This research aimed to investigate whether the optimization for electrode placement and current passed through electrodes to generate an electric field in the brain could be made robust. The optimization approach used in this study focused on minimizing the current outside of the region being targeted for stimulation with respect to uncertainty in the conductivities of each section of a spherical head model in the worst case. The robust approach used sequential rounds of particle swarm optimization to find worst case conductivity parameters for an electrode setup and convex optimization to find a new electrode setup for new conductivity parameters. The study found that the robust optimization approach was beneficial in worst-case scenarios, reducing the electric field outside of the target region by 12.5% compared to the original setup. However, the robust approach performed worse than the original approach in the average case. This work suggests that this robust electrode design scheme for stimulation experimentation and medical treatments may minimize the neurons outside the targeted region that may be activated, in turn potentially reducing side-effects. Further research is required to validate these findings, compare other robust formulations, and determine how other uncertainties affect the robust optimization performance.