24. Let the energy of the state in question be an amount ΔE above the Fermi energy $E_{\rm F}$. Then, Eq. 42-6 gives the occupancy probability of the state as

$$P = \frac{1}{e^{(E_{\rm F}+\Delta E-E_{\rm F})/kT}+1} = \frac{1}{e^{\Delta E/kT}+1} \ .$$

We solve for ΔE to obtain

$$\Delta E = kT \ \ln\left(\frac{1}{P}-1\right) = (1.38\times10^{23}\,\mathrm{J/K})(300\,\mathrm{K}) \ \ln\left(\frac{1}{0.10}-1\right) = 9.1\times10^{-21} \ \mathrm{J} \ ,$$

which is equivalent to $5.7\times10^{-2}\,\mathrm{eV} = 57\,\mathrm{meV}$.