Department of Mathematics and Statistics Colloquium

# Applications of Matrix Population Models

## Anthony Tongen

Abstract:  Anthony Tongen had the privilege of spending the 2012-2013 academic year as a Fulbright scholar to Mexico.  During his concurrent educational leave, he taught and performed research at the University of Colima in Colima, Colima, Mexico.  This talk will focus on two undergraduate research projects, described below, that apply matrix population models to biological species.  This talk will be accessible to anyone with an interest in applications of mathematics, but knowledge of basic linear algebra is always helpful.

The monarch butterfly (Danaus plexippus) exhibits a unique migration phenomenon by leaving Michoacán, Mexico in the spring and traveling as far north as Southern Canada; later generations return to the same location in Mexico the following fall.  However, there is concern within the scientific community about the long-term stability of this impressive annual journey. We use periodic population matrices to model the life cycle of the eastern monarch butterfly and find that this unique migration is not currently at risk.

South American camelids are some of the most representative mammals of South America. The guanacos (*Lama guanicoe*), one of the two wild camelid species, have an important family and social structure that influences their population size. We develop a two-sex matrix population model that incorporates both familial and social structure into the model. We test our model with data collected from guanacos in Chile between 2004 and 2009 and extend the model to another biological species with a similar harem structure.

## Wednesday, November 20 at 3:45 in Roop 103

## Refreshments at 3:30