We know: $E[E[x]] = E[x]$, so:

$$E\left[\left(\hat{f}(x) - E[\hat{f}(x)]\right)^2\right] + E\left[\left(E[\hat{f}(x)] - f(x)\right)^2\right]$$

$$+ 2\Big\{E[\hat{f}(x)] \cdot E[\hat{f}(x)] - E[\hat{f}(x) \cdot f(x)] - E[\hat{f}(x)] \cdot E[\hat{f}(x)]$$

$$+ E[\hat{f}(x) \cdot f(x)]\Big\}$$

$$= \underbrace{E\left[\left(\hat{f}(x) - E[\hat{f}(x)]\right)^2\right]}_{\text{Variance}} + \underbrace{E\left[\left(E[\hat{f}(x)] - f(x)\right)^2\right]}_{\text{Bias}^2}$$

For $X = 0$:-

$$\text{Bias}^2 = E\left[\left(E[\hat{f}(X=0) | (X=0)] - f((X=0) | (X=0))\right)^2\right]$$

$$= E\left[\left(\left(\frac{1}{3}\right) - (0)\right)^2\right] = \frac{1}{9}$$