جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

Course Syllabus: Physical/Chemical Treatment Processes - EnSE 342

Division	Biological and Environmental Sciences & Engineering Division
Course Number	EnSE 342
Course Title	Physical/Chemical Treatment Processes
Academic Semester	Spring
Academic Year	2016/2017
Semester Start Date	01/22/2017
Semester End Date	05/18/2017
Class Schedule (Days & Time)	09:00 AM - 10:30 AM | Sun Tue

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Torove Leiknes	torove.leiknes@kaust.edu.sa	+966128082193	4235, 4, Al-Jazri (bldg. 4)	As per appointment

Teaching Assistant(s)

Name	Email

Course Information

Comprehensive Course Description	This course aims to give an introduction to the most common physical / chemical unit processes applied in conventional water treatment. Although the unit processes can be applied to both drinking water production and wastewater treatment, an emphasis will be made on their use in drinking water production. Following a brief introduction drinking water supply engineering (e.g. drinking water quality standards / parameters / criteria), and brief review of general reactor theory, a more detailed presentation of the unit processes will be given. The course is not a treatment design course but the common unit processes will be presented following typical conventional treatment plant designs. The aim of the course is to give a more fundamental and theoretical understanding of the specific unit processes, providing a better understanding of the principles of how they function and the degree of treatment that can be achieved. On the basis of the theory, typical design approaches and practices will be presented. Practice and use of the theory will be reinforced through practical exercises to be undertaken by the students.
Course Description from Program Guide	Water-treatment processes, membranes, advanced oxidation, principles and techniques of water desalination
Goals and Objectives	Goal: gain a fundamental and theoretical understanding of the key and most common physical / chemical unit processes applied in conventional water treatment processes. Learn how to use the theory to calculate and design the specific unit processes presented. The aim of the course is to provide the student with a better knowledge and toolbox to both choose and design a water treatment process based on achieving the required water quality needed as a function of the source water quality.
Required Knowledge	**Prerequisite:** -EnSE 201 WaterQuality and Environmental Analysis -EnSE 202 Aquatic Chemistry (or equivalent)
Reference Texts	**Text Book:** Water Treatment: Principles and Design, MWH, 2nd Ed., *Recommended* Reading Assignments

Method of evaluation	**34.00**% - Course Project(s) **33.00**% - Exam 2 **33.00**% - Exam 1
Nature of the assignments	There will be two written exams covering the material of the course: one roughly halfway through the course, one at the end. The course project is a Term Paper on a gicen topic relatd to the course material presented as conference presentation and a journal publication. Presenttiosn will be doen durign the last week of the course. -Deliverable: - › Literature-Based Paper (e.g., Journals such as Water Research, research monograms, etc.; deemphasize “text books”) › Format based on a jounral template › 10 pages (max) of text including references (12 point font, single spaced, 2.5 cm margins, list of references can be 10 point font), including abstract; but excluding figures and tables › Prentation of paper - conference format, 20 min (15 min + 5 min questions) › Paper to be uploaded via Blackboard
Course Policies	The course uses practical assignments as part of the teaching tool. All assignments must be completed. **Practice Problem Sets:** Periodically Distributed, Not Collected; Solutions Later Posted
Additional Information	**Topics Not Covered:** -Desalination for Drinking Water Supply: EnSE 325 Seawater and Brackish Water Desalination, dedicated to this topic

Tentative Course Schedule *(Time, topic/emphasis & resources)*		
Week	**Lectures**	**Topic**
1	Sun 01/22/2017 Tue 01/24/2017	Introduction to (Drinking) Water Supply Engineering Drinking water quality parameters; water quality criteria/standards
2	Sun 01/29/2017 Tue 01/31/2017	Reactor theory
3	Sun 02/05/2017 Tue 02/07/2017	Mass transport Particles – definitions and separation
4	Sun 02/12/2017 Tue 02/14/2017	Chemical precipitation Mixing and flocculation
5	Sun 02/19/2017 Tue 02/21/2017	Sedimentation Floatation
6	Sun 02/26/2017 Tue 02/28/2017	*Work on assignment / exercise tasks*
7	Sun 03/05/2017 Tue 03/07/2017	Filtration
8	Sun 03/12/2017 Tue 03/14/2017	Membrane filtration
9	Sun 03/19/2017 Tue 03/21/2017	Adsorption Ion Exchange
10	Sun 03/26/2017 Tue 03/28/2017	Exam I *Work on assignment / exercise tasks*
11	Sun 04/02/2017 Tue 04/04/2017	Disinfection
12	Sun 04/09/2017 Tue 04/11/2017	Oxidation / Advanced oxidation (AOP)
13	Sun 04/16/2017 Tue 04/18/2017	Residuals Management (Sludge) Summary of topics / material to date
14	Sun 04/23/2017 Tue 04/25/2017	Paper presentations
15	Sun 04/30/2017 Tue 05/02/2017	Exam II
16	Sun 05/07/2017 Tue 05/09/2017	
17	Sun 05/14/2017 Tue 05/16/2017	
18		

Note

The instructor reserves the right to make changes to this syllabus as necessary.