Chapter 14
Fluid Mechanics
Pressure

- Pressure = force per unit area \( P = \frac{F}{A} \)
  - \( 1 \text{ Pa} = 1 \text{ N/m}^2 \)

- Pressure is transmitted equally in all directions through the fluid ("Pascal’s law")

\[ \Delta P = \rho g \Delta h \]

\[ \frac{F_1}{A_1} = \frac{F_2}{A_2} \]
Buoyant Force

- Buoyant force is exerted by a fluid on immersed object

\[ F = F_2 - F_1 = (P_2 - P_1)A = \rho g HA = \rho V g = mg \]

Buoyant force is equal to the weight of the fluid displaced by the object ("Archimedes’ principle")

density of the fluid, not the object!
Floating Objects

- Need to have (average) density less than that of fluid

\[ \rho_{\text{obj}} (h_1 + h_2) = \rho_{\text{fluid}} h_2 \]