

**King Saud University**  
**Mechanical Engineering Department**  
**ME 441: Refrigeration and Air Conditioning**  
**Second Semester: 1430-1431H**

**Instructor:** Dr. Hany Al-Ansary  
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**Course Description**

Vapor-compression Refrigeration Systems: standard cycle and its modifications, compressors, condensers, evaporators, expansion devices, system analysis and multi-pressure systems; Absorption Refrigeration Systems: Lithium-Bromide systems and Aqua-ammonia systems; Air Conditioning: Psychrometric processes, Air conditioning systems and single-zone system calculations.

**Number of Credits:** 3

**Prerequisites by Course:** ME 373 (Heat Transfer)

**Textbook(s)/ Required Material:** Refrigeration and Air Conditioning, W. F. Stoecker and J. W. Jones, McGraw-Hill Book Co.

**References:** ASHRAE Handbook (Fundamentals volume) and Modern Air Conditioning Practice, N. Harris, McGraw-Hill Book Co.

**Course Contents**

Topic No.	Topic	Time, hr
1	Introduction and applications of refrigeration and air conditioning	3
2	The vapor-compression cycle	3
3	Compressors	4
4	Condensers and evaporators	4
5	Expansion devices	3
6	Vapor-compression system analysis	3
7	Refrigerants: ozone depletion and new refrigerants	3
9	Multi-pressure systems.	3
10	Absorption Refrigeration Systems: Lithium Bromide and Aqua-Ammonia	3
11	Psychrometry and Wetted Surface Heat transfer.	3
12	Air Conditioning Systems.	3
13	Single Zone System Thermal Design Calculations	3

**Class/Laboratory Schedule**

Three 50-minute lecture sessions, one tutorial session and one 50- minute lab sessions per week.

**Laboratory Projects**

Six to seven lab experiments:

Four experiments on the operation and performance of a vapor-compression system and its components (compressor, condenser, evaporator and expansion valve) as well as a demonstration of the operation of an absorption system, and three experiments covering basic psychrometric measurements and various air-conditioning processes.

**Computer Applications:** EES software

**Contribution to Meeting the Professional Component:**

Engineering Topics

**Science/Design Contents:**

2.5/0.5

**Assessment Tools**

Final Examination: 40%

Home works, quizzes and Computer Assignment: 8%

Experimental Work (Lab) Reports: 12%

Written report: 5%

Mid-term Tests: 35%