# MATH CHATS

# *The Statistical Modeling Of Interspecies Competition On The Growth Of Trees*

## Professor Albert Y. Kim
### Middlebury College



Prof David Allen of the Middlebury Biology department conducted censuses of all trees in the University of Michigan's Edwin S. George Reserve where the location, species, and size of all trees was recorded. The censuses were conducted in both 2008 and 2014 so that the average annual growth could be computed. We would like a statistical model for the growth of each tree as a function of its size in 2008 and the competition it feels, with the latter incorporating notions of the numbers, the sizes, the spatial density, and the species of the competitor trees. In particular, we would like to capture all possible pairwise growth relationships between the species present; *e.g.* do Red Oaks impede/encourage the growth of Red Maples?

The current gold standard for such models is the model of Canham '04. However, this model encounters the issue of small sample sizes: for certain pairs of species we have very few observations, and hence have a hard time generating good estimates of the relationship. We therefore turn to Bayesian Hierarchical models that allow us to leverage similarities between certain species of trees within the same family e.g. Red Oaks and Black Oaks. We present a Bayesian alternative to Canham's model that Prof. Allen and I are currently working on.

**Tuesday, November 8**　　　　　　　　**Warner Hemicycle**
**12:30 PM – Free Pizza Lunch at 12:15 PM**　　**All Are Welcome**