Course Title	Course Code	Credit Hours
Heating Ventilation & Air Conditioning	AE-475	3-0

Text and Reference Books:

- Faye C. McQuiston, Jerald D. Parker, Jeffrey D. Spitler, “Heating, Ventilating, and Air-Conditioning: Analysis and Design”, John Wiley & Sons
- Wilbert F. Stoecker, and Jerold W. Jones, “Refrigeration and Air Conditioning”, McGraw Hill
- Ramesh Chandra Arora, “Refrigeration and Air Conditioning”, PHI Learning Pvt Ltd
- Yunus A. Cengel, Michael A. Boles, “Thermodynamics: An Engineering Approach”, Mc-Graw Hill
- Roger Haines, and Lewis W. Wilson, “HVAC Systems Design Handbook”, McGraw-Hill Education
- Ibrahim Dincer, Tahir Abdul Hussain Ratlamwala, “Integrated Absorption Refrigeration Systems, Comparative Energy and Exergy Analyses”, Springer International Publishing
- Shan K. Wang, “Handbook of Air Conditioning and Refrigeration”, McGraw Hill Education
- R.S. Khurmi, and J. K. Gupta, “A Textbook of Refrigeration and Air-conditioning”, Eurasia Publishing House Pvt Ltd, India

Course Objectives:

In this course students will learn to analyze refrigeration systems based on any given refrigeration cycle, demonstrate understanding of refrigerant properties and component functions through psychrometric analysis, and evaluate heating/cooling loads while analyzing air quality for given conditions.

Course Contents:

- HVAC Introduction:
    - Natural & Artificial Refrigeration
    - HVAC System Requirements & Layout
    - HVAC Applications

- Refrigeration:
    - Basics of Vapor Compression System
    - Pressure-Enthalpy Chart
    - Coefficient of Performance
    - Cycle Diagrams
    - Refrigerants and their Properties
    - Condensers and Evaporators
    - Compressors & Refrigerant Flow Control Devices
    - The Simple Saturated Cycle
    - Vapor Absorption Refrigeration Cycle
    - Types of VAR System
    - Comparison of Actual and Theoretical Refrigeration Cycle.
- Simple Heating and Cooling
- Heating and Humidification
- Cooling and Dehumidification
- Comfort and Health Indoor Environmental Quality:
    - Comfort Physiological Considerations
    - Environmental Comfort Indices
    - Comfort Conditions
    - The Basic Concerns of Indoor Air Quality
    - Methods to Control Contaminants
- HVAC Basics & Systems:
    - Essential Components
    - Design of Central Air-Conditioning Plant
    - Water Chiller and Water Heater
    - Air Handling Unit
    - Chilled Water and Hot Water Recirculation System
    - All-Air Systems Basics
- Heating and Cooling Load:
    - Space Heating and Cooling Load
    - Design Conditions
    - Transmission Heat Losses
    - Infiltration

    - Ventilation and other Heat Loss and Gain Sources
    - Thermal Radiation
- Refrigeration:
    - Refrigerants and Their Properties
    - Condensers and Evaporators Refrigeration
    - Compressors & Refrigerant Flow Control Devices
    - Vapor Absorption Refrigeration Cycle
    - Types of VAR Systems
    - Comparison of Actual and Theoretical Refrigeration Cycle
- Psychrometric Properties of Air:
    - Composition of Air
    - Dalton’s Law of Partial Pressure
    - Dew Point Temperature
    - Dry Bulb and Wet Bulb Temperatures
    - Psychrometric Charts