So, what if the graph isn't bipartite?

Big idea:

Just round!

If $x_u \geq \frac{1}{2}$, round up to 1.

If $x_u < \frac{1}{2}$, round down to 0

Minimize $\sum w(u) \cdot x_u$
Subject to:
$x_u + x_v \geq 1$ for all $(u, v) \in E$
$0 \leq x_u \leq 1$ for all u.

Two questions – is it a vertex cover? How far are we from the true minimum?