

$\frac{\cos^2 n}{n^4 + 1} \leq \frac{1}{n^4 + 1} < \frac{1}{n^4}$, so the series $\sum_{n=1}^{\infty} \frac{\cos^2 n}{n^4 + 1}$ converges by comparison with the p -series $\sum_{n=1}^{\infty} \frac{1}{n^4}$ $[p = 4 > 1]$.