



**MAESTRO**  
**CONSULTANTS**

**AIR CONDITIONING  
SYSTEMS DESIGN,  
SELECTION,  
OPERATION,  
MAINTENANCE  
AND  
TROUBLESHOOTING**

**COURSE OUTLINE 2020**

Contact Us On :

Tel : +971 7 2042072 |

Email: [training@maestrouae.net](mailto:training@maestrouae.net)

Website: [www.maestrouae.net](http://www.maestrouae.net)

## **TRAINING TITLE**

AIR CONDITIONING SYSTEMS DESIGN, SELECTION, OPERATION, MAINTENANCE AND TROUBLESHOOTING

## **VENUE**

Dubai, UAE

## **DURATION**

5 Days

## **DATES**

21 - 25 June 2020

## **PRICE**

US\$4,000 per attendee including training material/handouts, morning/afternoon coffee breaks and Lunch buffet daily.

## **TRAINING INTRODUCTION**

These courses will introduce the fundamental concepts of air-conditioning systems, the recent technologies and progress in the applications. It deals with the design considerations and the operations of typical air-conditioning systems for human comfort and air quality in commercial and non-residential applications. It will also outline typical types of air-conditioning systems and their components. The course critically examines the energy efficiency and usage in different air conditioning systems. The environmental issues will be also considered. The required load estimation and calculations of HVAC system design will be introduced. Practical hands-on exercises will be included in the workshop.

Keeping these machines running with least troubles and shutdown decreases the downtime of the whole system. Right machine selection appropriate to the right application, right machine operation, effective maintenance programs, reliable monitoring system, and skilled personnel capable of doing the right trouble shooting are essential requirements for prolong machine life. All the above can be achieved via deeper understanding of the machines construction and tolerances, the limits and constraints on their operation, and the more effective controlling methods.

This course will offer the opportunity to learn more about construction, operation, performance curves, control and troubleshooting of basic air conditioning systems. During the course participant's discussion, comments, bringing up their own problems are welcomed and encouraged. Short tests on the course material will be

performed to examine the degree of delivering the right and quality of the presented material.

## **TRAINING OBJECTIVES**

- Select the proper compressor for the A/C application
- Design a finned evaporator coil including circuiting & refrigerant distribution
- Design a finned condenser coil including circuiting & refrigerant distribution
- Select the proper expansion valve and system pressure drop
- Select basic system protections
- Design a hot water coil for heating applications
- Selection of proper heat pump unit & calculate supplementary heat requirements
- Estimate cooling / heating loads
- Select alternative refrigerants
- Calculate humidity for space requirements
- Select and calculate evaporator blowers, pulleys and belts
- Design and select the proper A/C unit for the application
- Basic knowledge of safety issues related to A/C units
- Familiarize the Attendees with different types of air conditioning equipment
- Exercising examples of troubleshooting methods
- Highlight the importance of proper Air distribution systems
- Highlight the importance of maintenance and troubleshooting
- Basic life cycle cost analyses

## **TRAINING AUDIENCE**

- HVAC Designers, Engineers, Plant Operators
- Plant and Maintenance Craftsmen
- Building or Energy Managers
- Environmental Engineers
- Process and Mechanical engineers who are involved with troubleshooting, selection, operation, and maintenance of large process machinery.
- Entry level engineers all the way to senior engineers will benefit because of the course structure, the course targets engineers in the petrochemical, chemical, refining and power industries.

## **COURSE OUTLINE**

### **Day 1**

Introduction to refrigeration systems

- Basic cycles calculations

- Major losses and minor losses

- Minimum piping size

Detailed cooling load estimation tips

- Internal Loads,
- Room Design and architectural requirements

Fundamentals of HVAC design calculations

- Basic Load estimates

Introduction and history

Terms and definitions

## **Day 2**

Airflow Design in Ducts and Air Distribution in different applications

- Duct Design
- Outlets and return grilles

Worked examples and discussions I:

Special HVAC design applications to hospitals

- Clean Rooms
- Energy Efficiency

Indoor Air Quality (IAQ) at workplace

- Hygiene
- CO<sub>2</sub>, molds, radon, pollutants

HVAC plant and piping calculations

Electrical power requirements in HVAC systems

## **Day 3**

- Compressor selection
- Design of finned evaporators
- Selection of refrigeration distributors
- Design of air cooled condensers
- Software on coil design
- Expansion valve selection and unit pressure drop

## **Day 4**

- Refrigerants environmental regulations, compliance & methods for pollution control
- Overview of HVAC system controls
- Worked examples and discussions II
- Instruments used for flow and temperature measurements
- Remedial procedures checklist for operational emergencies: inspection details
- Plant operation – start up, normal operation, coming off line, provisions for short shutdown, provision for long shutdown.

## **Day 5**

Maintenance checklist

HVAC life cycle cost analyses

- Capital cost
- Operating Costs,
- Maintenance Cost

Codes and standards

- National Code
- ARAB & ISO Standards

Introduction and overview of ASHRAE Energy Code 90.1 and DOE

Troubleshooting and Maintenance

- Principles of troubleshooting
- Statistics of more frequent troubles
- Off-design operating conditions

## **TRAINING CERTIFICATE**

**MAESTRO CONSULTANTS** Certificate of Completion for delegates who attend and complete the training course

## **METHODOLOGY**

Our courses are highly interactive, typically taking a case study approach that we have found to be an effective method of fostering discussions and transferring knowledge. Participants will learn by active participation during the program through the use of individual exercises, questionnaires, team exercises, training videos and discussions of “real life” issues in their organizations. The material has been designed to enable delegates to apply all of the material with immediate effect back in the workplace.