Description: The course will cover the theory and practice of ‘Plant Breeding with Molecular Markers’.

Overview: The development of more productive plant varieties, combined with improved methods of production offers a solution to meet the caloric and nutritional needs of a growing world population. This course, ‘breeding with molecular markers’, will examine the role of ‘marker assisted selection’ or ‘genome assisted selection’ in improving plant varieties. In the last two years the draft genome sequence of soybean, corn, cucumber, potato, and tomato have been completed and made available. More genomes will follow. For example current activities in China seek to use ‘Next Generation’ sequencing to sequence 100 tomato varieties. The question we will try to address in this class is ‘how can we translate genome sequence data into new plant varieties?’. We will review concepts from classical plant breeding, the biochemical basis for DNA sequence variation, molecular assays for sequence variation, bioinformatics, sequence databases, and techniques for implementing molecular markes for crop improvement.

Resources: A course website has been established at http://www.oardc.ohio-state.edu/tomato/courses.htm. The website is password protected (username: oardcwin\hcs825 Password: Genetics825). Lecture notes will be posted to the website.

Grading:
Preparation and participation in paper discussions 30%
   Includes in class discussion or virtual discussion
Trait project and presentation 30%
   Mini-review or Fact-sheet
Analytical project and presentation 40%

The two projects are designed to communicate expertise to your peers (other students, practicing professionals, etc…). My goal is to use these projects as “eXtension.org” publications as part of the Plant Breeding and Genomics (PBG) Community of Practice (CoP) (http://pbgworks.org/). Projects that are satisfactorily completed will be edited and reviewed for publication under the SolCAP project that seeks to provide resource material for continuing education for practicing plant breeders, their staff and allied professionals.

The trait project (one or the other):
   Mini-Review: Provide a two-page review of a recent paper and add supplemental information and photographs that would assist a plant breeder in translating the discovery into an applied outcome.
   Fact Sheet: Review current literature concerning a trait in 1-2 pages, and provide supplemental information.
The analytical project
For this project you will learn a form of analysis and share this with your peers.
The Solanaceae Genomics Network has requested specific tutorials in the following:

Tutorials for SGN
How to search a database for traits or markers
How to use the CAPs designer
How to use the Comparative viewer
How to use the SNP discovery tool
QTL analysis