



BUILDINGS HVAC SYSTEM HVAC SYSTEM DESING HVAC LOAD CALCULATION



INTRODUCTION

- HVAC: **H**eating **V**entilation and **A**ir **C**onditioning
- The course introduces students to the basics of designing plant systems developed to ensure the health and well-being of people.
- The main objective of this course is to:
 - Knowledge of the main plants for heating, cooling and ventilation of (mainly) buildings
 - How to define the design conditions
 - How to design the HVAC systems and their components
 - Basic knowledge of current standards and laws regarding energy conservation in buildings
 - An overview of international, European and Italian standards



Methods

- Frontal lessons
- Exercises
- Project development
- Visits to Companies
- Meetings with companies and designers



Teaching Material

- All material will be made available in Moodle system
- Slides presented during frontal lessons
- books of interest:
- HEATING VENTILATING, AND AIR CONDITIONING analysis and design, Mc Quiston, Parker, Spitler; JHON WILEY & SONS
- HANDBOOK OF AIR CONDITIONING AND REFRIGERATION, Shan K. Wang, McGraw-Hill
- The last book can be accessed also using access engineering service of Mc Grew Hill <https://www.accessengineeringlibrary.com>



Tools for project and exercises

- During exercises different tools will be used
- Team System Termolog
 - for computing buildings loads
 - Compute the energy requirements
 - <https://www.logical.it/academy-ts/>
 - four months, extension available on request
 - There is a English version, select the language in options, no need to download a different version
- SpreadsSheet
 - Design heating plants
 - Sizing HVAC systems



Main parts of the course

- Thermal Comfort
- Design: basic design heat loss computation.
- Hydronic system
- Boiler rooms
- Domestic Hot Water systems
- Heat pumps, source, insertion in heating and cooling systems, hybrid systems
- Air conditioning plants
- Cooling systems
- Environmental issues



Exam

- Presentation and discussion of a Design Project:
 - Heat losses computed with Termolog
 - Sizing of a heating systems using a Spreadsheet
 - Primary Energy required for building heating
 - Select of building or an apartment, if not available a plant will be provided at request
 - The student must explain the choices made during the development of the project, and must know the main values of parameters selected and main results
 - Each student must submit a different project, no team projects
 - The project must be submitted the week before the exam. The submission must be done using the Moodle system
 - The project consist of three parts:
 - The project description in pdf format
 - The Termolog input file
 - The plant sizing in spreadsheet format



Exam II

- Please note that the project **is not the examination!**
- After the project discussion two questions regarding the whole program
- The same procedure will be followed for the students of the courses
 - Building Energy Simulation 6 cfu (IN11)
 - HVAC system design 6 cfu (IN15)
 - Building Energy simulation 6 cfu + HVAC load calculation 3 cfu (IN22)
- For the students of IN22 the oral exam cover the 6+3 cfu program, the project is the same of the other courses