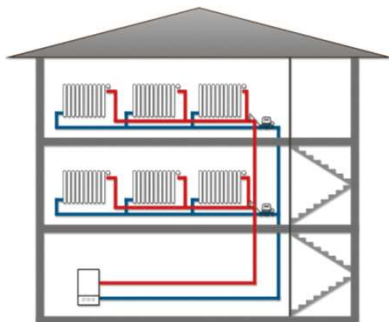


HEATING, VENTILATION, AIR CONDITIONING SYSTEMS (HVAC)

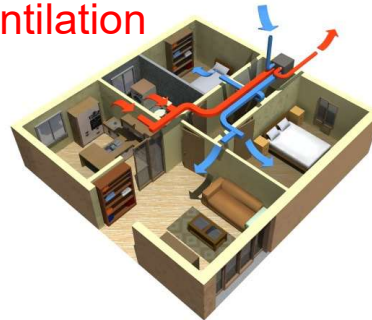
Prof. Michele De Carli
Prof. Jacopo Vivian
Dr. Laura Carnieletto

Heating



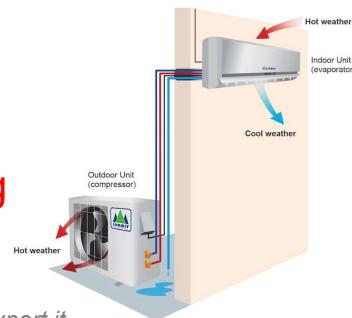
Source: herzitalia.it

Ventilation



Source: ahoraarchitectura.it

Air-conditioning



Source: climaexpert.it

HVAC (1/2)

- Problems related to IEQ (Indoor Environmental Quality)
- Climate, peak power, energy and loads
- Recap on heat transfer, building envelope, energy consumptions
- Sizing of Domestic Hot Water (DHW)
- Types of plants (full air, water, primary air)
- Types of ventilation in rooms, mechanical ventilation for residential buildings and control of humidity.
- Air Handling Units (AHU)
- Types of terminal units (radiators, fan-coils, chilled/active beams, radiant systems)

HVAC (2/2)

- Aerualics (air ducts distribution, terminal air diffusers) sizing, choice, balancing, air to ground heat exchangers
- Hydronics (piping, distribution, valves) sizing and balancing
- Generation systems: boilers, air source heat pumps, ground source heat pumps
- Control of hydronic systems
- District heating and cooling networks
- Cooling supply stations
- Energy certificates and regulations

Exam rules 1/2:

- Report: 7 points

Report

- Calculation of **peak power for heating** of your house
- Calculation of **peak power for cooling** of your house
- Net energy demand for heating and DHW
- Sizing the DHW tank and generation power
- Sizing of the **radiant floor heating**
- Sizing/balancing of the **ventilation** system
- Sizing/balancing of the **hydronic** system
- Choice of the peak power of the heat pump

Exam rules 2/2:

• 1 long written question	7 points	}
• 2 short written questions (2 x 4 =)	8 points	
• 1 oral question	8 points	
• report	7 points	
<hr/>		
Σ	30 points	

Duration of the written part: 1 hour ←

**At the end of the written part, the oral question will start.
First In First Out (the first who delivers the written answers
will be the first one in answering the oral question).**

Exams

- 6/6 : **officially (in Uniweb)**
 - the exam starts at 12.30 in Room Oe
 - in practice:**
 - Written question: 9.00 – 10.00 (Room ICH1)
 - Oral questions: 11.15 – 12.15 (Room RH03)
 - 12.30 – 14.00 (Room Oe)
 - 14.30 – 16.00 (Room Ne)
 - 20/6 at 8.45: Room Catullo (official exam)
 - 27/6 at 8:45: Room M5 (official exam of Energy & Buildings)
 - 14/7 at 8.45: Room De (official exam)
- One of them
- One of them

Dates for the report:

They should be uploaded in Moodle

- either the 13/6 for the exams given in June
- or the 7/7 for the exams given in July

