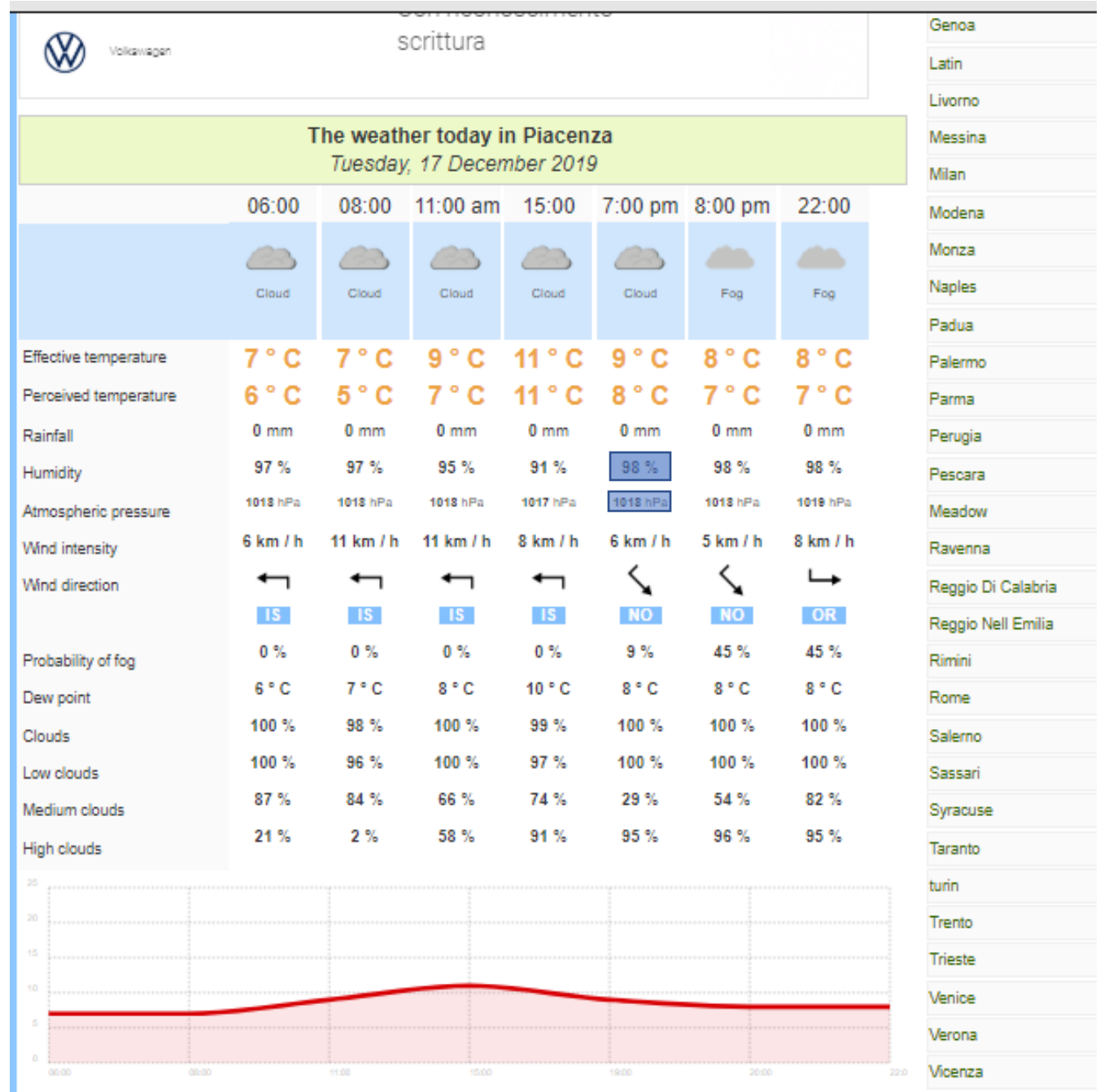


# Week 9 Assignment

## Question 1:

Use a weather forecast website, and utilize the psychrometric chart and the formula we went through in the class to determine the absolute humidity, the wet-bulb temperature and the mass of water vapour in the air in Class Room A (Aula A) of Piacenza campus in the moment that you are solving this exercise (provide the inputs that you utilized):



Studio 1 Competitions Graduation 1

Water tends to evaporate or vaporize by proportionally to the partial pressure exerted by the vapor. The rate at which they leave is equal to the rate at which they leave. The *thermodynamic equilibrium with its condensate* condition the vapor pressure is the **saturation pressure**.

### Online Water saturation pressure Calculator

The calculator below can be used to calculate the saturation pressure of water. The output pressure is given as kPa, bar, atm, psi and psf.

Temperatur must be within the ranges 0-370 °C, 32-700 °F, 273-645 K and 492-1160 °R

Temperature

Choose the actual unit of temperature:

☒ °C ☐ °F ☐ K ☐ °R

**Calculate water saturation pressure!**

The saturation pressure of water depends on temperature as shown below:

See [Water](#) and [Heavy Water](#) for thermodynamic properties at standard conditions.

See also other properties of [Water](#) at [varying temperature and pressure](#): [Boiling points at high pressure](#), [Boiling points at vacuum pressure](#), [Density and specific weight](#), [Dynamic and kinematic viscosity](#), [Enthalpy and entropy](#), [Heat of vaporization](#), [Ionization Constant,  \$pK\_w\$](#) , of normal and heavy water, [Melting points at high pressure](#), [Prandtl number](#), [Properties at Gas-Liquid Equilibrium Conditions](#), [Specific gravity](#), [Specific heat \(heat capacity\)](#), [Specific volume](#), [Thermal conductivity](#), [Thermal diffusivity](#) and [Vapour pressure at gas-liquid equilibrium](#).

www.engineeringtoolbox.com says

Water saturation pressure at 9 degree C:

1.147 kPa  
0.0115 bar  
0.0113 atm  
0.166 psi  
24 psf

OK

$$T = 9\text{ }^{\circ}\text{C} = 282\text{ }^{\circ}\text{K}$$

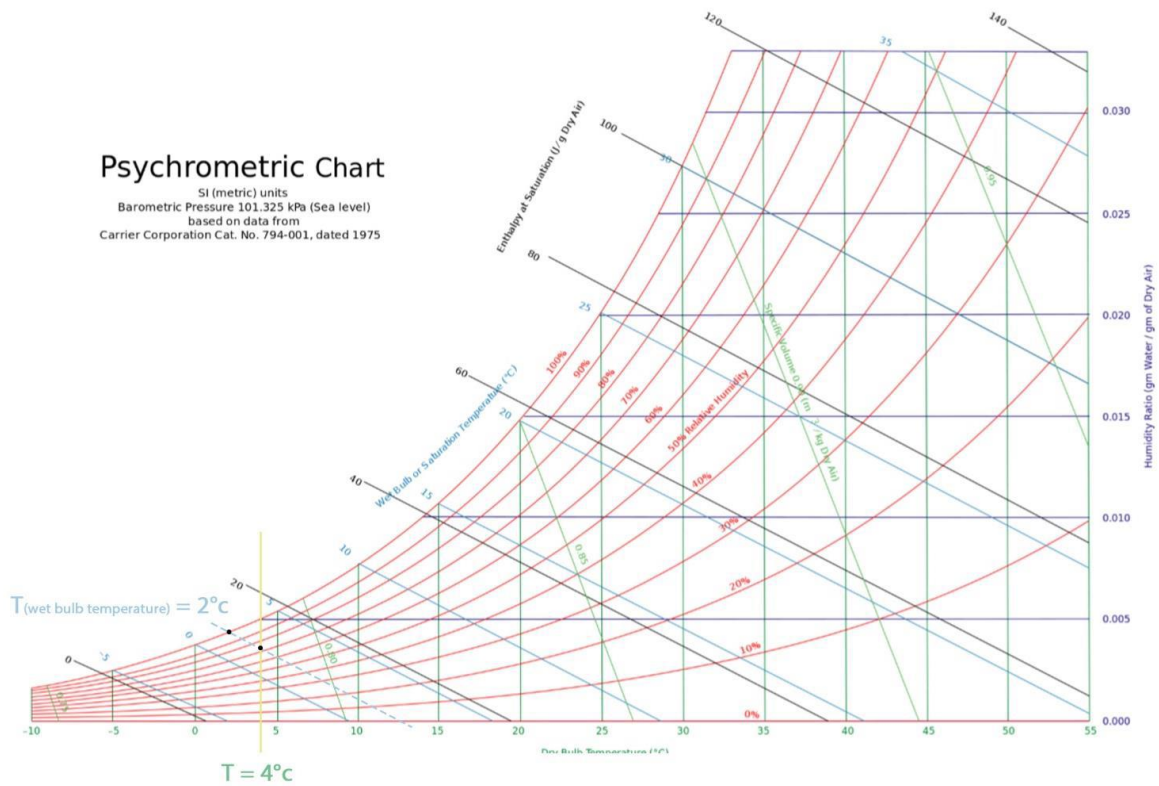
$$\phi = 0.98$$

$$P = 101.8\text{ kPa} = P_a + P_v$$

$$P_s \text{ at } 9\text{ }^{\circ}\text{C} = 1.147\text{ kPa}$$

$$P_v = \phi * P_s = 1.124\text{ kPa}$$

$$W = 0.622 * P_v / (P - P_v) = 0.622 * 1.124 / (101.8 - 1.124) = 0.00694\text{ absolute humidity}$$



The wet bulb temperature is  $T = 3^\circ\text{C}$  taken from the psychrometric chart

$$M_v = P_v \cdot V / P_{sp} \cdot T$$

$$P_v = 1.124 \text{ kPa}$$

$$V_{\text{aula}} = 10 \cdot 5 \cdot 5 = 250 \text{ m}^3$$

$$P_{sp} = 0.146$$

$$T = 9^\circ\text{C} = 282^\circ\text{K}$$

$$M_v = 6.82 \text{ Kg}$$