Requires $\int_{-\infty}^{\infty} |f(x)|\,dx < \infty$

$$F(\omega) = \frac{1}{2\pi}\int_{-\infty}^{\infty} f(x) e^{i\omega x}\,dx$$

Haberman

$$f(x) = \int_{-\infty}^{\infty} F(\omega) e^{-i\omega x}\,d\omega$$

ω = natural frequency
x = time or distance

$$f(x) = \sum_{n=-\infty}^{\infty} c_n e^{-in\pi x/L}$$

$$= a_0 + \sum_{n=1}^{\infty} a_n \cos\left(\frac{n\pi x}{L}\right) + b_n \sin\left(\frac{n\pi x}{L}\right)$$

$$c_n = \frac{1}{2L}\int_{-L}^{L} f(x) e^{in\pi x/L}\,dx$$

$a_0 = c_0$, $c_n = \frac{a_n + b_n i}{2}$