



ChE 413: Desalination and Water Treatment

٤١٣ هـ.م: تحلية ومعالجة المياه

**Instructor:** Prof. Ibrahim S. Al-Mutaz, Room: 2B57, Phone: (46) 76870

Class Hours: TBA

**Catalog Data:** (3 credit hours – 4 contact hours)

(Study of the scientific, technical as well as economical aspects of desalination of seawater and brackish water with special reference to local conditions. Recovery of minerals as by-products. Solar energy utilization)

**Textbook:** E.D.Howe, *Fundamentals of Water Desalination*, Marcel Dekker Inc., New York, 1974.

**References:**

- 1- Some research papers and notes will be distributed in class.
- 2- K.S.Spiegler(Ed), *Principles of Desalination*, 2<sup>nd</sup> Ed., Academic Press, New York, 1980.

**Topics to be covered:**

1. Introduction  
(water problem in Saudi Arabia, water characteristics, seawater chemistry: (composition, salinity, alkalinity, gases dissolved), brackish water, desalination terminology).
2. General Description of Water Treatment Processes
3. Scale Formation and Prevention  
(definition of scales, main scale component, factors affecting scaling, scale control methods, scale cleaning methods)
4. Water Hardness and Chemical Processes for Hardness Removal
5. Desalination Processes and Methods of Classifications  
(technical comparison between various processes).
6. Thermal Desalination Processes  
(flash distillation, multiple effect distillation(MED), multistage flash distillation(MSF), vapor compression(VC), combination distillation, solar distillation).
7. Membrane Processes  
(electrodialysis(ED), reverse osmosis(RO)).
8. General Engineering Considerations  
(cost estimation of desalination processes, minimum energy requirements, waste brine disposal, decarbonation and deaeration).

**Prerequisite**

ChE 313: Heat Transfer

**Requirements:**

homework, midterm(s), paper and final exam.