Final Exam Example Problem (20 points) An ideal Schottky barrier is formed between a metal having work function $\Phi = 4.8$ eV and n-type Si (electron affinity $\chi = 4.0$ eV, $E_g = 1.11$ eV). The donor doping in the Si is $N_d = 10^{18}$ cm^{-3}.

Calculate the barrier height Φ_B. Calculate the semiconductor work function Φ_S. Calculate the contact potential, i.e., built-in potential qV_0.

Draw the energy band diagram for the metal-semiconductor interface showing Φ_B, Φ_S, and qV_0.