



# **Refrigeration Course Catalogue**

# 2023-2022

College	Erbil Technology Colleg	ge
	Department of Mechanics and Renewable	
Department	Energy	
Module Name	Refrigeration	
Module Code	REF303	
Semester	3	
Credit	7 ECTS	
Module type	Spec. list	
Weekly hours	4	
Weekly hours (Theory)	( 2 )hr Class	(171 )hr Workload
Weekly hours (Practical)	( 2 )hr Class	(171 )hr Workload
Lecturer (Theory)	Fadi Riath Shamoon	
E-Mail	Fadi.shamoon@epu.edu.iq	
Lecturer (Practical)	Fadi Riath Shamoon	
Email	Fadi.shamoon@epu.edu.iq	

## **Course Book**

#### Course overview:

The design of this module includes establishing improving the student's knowledge and understanding about the Refrigeration to provide the student realistic applications encountered in professional practice. The topics of this module includes: basic concepts of refrigeration systems, refrigerants and refrigeration cycles, evaluating the coefficient of performance, using diagrams and charts determination of cooling load for cold storages.

. The module will be delivered via lectures in both theoretical and practical side

#### Course objective:

- Understand the theory of refrigeration to tackle real live engineering problems
- Apply principles of thermodynamics to solve refrigeration cycles problems.
- Involve in team working and collaborate with colleagues.

## - Student's obligation

To pass this module the students should attend all lectures and complete all tests, exams and assignments.

#### - Forms of teaching

-Oral presentations lectures, Group discussions, Seminars, Problem-solving based learning, Project based learning

#### Assessment scheme

2% In Class Activity14% Homework24% Report, Seminar, Project4% Quiz

16% Mid Semester (Theory) exam 40% Final (theory) exam

- Specific learning outcome:

On successful completion of this module the learner will be able to:

- 1. Recognize basic concepts of engineering mechanics
- 2. **Identify** all types of refrigeration cycles and **analyze** their components
- 3. **Determine** and **apply** concepts of thermodynamics
- 4. **Develop** and **sketch** the cycle for better understanding
- 5. **Determine** all cycle characteristics
- 6. Apply fluid mechanics concepts in refrigeration piping design
- 7. **Collaborate** with others to solve problems by group or team working.

#### - Course Reading List and References:

Handbook of Air Conditioning and Refrigeration (Second dition)

- Shan K. Wang

Air Conditioning Engineering

- W.P.Jones

Basic Refrigeration and Air Conditioning (Third edition)

- P N Ananthanaryanan

الموسوعة العالمية للتكييف و التبريد

ریکس میلر – مار ك میلر

مبادئ هندسة تكييف الهواء والتثليج

الدكتور خالد احمد الجودي

Fundamentals of Engineering Thermodynamics

Michael J. Moran

Howard N. Shapiro

Course topics (Theory)	Week
Introduction	Week 1
Basic definitions, Refrigerants and their properties, uses	Week 2
, numbering	
Theoretical vapor compression refrigeration cycle	Week 3
Actual vapor compression refrigeration cycle, calculation	Week 4
of components capacity, C.O.P.	
Evaporator selection	Week 5
Condenser selection	Week 6
Midterm Examination	Week 7
Midterm Examination	Week 8
Compressor selection, calculation of mechanical and	Week 9
volumetric efficiency	
Thermal equilibrium of refrigeration cycle	Week 10
Cascade refrigeration cycles\multi compressors	Week 11
Cascade refrigeration cycles\multi evaporators	Week 12
Cascade refrigeration cycles\with heat exchanger and	Week 13
flash intercooler	
Vapor absorption refrigeration cycles	Week 14
Final Examination	Week 15
	Week 16
Practical Topics (If there is any)	Week
Calculating the coefficient of performance for an	Week 1
educational refrigerator (COP)	
Calculate the condenser capacity Qc	Week 2
Thermal equilibrium for educational refrigerator	Week 3
The total heat transfer coefficient between water and gas	Week 4
in the condenser and the evaporator	
The effect of temperature of evaporator and condenser on	Week 5
the amount of heat of evaporator and condenser	
Cooling and dehumidification	Week 6
Relationship between (Pc / Pe) and the amount of heat of	Week 7
condenser and evaporator	M
Relationship between temperature and pressure	Week 8
Sensible and latent heat	Week 9

# - Examinations (question design):

The following is an example of the examination questions:

Ministry of Higher Education & Scientific Research Erbil Polytechnic University Erbil Technology Institute Dept. of Mechanics and Energy



Academic year: 2018 – 2019
Exam: (Final Examination \ 2<sup>nd</sup> attempt)

Second Year Subject: Refrigeration Time: 2 Hours

Time: 2 Hours Date: 20 /6 /2018

Q1/ Draw a diagram showing the processes going in a real vapor compression refrigeration cycle on the (pressure-enthalpy) diagram, Explain the type and details of each process.

(25 Mark)

Q2/a: What is meant by (Ton Refrigeration), Prove that:

Ton Refrigeration = 3.517KW

Q2/b: What are the commercial names of the following:

 $\mathsf{CHF}_3 \qquad \qquad \mathsf{C}_2\mathsf{H}_2\mathsf{CI}_2\mathsf{F}_2$ 

(25 Mark)

Q3/A freezer chamber of capacity (3Ton) of chicken meat which is saved inside the chamber at a temperature of (-18°c), Calculate the cooling load for the meat knowing that the meat arrives at the store at a temperature of (6°c).

Take: freezing temperature of meat (-2.8°c), freezing enthalpy (247kj/kg), specific heat of meat before freezing (3.32kj/kg.°c), specific heat of meat after freezing (1.77kj/kg.°c), the process requires a total time of (4 hours)

Q4/a: Explain the types of cooling and air conditioning water systems regarding the number of pipes and the design of the return pipe, use diagrams to support your explanations when exists

Q4/b:What are the requirements to design the suction line when:

- 1. The compressor level is the same as the evaporator level.
- 2. The compressor level is lower than the evaporator level.
- 3. The compressor level is higher than the evaporator level.

(25 Mark)

Fady R. Shamoon

Lecturer

Ministry of Higher Education and Scientific research

Extra notes: no notes

### Ministry of Higher Education and Scientific research

External Evaluator : -	