



A) COURSE

Course Id:	Course
5515	REFRIGERATION AND AIR CONDITIONING

Class Hours per Week	Lab hours per week	Complementary practices	Credits	Total hour course
5	0	5	10	80

B) GENERAL COURSE INFORMATION:

	EE (IEA)	ME (IM)	MME (IMA)	EME (IME)	MTE (IMT)
Level:		X		X	
Course Type (Required/Elective)		Elective		Elective	
Prerequisite Course:		Transport Phenomena		Transport Phenomena	
CACEI Classification:		AE		AE	

C) COURSE OBJECTIVE

At the end of the course, the student will be capable of:

That the student knows the elements, the methods and the practical applications that help him in order to troubleshoot in refrigeration and air conditioning.

D) TOPICS (CONTENTS AND METHODOLOGY)

1. PURPOSE, AGENDA, POLICY AND COURSE METHOD.		1 hour
Specific Objective:	That the student knows the elements, the methods and the practical applications that help him in order to troubleshoot in refrigeration and air conditioning.	
Readings and other resources	Read the topics suggested bibliography.	
Teaching Methodologies	Exposition in classroom, students questioning, dialogue, solving typical problems, meet laboratory practices, clarification of doubts.	
Learning Activities	Do exercises of theme, taken from the suggested bibliography, lab practices and classroom discussion of the results obtained in the laboratory.	

1.- GAS-VAPOR MIXTURE		10 hrs
Specific Objective:	That the student knows and understands the characteristics and properties of air, before studying air conditioning.	



1.1 Heat transfer. Vapor-air mixture. 1.2 Relative humidity. 1.3 Moisture ratio. 1.4 Dry and wet bulb temperature. 1.5 Heat exchange processes.	
Readings and other resources	Read the topics suggested bibliography.
Teaching Methodologies	It will be taught by expository sessions by the teacher, problem solving sessions and conducting case analysis.
Learning Activities	The research, solving exercises and problems, readings.

2.- PSYCHOMETRY.		5 hrs
Specific Objective:	That student understands and learns the handling of the psychometric chart.	
2.1 Psychometric chart. 2.2 Psychometric chart handling. 2.3 Psychometric chart construction.		
Readings and other resources	Read the topics suggested bibliography.	
Teaching Methodologies	It will be taught by expository sessions by the teacher, problem solving sessions and conducting case analysis.	
Learning Activities	The research, solving exercises and problems, readings.	

3 - . PHYCHROMETRIC PROCESSES.		25 hrs
Specific Objective:	That the student learns to apply the psychometric chart.	
3.1 Heating. 3.2 Cooling 3.3 Humidification. 3.4 Dehumidification. 3.5 Combined processes. 3.6 Cooling tower. 3.7 Comfort table.		
Readings and other resources	Read the topics suggested bibliography.	
Teaching Methodologies	It will be taught by expository sessions by the teacher, problem solving sessions and conducting case analysis.	
Learning Activities	The research, solving exercises and problems, readings.	

4.- CÁLCULO DE LA CARGA TÉRMICA		10 hrs
Specific Objective:	That the Student learn to calculate the heat load for comfort.	
4.1.- Sensible heat. 4.2.- Latent heat. 4.3.- Total heat. 4.4.- Impulse lines. 4.5.- Total heat load.		
Readings and other resources	Read the topics suggested bibliography.	
Teaching Methodologies	It will be taught by expository sessions by the teacher, problem solving sessions and conducting case analysis.	
Learning Activities	The research, solving exercises and problems, readings.	



5.- REFRIGERATION SYSTEMS		10 hrs
Specific Objective:	That the student understands the principles of operation and meets its applications.	
5.1.- Refrigeration by compression. 5.2.- Refrigeration by vacuum. 5.3.- Refrigeration by absorption.		
Readings and other resources	Read the topics suggested bibliography.	
Teaching Methodologies	It will be taught by expository sessions by the teacher, problem solving sessions and conducting case analysis.	
Learning Activities	The research, solving exercises and problems, readings.	
6.- SYSTEMS DUCT DESIGN		13 hrs
Specific Objective:	That the student determines the most cost-effective pipeline system, based on factors that influence in a proper selection of grilles and diffusers.	
6.1 Classification by velocity. 6.2 Classification by pressure. 6.3 Economic factors influencing the design. 6.4 Pipeline design methods. 6.5 Selecting grilles and diffusers. 6.6 Design of a complete system. 6.7 Testing the designed system.		
Readings and other resources	Read the topics suggested bibliography.	
Teaching Methodologies	It will be taught by expository sessions by the teacher, problem solving sessions and conducting case analysis.	
Learning Activities	The research, solving exercises and problems, readings.	
7.- CRYOGENICS.		6 hrs
Specific Objective:	That the student understand and learn the gas liquefaction process.	
7.1.- Gas Liquefaction. 7.2.- Liquefied air 7.3.- Joule-Thompson effect. 7.4.- Claud system		
Readings and other resources	Read the topics suggested bibliography.	
Teaching Methodologies	It will be taught by expository sessions by the teacher, problem solving sessions and conducting case analysis.	
Learning Activities	The research, solving exercises and problems, readings.	

E) TEACHING AND LEARNING METHODOLOGIES

- a) Conventional Exposure of each subject by the teacher.
- b) Analysis of the practical and theoretical concepts.
- c) Resolution of practical problems allusive topics.
- d) Individual work.

F) EVALUATION CRITERIA:



Evaluation:	Schedule	Suggested Form of Evaluation and weighing	Topics
1st. Partial Evaluation	16 Sessions	Exam 80%, Tasks 20%	1 & 2
2nd Partial Evaluation	16 Sessions	Exam 80%, Tasks 20%	3
3rd. Partial Evaluation	16 Sessions	Exam 80%, Tasks 20	4
4th. Partial Evaluation	16 Sessions	Exam 80%, Tasks 20	5
5th. Partial Evaluation	16 Sessions	Exam 80%, Tasks 20	6 & 7
Final Ordinary Evaluation		100% (Average of the Partial Evaluations)	
Other activities:			
Extraordinary Exam	Week 17 of the semester in course	Exam 100%	Topics 100%
Title Exam	According to the program of the School Secretary.	Exam 100%	Topics 100%
Regularization Exam	According to the program of the School Secretary.	Exam 100%	Topics 100%

G) BIBLIOGRAPHY AND ELECTRONIC RESOURCES

Main Books

1. HERNÁNDEZ GORIBAR E., Fundamentos de aire acondicionado y refrigeración, Limusa, 1984.
2. CARRIER , System design manual, Carrier air conditioning co., Tomos 1, 2, 3 y 4.
3. GILBERT , Manual de refrigeración Gilbert Copeland, S.A. de C.V.

Complementary Books

1. CARRIER, Manual de Aire Acondicionado, Marcombo.
2. FAIRES Y SIMMANG, Termodinámica, Uteha, 1983.
3. SEVERNS E. FELLOWS, Aire acondicionado y refrigeración, Wiley.
4. REFRIGERATION AND AIR CONDITIONING INSTITUTE, Manual de Refrigeracion y Aire Acondicionado, Carrier air conditioning co., 4 tomos.

Internet Links