In the academic year 2010–11, I received a 2011–12 Research Grant of $3500 (summer stipend) for the project “Conjugacy in Semigroups.” The goal of the project was to provide a new definition of the concept of conjugacy in semigroups. As indicated in the proposal, this concept is of great importance in group theory, but the attempts to extend it to semigroups had not been satisfactory since they only applied to particular classes of semigroups. (See page 1 of the proposal.)

Our objectives were to find a definition of conjugacy that would apply to all semigroups, compare it with the existing definitions, and apply the new concept to known classes of semigroups. (See page 2 of the proposal.)

I am happy to report that these objectives have been fully achieved and are contained in the attached article (28 pages long). In particular:

(1) We provided a new definition of conjugacy and compared it with the existing definitions (Definition 2.1 and Theorem 2.2 on page 2 of the attached article).

(2) We characterized this new conjugacy relation for some well-known classes of semigroups (Sections 5–7 of the article).

(3) The conjugacy relation partitions a given semigroup into disjoint blocks, called the conjugacy classes. We found formulas for the number of conjugacy classes in some infinite semigroups. (For example, see Theorem 5.16 on page 19 of the article).

I should point out that when our concept of conjugacy is applied to groups, it reduces to the standard group theory notion that can be found in all standard textbooks on abstract algebra. Based on the results contained in our article, we have reasons to believe that our concept of conjugacy will become standard in semigroup theory. We intend to post our article on arXiv:math (a data base containing mathematics articles not yet published) and submit it to a high-quality mathematics journal. We also plan to give talks on our research at professional meetings and conferences.