In the present study, the average in-tube heat transfer coefficients in a spiral-coil heat exchanger are investigated. The test section is a spiral-coil heat exchanger which consists of six layers of concentric spirally coiled tubes. Each tube is fabricated by bending a 9.27 mm diameter straight copper tube into a spiral coil of five turns. The experiments are done under dehumidifying conditions. The effects of the inlet conditions of both working fluids are discussed. The results from the experiments are compared with those calculated from correlations reported in literature. In addition, a new correlation for the in-tube heat transfer coefficient for spirally coiled tube used under dehumidifying conditions is proposed for practical applications. The majority of the data falls within ±10% of the proposed correlation.