the common physical, chemical and biological unit operations encountered in treatment process Understand the ecological and public health effects of major wastewater contaminants <p>Application</p> <ul style="list-style-type: none"> Apply procedures and techniques for the designing of aquatic pollution monitoring programmes Apply procedures and techniques to design wastewater treatment plants' monitoring programmes <p>Analysis</p> <ul style="list-style-type: none"> Analyse the quality characteristics of a water body in view of assessing its pollution state Analyse wastewater quality parameters in view of assessing the suitability of wastewater

<p>treatment processes</p> <ul style="list-style-type: none"> Analyse wastewater data in view of evaluating public health effects <p>Synthesis</p> <ul style="list-style-type: none"> Use monitoring data to identify existing pollution problems in a water body Use wastewater data to plan of an appropriate wastewater management plan Use wastewater and aquatic environment data to assess the risk for public health effects <p>Evaluation</p> <ul style="list-style-type: none"> Evaluate aquatic pollution state Evaluate the performance of wastewater management plans Evaluate public health effects risks
General Competences
<p>The aim of the course is to provide students with an understanding about the key concepts of aquatic pollution from municipal and industrial wastewater, the public health effects related to key wastewater contaminants and the organization of relevant pollution monitoring programs to assess the quality of the receiving waters.</p> <p>The student who will successfully complete the course is expected to be able to:</p> <ul style="list-style-type: none"> Search for, analyse and combine bibliographical and monitoring data in view of assessing aquatic pollution status and potential public health effects from municipal wastewater effluents Contribute to the organisation of monitoring programmes in view of assessing the quality of municipal wastewater and the ecological status of aquatic environment Contribute to a decision making process for the evaluation of the quality of the aquatic environment and the potential risk of wastewater to the public health Work in an interdisciplinary environment on wastewater management, aquatic pollution assessment and public health effects Work on project planning and management of environmental issues Respect natural environment and contribute to the sustainable development of in line with UN Sustainable Development Goals Communicate information, ideas, problems and solutions in relation to aquatic pollution and its mitigation, to pollution experts, decision makers and the general public

SYLLABUS

<p>Courses outline:</p> <ol style="list-style-type: none"> Introduction to water pollution: key concepts of pollution; major groups of contaminants in municipal wastewater; fate of contaminants in the aquatic environment and impact on the aquatic ecosystem Aquatic pollution monitoring programme to assess environmental status and relevant EU legislation Aquatic pollution monitoring programme: Strategy for sampling, sample preservation, analysis of contaminants, data quality assurance and reporting Municipal Wastewater Treatment and Reuse: current status in EU and legislation, basic treatment processes, common problems and monitoring strategy Municipal Wastewater Treatment and Reuse: new problems and novel treatment processes Sewage Sludge Treatment and Reuse: methods, sludge management in EU, legislation Water quality: sources, fate, and transport of waterborne pathogens Waterborne diseases and public health

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	<i>Face-to Face</i>	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Use of ICT, communication with students	
TEACHING METHODS	Activity	Semester workload
	Lectures	16 h
	Essay writing	14 h
	Study and analysis of bibliography	20 h
	Course total	50 h
STUDENT PERFORMANCE EVALUATION	<p>Students will be individually graded based on:</p> <ul style="list-style-type: none"> • Two individual written essays (50% each) 	
ATTACHED BIBLIOGRAPHY		
<ul style="list-style-type: none"> • Arkema, K.K., Abramson, SC, Dewsbury, BM (2006). Marine ecosystem-based management: from characterization to implementation. <i>Frontiers in Ecology and the Environment</i>, Volume: 4, Issue: 10, Pages: 525-532. • Angelidis, M.O., P.G. Markantonatos and N.Ch. Bacalis (1995). Impact of human activities on the quality of river water: the case of Evrotas river catchment basin, Greece. <i>Environmental Monitoring and Assessment</i>, 35 (2): 137-153. • Angelidis, M.O., P.G. Markantonatos, N.Ch. Bacalis and T.A. Albanis (1996). Seasonal fluctuations of nutrients and pesticides in the basin of Evrotas river, Greece. <i>Journal of Environmental Science and Health</i>, A31: (2), 387-410. • Directive 2000/60/EC establishing a framework for Community action in the field of water policy • Directive 2008/56/EC for a European Marine Strategy Framework • UNEP (2011). Taking steps toward marine and coastal Ecosystem-Based Management: An introductory guide. • Koutsou O.P., Gatidou G., Stasinakis A.S. (2018) Domestic wastewater management in Greece: greenhouse gas emissions estimation at country scale. <i>Journal of Cleaner Production</i> 188, 851-859. • Thomaidi V.S., Stasinakis A.S., Borova V.L., Thomaidis N.S. (2015) Is there a risk for the aquatic environment due to the existence of emerging organic contaminants in treated domestic wastewater? Greece as a case-study. <i>Journal of Hazardous Materials</i> 283, 740-747. • Kelessidis A., Stasinakis A.S. (2012) Comparative study of the methods used for treatment and final disposal of sewage sludge in European countries. <i>Waste Management</i> 32, 1186-1195. • http://www.unep.org • http://www.msfd.eu • http://www.wfd.eu • https://www.eea.europa.eu/data-and-maps/indicators/urban-waste-water-treatment/urban-waste-water-treatment-assessment-4 • https://www.ecdc.europa.eu/en/publications-data/toolkit-investigation-and-response-food-and-waterborne-disease-outbreaks-eu 		