(3 credits)

001-2-5061

Weekly Lecture Hours	Exercise	Laboratory	Field Trip
3			

Abstract
Limitations of global freshwater supplies have stimulated the application of desalination technology with desalinized water coming on line worldwide at a rate of 90 to 100 million $m^3 d^{-1}$. Large scale desalination facilities such as seawater reverse osmosis and multi-stage flushing have tight bidirectional interaction with the aquatic environment. These interactions impose technical challenges on desalination operators as they draw seawater with changing characteristics, while effecting the aquatic environment by altering the ambient: (i) salinity, (ii) temperatures and (iii) nutrient loads. The growing need of desalinated water from one end and the clear importance of the coastal environment on the other hand highlight the importance of understanding this sensitive nexus between the desalination industry and the aquatic environment.

Course description	The course will discuss in details the tight links between the desalination industry and the aquatic environment. These interactions are bidirectional and concern the efficiency of the desalination process due changes in feedwater quality as well as direct impact on the costal environment through brine and backwash discharge.
Course aim	The main objective of the course is to provide the students with comprehensive understanding of the links between the growing desalination industry and the aquatic environment
Course content	The lectures will be divided to the following topics: Introduction to seawater desalination Feedwater (seawater) characteristics and desalination efficiency, challenges and solutions The effect of feedwater draw on planktonic organisms Reverse osmosis and brine characteristics Impact of brine discharge on the planktonic and benthic environment The use of antiscalants in the desalination industry and their effect on the coastal environment: from phytoplankton and bacterioplankton to coral reefs

	What would be the results of discharging sand filtration backwash to the aquatic environment The effects of thermal desalination on the coastal environment Imposing zero liquid discharge (ZLD) on the desalination industry 0. Minimizing the impact of desalination on the aquatic environment via engineered solutions
Learning outcomes	At the end of the course students will be able to: Characterize desalination processes that are linked to the aquatic environment Define the impacts of the desalination process on the aquatic environment and vice versa Describe the possible engineered solutions to minimize the effect of desalination on the aquatic environment
Attendance requirements	80%
Teaching arrangements	Frontal lectures
Required Reading	Provided during the course
Course/module Evaluation	Final exam
Prerequisites	No special requirements
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