MECH22202 Materials 2
Formula Sheet

1 Review

$$\text{APF} = \frac{\text{Atom volume}}{\text{Unit cell volume}} \quad \text{Atomic Packing Factor} \quad (1)$$

$$E \approx \frac{dF_N}{dr} \quad \text{Elasticity (Force vs Interatomic distance)} \quad (2)$$

$$\sigma = \frac{F}{A_0} \quad \text{Engineering Stress} \quad (3)$$

$$\epsilon = \frac{\Delta L}{L_0} \quad \text{Engineering Strain} \quad (4)$$

$$\sigma_T = \frac{F}{A} \quad \text{True Stress (Instantaneous Area)} \quad (5)$$

$$\epsilon_T = \ln\left(\frac{L}{L_0}\right) \quad \text{True Strain} \quad (6)$$

$$G = H - TS \quad \text{Gibbs Free Energy (Enthalpy Form)} \quad (7)$$

$$G = \sum_{i=1}^{j} n_i G_i \quad \text{Total Gibbs Energy (Multi-phase)} \quad (8)$$

$$W_\alpha + W_L = 1 \quad \text{Total Mass Balance} \quad (9)$$

$$W_\alpha C_\alpha + W_L C_L = C_o \quad \text{Component Mass Balance} \quad (10)$$

$$W_\alpha = \frac{C_L - C_o}{C_L - C_\alpha} \quad \text{Solid Fraction } (\alpha) \quad (11)$$

$$W_L = \frac{C_o - C_\alpha}{C_L - C_\alpha} \quad \text{Liquid Fraction } (L) \quad (12)$$