The University of Jordan
School of Engineering

Department	Course Name	Course Number	Semester
Mechanical Engineering	Air Conditioning II	0944541	

2019 Course Catalog Description

This course is designed to prepare students for employment in the Heating, Ventilation and Air Conditioning field. Review of psychometric, heating and cooling load calculation. Supply design conditions. Design options for HVAC distribution systems. Central air condition system. Chiller, boiler, air handling unit sizing and selection. Variable refrigerant flow systems. Duct design. Energy consumption in buildings.

Instructors

Name	E-mail	Sec	Office Hours		Lecture Time	

Text Books

	Text book 1	Text book 2	Text book 3
Title	Principles of heating, ventilating and air conditioning	Air Conditioning Engineering	Refrigeration and Air Conditioning
Author(s)	H.J. Sauer, Jr. R.H. Howell and W.J. Coad;	W.P. Jones	Stoecker & Jones
Publisher, Year, Edition	American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE),2010, 6th Edition in SI units	Edward Arnold, 2007, 5th Edition	McGraw-Hill, 1982, 2nd Edition

References

Books	National Building Code of Jordan (1990) Jordanian code for central heating.
Journals	
Internet links	https://www.ashrae.org/

Prerequisites

Prerequisites by topic	Excel knowledge is preferable.
Prerequisites by course	Air conditioning (1) 0934445
Co-requisites by course	-
Prerequisite for	-

Topics Covered

Week	Topics	Chapter in Text	Sections
1-2	The Psychrometric of Air Conditioning Systems : Review of various psychrometric processes. cooling and dehumidification with reheat, pre-heat and humidification with re-heat, mixing and adiabatic saturation with re-heat	From Jones: Ch.3	
3	Design Conditions: Comfort, Inside design conditions, outside design conditions, local and international codes pertaining to design conditions.	From Sauer, et al.: Ch. 4	
4	Supply Design Conditions : Sensible heat removal, specific heat capacity of humid air, latent heat removal, the slope of the room ratio line, heat	From Jones: Ch.6	

	gain due to fan power, wasteful reheat, the choice of suitable supply state.		
5	Load Estimating Fundamentals: Outdoor air load, Heat transmission load. Local codes related to insulation.	From Sauer et al: Ch.5	
6	Cooling load calculations: CLTD/SCL/CLF concepts, Residential and Non-Residential cooling load; Heat sources: People, Appliances; Lights…etc.	From Sauer et al: Chapter 7	
7	Cooling Load : Cooling load & heat gain, partial load, cooling load offset by reheat, the use of by-pass air, face & by-pass dampers, cooling in sequence with heating, hot deck - cold deck system, double-duct cooling load.	From Jones: Ch.8	
8	Duct and Pipe Sizing Pressure Changes, Circular and rectangular ducts, Losses in ducts, Design methods, Fittings, Grilles, Fans and Air Distribution.	From Sauer et al: Ch.9	
9	Air conditioning controls Closed-loop and open loop systems, control types, liquid valves, fail-safe design, dampers and damper operators, other controls and thermostats. Valve characteristics and selection.	From Stoecker & Jones, Ch. 9	
11-15	Systems and Applications This title combines a wide spectrum of applications ranging from DX to All-Air systems.	From Sauer et al: Ch. 11, 12, 13, 14	

Mapping of Course Outcomes to ABET Student Outcomes

SOs	Course Outcomes
2	1. Evaluate the cooling loads of a building, and design a suitable air conditioning system that satisfies these loads. 2. Understand the architectural plans of a building and design the optimal air conditioning system for it. 3. Analyze the performance of the vapor compression cycle used for air conditioning systems. 4. Size the air ducts for cold air-cooling and calculate the pressure drop in the system
4	5. Understand the effect of the selection of building materials on the building behavior.
5	6. Work effectively in a team project
7	7. Size and select the proper fan and other air conditioning plant components. 8. Apply the Jordanian local codes and the ASHRAE codes in the procedure of selecting design parameters. 9. Explain the vital rule of air conditioning systems on the life quality of humankind in residential and commercial buildings.

Evaluation

Midterm Exam		30%
Project		20%
Final Exam		50%

Contribution of Course to Meet the Professional Components

The course contributes to building the knowledge and skills required for the design of air conditioning systems for residential and commercial buildings.

Relationship to Student Outcomes							
SOs	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Availability		X		X	X		X

Relationship to Mechanical Engineering Program Objectives (MEPOs)				
MEPO1	**MEPO2**	**MEPO3**	**MEPO4**	**MEPO5**

ABET Student Outcomes (SOs)	
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	An ability to communicate effectively with a range of audiences
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Updated by ABET Committee, 2021