

DEPARTMENT OF TECHNOLOGY EDUCATION
University of the Punjab, Lahore
Course Outline

Programme	BS Technology Education	Course Code	BSTE306	Credit Hours	3
Course Title	Basic of HVACR				
Course Introduction					
This course covers the fundamental principles and concepts of HVACR systems, including safety procedures, tools, and equipment. Students will learn about the installation, maintenance, and repair of HVACR systems, as well as energy efficiency and indoor air quality.					
Learning Outcomes					
On the completion of the course, the students will:					
<ol style="list-style-type: none"> 1. Understand the basic principles of thermodynamics and refrigeration 2. Identify and explain the components of HVACR systems 3. Install, maintain, and repair HVACR systems 4. Analyze and troubleshoot common problems in HVACR systems 5. Apply safety procedures and use tools and equipment appropriately 6. Understand energy efficiency and indoor air quality principles 					
Course Content				Assignments/Readings	
Week 1	Unit-I.1 Overview of HVACR industry			Create a safety manual outlining procedures for working with HVACR equipment (1000 words)	
	Unit-I.2 Safety procedures				
Week 2	Unit-2.1 Tools and equipment			Create a catalog of common tools and equipment used in the HVACR industry, including descriptions and images	
	Unit-2.2 Laws of thermodynamics				
Week 3	Unit-3.1 Refrigeration cycle			Create a detailed diagram of the refrigeration cycle, labeling all components and processes	
	Unit-3.2 Types of refrigeration systems				
Week 4	Unit-4.1 - Compressors			Write a technical description of how compressors work in HVACR systems (1000 words)	
	Unit-4.2- Condensers				
Week 5	Unit-5.1 Evaporators			Create a diagram illustrating the components and processes of an evaporator	
	Unit-5.2- Expansion valves				
Week 6	Unit-6.1- Types of air conditioning systems			Research and write a report comparing and contrasting different types of air conditioning systems (1500 words)	
	Unit-6.2- Installation and maintenance				
Week 7	Unit-7.1- Types of heating systems			Create a table summarizing the characteristics and applications of different heating systems	
	Unit-7.2- Installation and maintenance				

Week 8	Unit-8.1- Types of ventilation systems	Create a table summarizing the characteristics and applications of different ventilation systems
	Unit-8.2- Installation and maintenance	
Week 9	Unit-9.1- Types of refrigeration systems	Research and list the different types of refrigeration systems, including vapor compression, absorption, and evaporative cooling.
	Unit-9.2- Installation and maintenance	
Week 10	Unit-10.1- Electrical circuits	Design a simple control system for a residential heating and cooling system.
	Unit-10.2- Control systems	
Week 11	Unit-11.1- Common problems in HVACR systems	Research and report on advanced troubleshooting techniques, such as using thermal imaging and ultrasonic detection.
	Unit-11.2- Troubleshooting techniques	
Week 12	Unit-12.1- Energy efficiency principles	Calculate the energy savings of upgrading to an energy-efficient HVAC system.
	Unit-12.2- Indoor air quality principles	
Week 13	Unit-13.1- Load calculations	Develop a maintenance schedule for a newly installed HVAC system
	Unit-13.2- System sizing & maintenance	
Week 14	Unit-14.1- Installation procedures & Safety considerations	Develop a preventive maintenance program for a residential HVAC system, including regular inspections and cleaning
	Unit-14.2- Maintenance procedures & Preventive	
Week 15	Unit-15.1- Building automation systems & Energy management systems	Develop a step-by-step guide for troubleshooting and repairing a common HVAC issue, such as a faulty compressor
	Unit-15.2- Repair procedures & Troubleshooting techniques	
Week 16	Unit-16.1 - Heat pumps, Chillers & Industrial refrigeration systems	Design a complete HVACR system for a small commercial building, including heating, cooling, and ventilation.
	Unit-16.2 Design and present an HVACR system	

Textbooks and Reading Material

1. Textbooks.

1. HVACR Systems by R. M. Cunningham
2. Refrigeration and Air Conditioning by C. P. Arora
3. HVAC System Design by ASHRAE
4. HVAC Service Technician Handbook by R. F. Johnson
5. Indoor Air Quality Handbook by H. E. Burroughs

Teaching Learning Strategies

1. Lectures
2. Discussions
3. Demonstrations
4. Hands-on lab experiments
5. Group projects
6. Case studies

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.

2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.