

$$\sigma^2 | \mathbf{x} \sim \mathcal{IG} \left(\alpha + \frac{n}{2}, \beta + \frac{1}{2} \left(\sum_{i=1}^n (x_i - \bar{x})^2 + \frac{ns_0}{n + s_0} (\bar{x} - \mu)^2 \right) \right) \quad (3.16)$$