Definition 0.0.1 (Ito process, multidimensional). $X = (X^1, \ldots, X^k)$ is a k-dimensional Ito process if

$$X_t^i = X_0^i + \int_0^t \alpha_s^i \, ds + \int_0^t \beta_s^i \cdot dW_s$$

where α^i are real-valued processes and $\beta^i = (\beta^{i1}, \ldots, \beta^{im})$ are $\mathbb{R}^d$-valued processes for $i = 1, \ldots, k$. It is implicitly assumed in the above that the processes α^i, β^i, $i = 1, \ldots, k$ are integrable in a suitable sense.