



Mechanical Engineering Dept. Department

Syllabus

ME 460: Thermal Desalination Systems (3-0-3)

Course Catalog Description:

Seawater composition. The need for water desalination. Classification of desalination processes. Single effect evaporation. Thermal vapor compression systems. Multiple effect evaporation. Multistage flash distillation, once through MSF, Brine mixing and recirculation MSF. Reverse osmosis. Desalination using renewable energy sources. Economic analysis of desalination processes

Course Pre-requisites:

- ME 315: Heat Transfer

Course Objectives:

1. Students will demonstrate a basic understanding of various desalination systems
2. Students will demonstrate ability to apply first and second law of Thermodynamics to analyze the details and carry out performance evaluation of various thermal desalination systems with and without computer software programs
3. Students will demonstrate the ability to give a professional and well-organized presentation of their design and analysis through a written report

Course Learning Outcomes:

- CLO1. Identify and explain various desalination systems
- CLO2. Evaluate various thermal desalination systems
- CLO3. Design and Assess performance parameters of the desalination systems.
- CLO4. Engage in life-long-learning.
- CLO5. Develop interpersonal skills

Learning Resources:

- COURSE MATERIALS PREPARED IN CHAPTERS DISTRIBUTED TO STUDNETS IN BLACKBOARD
- Fundamentals of Salt Water Desalination (made available to students in an electronic form)

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
Project	15	15.0%

Assessment Task	Week Due	Weight
HW	3,6,9,12,15	10.0%
QUIZZES	3,6,9,12,15	15.0%
major exams	6, 10	35.0%
final	end	25.0%

Lecture Weekly Schedule:

Week#	Topics
1	Introduction; Need for desalination, Composition of seawater, classification of desalination systems
	Desalination using renewable energy Sources: Solar stills
2	Desalination using renewable energy Sources: Solar stills (Continue)
	Desalination using renewable energy Sources: HDH Systems
3	Desalination using renewable energy Sources: HDH Systems (Continue)
4	Desalination using renewable energy Sources: HDH Systems (Continue)
5	Single effect evaporation, process modeling
6	Single effect evaporation, process modeling (Continue)
	Multiple effect evaporation, process modeling
7	Multiple effect evaporation, process modeling (Continue)
8	Multiple effect evaporation, process modeling (Continue)
	Vapor compression systems
9	Vapor compression systems (Continue)
	single stage flashing
10	single stage flashing (Continue)
	Once through system
11	Once through system (Continue)
	Brine recirculation system
12	Brine recirculation system (Continue)
	MSF with thermal vapor compression
13	MSF with thermal vapor compression (Continue)
	Reverse Osmosis
14	Reverse Osmosis (Continue)
	Membrane Distillation
15	Membrane Distillation (Continue)
	Economics and Presentations