



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	2018/2019
Semester Start Date	01/27/2019
Semester End Date	05/23/2019
Class Schedule (Days & Time)	10:30 AM - 12:00 PM Mon Wed

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
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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 to 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., <i>Recommended Reading Assignments</i>

Method of evaluation	20.00% - Scientific review article presentation 40.00% - Exam 2 40.00% - Exam 1
Nature of the assignments	<p>There will be two written exams covering the material of the course: one roughly halfway through the course, one at the end.</p> <p>The course project is a Term Paper on a given topic related to the course material presented as conference presentation and a journal publication. Presenttions will be done during the last week of the course.</p> <p>-Deliverable:</p> <p>-</p> <ul style="list-style-type: none"> › Literature-Based Paper (e.g., Journals such as Water Research, research monograms, etc.; <p>deemphasize “text books”)</p> <ul style="list-style-type: none"> › Format based on a journal 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 › Presentation of paper - conference format, 20 min (15 min + 5 min questions) › Paper to be uploaded via Blackboard
Course Policies	<p>The course uses practical assignments as part of the teaching tool. All assignments must be completed.</p> <p>Practice Problem Sets: Periodically Distributed, Not Collected; Solutions Later Posted</p>
Additional Information	<p>Topics Not Covered:</p> <ul style="list-style-type: none"> -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	Mon 01/28/2019 Wed 01/30/2019	Introduction to (Drinking) Water Supply Engineering Drinking water quality parameters; water quality criteria/standards
2	Mon 02/04/2019 Wed 02/06/2019	Reactor theory
3	Mon 02/11/2019 Wed 02/13/2019	Mass transport Particles – definitions and separation
4	Mon 02/18/2019 Wed 02/20/2019	Chemical precipitation Mixing and flocculation
5	Mon 02/25/2019 Wed 02/27/2019	Sedimentation Floatation
6	Mon 03/04/2019 Wed 03/06/2019	<i>Work on assignment / exercise tasks</i>
7	Mon 03/11/2019 Wed 03/13/2019	Filtration (conventional)
8	Mon 03/18/2019 Wed 03/20/2019	Filtration (membrane filtration)
9	Mon 03/25/2019 Wed 03/27/2019	(Spring break)
10	Mon 04/01/2019 Wed 04/03/2019	<i>Work on assignment / exercise tasks</i> Exam I
11	Mon 04/08/2019 Wed 04/10/2019	Adsorption Ion Exchange
12	Mon 04/15/2019 Wed 04/17/2019	Disinfection
13	Mon 04/22/2019 Wed 04/24/2019	Oxidation / Advanced oxidation (AOP)
14	Mon 04/29/2019 Wed 05/01/2019	Residuals Management (Sludge) Summary of topics / material to date
15	Mon 05/06/2019 Wed 05/08/2019	Paper presentations
16	Mon 05/13/2019 Wed 05/15/2019	Paper presenations Exam II
17	Mon 05/20/2019 Wed 05/22/2019	Final Exam Week

Note

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