Course-Plan

School	: School of Engineering	
Department	: Department of Mechanical Engineering	
Course Code	: ME439	
Course Name	: Refrigeration and Air conditioning	

Instructor: Shikha Bhuyan

1. Abstract:

ME439 is an elective course offered for the B.Tech programme under the Department of Mechanical Engineering. This Course provides a simple understanding of Refrigeration and Air-conditioning fundamentals. The course consists of different refrigeration cycles and understanding of psychrometry and psychrometric processes used for the purpose of airconditioning. Further, the comfort air-conditioning and indoor environment health are also addressed in this course.

2. Objective:

The following objectives are:

- Understand vapour compression and vapour absorption system operation. 1.
- 2. 3. Analyse the refrigeration cycles and methods for improving performance.
- Familiarze the components of refrigeration systems
- 4. Design air conditioning systems using cooling load calculations.
- 5. Know the application of refrigeration and air conditioning systems
- 3. Prerequisites of the course: A course in Basic Thermodynamics

4. Course outline:

Vapour-compression cycles; Absorption refrigeration; Vapour-compression-system analysis; Air-Craft refrigeration cycle; Multi-pressure systems; Refrigerants; Condensers and evaporators; Compressors; Expansion devices, Psychrometry, Psychrometric Processes; Heating- and cooling-load calculations; Air-conditioning systems; Fan and duct systems; Pumps and pumping; Cooling and dehumidifying coils; Air-conditioning controls; Heat pumps; Cooling towers and evaporative condensers.

5. (a) Time-Plan

Topic	Content		Contact Hours	
		L	Т	
Vapour	Review of thermodynamic principles of			
Compression and	refrigeration-simple vapour compression			
Refrigeration	systems-analysis-Method for improving COP-	12	0	
system	Multistage and multiple evaporator system-			
	Cascade system-COP comparision			
Vapour	Ammonia absorption refrigeration system,			
Absorption	Water lithium bromide systems,	F	0	
systems	Comparision of absorption system with	5	0	
	vapour compression systems			
Refrigerants	Properties, selection of refrigerants,			
	alternate refrigerants	3	0	

Aircraft refrigeration system	Aircraft refrigeration system (Reverse Brayton cycle), Type of aircraft refrigeration system.	3	0
Refrigeration equipment and control	Compressors ,condensers and cooling tower, evaporators, expansion devices, heat pump	5	0
Air conditioning	Introduction, psychrometry, psychrometric processes	5	0
Design of air conditioning system	Heating and cooling load calculatons, cooling and dehumidifying coils, Bypass factor consideration, Effective sensible heat factor	10	0
Total contact hours		4	3

Text Books:

1. Stoecker, W.F and Jones, J.W., Refrigeration and Air Conditioning (McGraw-Hill International Editions, 3/e, 1986)

2. Threkeld, J.L. Thermal Environmental Engineering (Prentice Hall Inc, 2/e., 1970).

Reference Books:

1. Arora, C.P. Refrigeration and Air Conditioning (Tata McGraw-Hill, 2/e, 2000).

2. Air conditioning Design Handbook (Carrier Corpn, McGraw Hill, 1965)

3. ASHRAE Handbooks (ASHRAE, 2007)

5. (b) Evaluation Plan:

Test No.	Marks	Duration (minutes)
Ι	10	30
II (Major I)	30	90
III	10	-
IV (Major II)	50	120
Total Marks	100	

All the tests will be held as per the schedule notified by the Controller of Examinations, Tezpur University

6. Pedagogy:

Teaching-learning methods to be used:

- Lecture and Discussion Presentations Assignments Class Tests/Quiz
- 7. **Expected outcome:** On completion of the course, the students are expected to come with following outcomes:
 - (a) Familiarize with the terminology associated with refrigeration and air conditioning
 - (b) Understand the components of vapour compression systems and other types of cooling systems
 - (c) Be able to apply basic principles of psychrometry and applied psychrometrics
 - (d) Be able to perform load calculations and elementary duct design
 - (e) Be able to undertake system analysis.