DEPARTMENT OF POWER ENGINEERING

COURSE OUTLINE – WINTER 2012

POF 434 AIR CONDITIONING – 1.5(28)

INSTRUCTOR: Houshang Ghazi **PHONE:** 780-835-6609
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OFFICE HOURS: As posted

PREREQUISITE(S)/COREQUISITE:

REQUIRED TEXT/RESOURCE MATERIALS:

PE4B TEXT (BOOK 2)
PE4B WORKBOOK (book 2)

RECOMMENDED Reference
TRANE Air Conditioning
HVAC ATP publishers

CALENDAR DESCRIPTION:

This is a basic course in air conditioning, designed to present topics such as air conditioning equipment and systems and psychometrics.

CREDIT/CONTACT HOURS:

1.5 CREDITS, 28 HOURS

DELIVERY MODE(S):

Theory and Lab

OBJECTIVES (OPTIONAL):

UNIT 27 AIR CONDITIONING

Chapter 130(62): Psychometric Properties of Air

Describe the psychometric properties of air.

1. Explain the composition of air and define the terms: humidity, relative humidity, and dewpoint.
2. Define the terms: wet bulb temperature, dry bulb temperature, wet bulb depression, and psychrometer, and state the relationship between these terms and relative humidity.
3. Define the specific volume and enthalpy of air.
4. Identify and interpret the psychometric properties of air on a psychometric chart.

Chapter 131(63): Application of the Psychometric Chart and Comfort Conditions

Solve problems using a psychometric chart.

1. Interpret the psychometric chart to find values of specific properties.
2. Apply the psychometric chart to the heating and cooling of air, and calculate heat added or removed.
3. Apply the psychometric chart to the humidification and dehumidification of air, and calculate moisture added or removed.
4. Apply the psychometric chart to combined heating/cooling and humidification problems.
5. Discuss what is meant by "comfort conditions", with respect to the psychometric chart.

Chapter 132(64): Fans for Air Distribution Systems

Describe the air flow behavior and movement of air through distribution systems.

1. Discuss the theory of air flow and pressure conversions.
2. Describe the major types of air handling fans, their construction and operation.
3. Interpret fan performance curves.
4. Describe fan motors, drives and belt guards.

Chapter 133(65): Air Conditioning Duct Systems

Describe the designs and components of duct systems used in air conditioning.

1. Explain how air duct systems are classified.
2. Describe air duct materials, system layout, fabrication and installation.
3. Describe air duct leakage.
4. List and describe the types of liners and dampers used in air duct systems.
5. Discuss terminal air distribution devices, and the principles of diffusion, induction, entrainment, and aspiration.

Chapter 134(66): Coil Types

Describe the various types of coils used in air conditioning systems.

1. Describe the general construction of finned type heat exchanger coils.
2. Describe the detailed construction and operational principles of water coils.
3. Describe the detailed construction and operational principles of steam coils.

Chapter 135(67): Coil Operation

Describe the operation of the various types of coils used in air conditioning systems.

1. Explain the operational and equipment sizing issues associated with steam coils and freezing problems.
2. Explain the operational and equipment sizing issues associated with water coils and freezing problems.
3. Explain the operational and equipment sizing issues associated with glycol coils.
4. Describe the installation recommendations for coils, piping, steam traps, control valves, air vents, and vacuum relief devices.

Chapter 136(68): Humidification

Explain the equipment and principles of humidification.

1. Describe the general purpose and principles of humidification.
2. Describe residential and commercial types of humidifiers.
3. Describe industrial types of humidifiers.

UNIT 28 AIR CONDITIONING SYSTEMS

Chapter 137(69): Air Conditioning Systems I

Describe the operation of various air conditioning systems.

1. List the functional components and categories of air conditioning systems.
2. Describe the operation of air handling units.
3. Describe the general layout and operation of unitary air conditioning systems.
4. Describe the general layout and operation of central air conditioning systems.

Chapter 138(70): Air Conditioning Systems II

Discuss the design of combined air conditioning systems; alternate system arrangements and factors to be considered when selecting a system.

1. Describe the general layout and operation of combined air conditioning systems.
2. Discuss alternative arrangements of equipment for air conditioning systems.
3. Discuss the selection criteria for air conditioning systems.

Chapter 139(71): Air Conditioning Heat Recovery Systems

Explain the purpose, design and operation of heat recovery in air conditioning systems.

1. Describe the general principles of air conditioning heat recovery, and the operation of the "runaround" system.
2. Describe the thermal wheel air conditioning heat recovery system.
3. Describe the heat pipe air conditioning heat recovery system.
4. Describe the heat pump system.

Chapter 140(72): Air Conditioning System Controls

Describe the control systems used in air conditioning.

1. Describe various damper control strategies for air conditioning systems.
2. Describe preheat coil control strategies for air conditioning systems.
3. Describe heating coil control strategies for air conditioning systems.
4. Describe humidification control strategies for air conditioning systems.
5. Describe dehumidification and cooling control strategies for air conditioning systems.
6. Describe volume control with static pressure regulation for air conditioning systems.
7. Describe complete air conditioning control systems.

Chapter 141(73): Heat Gains and Losses

Describe the various ways a building gains and loses heat.

1. Define heat transmission terminology and identify conversions of related units.
2. Describe the heat gains that occur in a building due to conduction, infiltration, radiation, and ventilation.
3. Describe the heat gains that occur in a building due to people, lighting, electric motors, appliances and cooking.
4. Describe the heat losses that occur in a building due to conduction, convection, radiation, infiltration and ventilation.

TRANSFERABILITY:

**** Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability**

GRADING CRITERIA:

Method	Percentage	Minimum
Course assignments/workbooks	15%	50%
CML quizzes	15%	50%
Unit Exams	30%	50%
Final Exam	40%	50%
	100%	50%
		65% average, with no mark below 50%

GRANDE PRAIRIE REGIONAL COLLEGE			
GRADING CONVERSION CHART			
Alpha Grade	**4-point Equivalent**	**Percentage Guidelines**	**Designation**
A+	**4.0**	**90 – 100**	**EXCELLENT**
A	**4.0**	**85 – 89**	
A–	**3.7**	**80 – 84**	**FIRST CLASS STANDING**
B+	**3.3**	**77 – 79**	
B	**3.0**	**73 – 76**	**GOOD**
B–	**2.7**	**70 – 72**	
C+	**2.3**	**67 – 69**	**SATISFACTORY**
C	**2.0**	**63 – 66**	
C–	**1.7**	**60 – 62**	
D+	**1.3**	**55 – 59**	**MINIMAL PASS**
D	**1.0**	**50 – 54**	
F	**0.0**	**0 – 49**	**FAIL**
WF	**0.0**	**0**	**FAIL, withdrawal after the deadline**

EVALUATIONS:

STUDENT RESPONSIBILITIES:

STATEMENT ON PLAGIARISM AND CHEATING:

Please refer to pages 49-50 of the College calendar regarding plagiarism, cheating and the resultant penalties. These are serious issues and will be dealt with severely.

COURSE SCHEDULE/TENTATIVE TIMELINE: