Let $C[0, T]$ denote a generalized analogue of Wiener space, that is, the space of continuous real-valued functions on the interval $[0, T]$. On the space $C[0, T]$, we introduce a finite measure $w_{\alpha, \beta; \varphi}$ with its properties, where $\varphi$ is an arbitrary finite measure on the Borel class of $\mathbb{R}$. Using the measure $w_{\alpha, \beta; \varphi}$, we also introduce a measurable function on $C[0, T]$ which is similar to the Itô integral. We also establish the fact that if $\varphi(\mathbb{R}) = 1$, then $w_{\alpha, \beta; \varphi}$ is a probability measure with the mean function $\alpha$ and the variance function $\beta$, and the measurable function is reduced to the Paley-Wiener-Zygmund integral on the space $C[0, T]$. As an application of the integral, we derive a generalized Paley-Wiener-Zygmund theorem which is useful to calculate the integrals on $C[0, T]$. (Received September 19, 2017)