In this paper, a parametric study of a gas turbine power plant with the implementation of intercooling, reheating and regeneration is proposed. Thermal efficiency and the specific fuel consumption are evaluated with respect to various parameters including intercooler effectiveness, regenerator effectiveness, ambient temperature, compression ratio, reheating temperature, turbine isentropic efficiency, and compressor isentropic efficiency. The analytical formulas to evaluate the thermal efficiency are derived taking into consideration the operation conditions. MATLAB software is used to build the model. Modeled results show that the thermal efficiency increases with the increase of intercooler and regenerator effectiveness, increase of reheating temperature, decrease of ambient temperature, increase of turbine and compressor efficiencies. Thermal efficiency rises with compression ratio up to 2.2, and then it starts to decrease with increasing of compression ratio. Specific fuel consumption decreases with the decrease of ambient temperature, intercooler and regenerator effectiveness. SFC decrease with compression ratio up to 2.2. Then, it rises with the rise of compression ratio. Comparison between simple gas turbine and current model is presented also, and results indicated that at any ambient temperature, the thermal efficiency of the proposed model is higher than the simple cycle within 16–20%.