

## Course Focus

Mike Giroux - AGSC 441

### Plant Biotechnology



Plant Biotechnology is a senior level course taken by both junior and senior level Plant Science majors as well as graduate students. Coming in to the course, students often have a pre-conceived notion of what plant biotechnology is. Broadly defined, we have been altering plants to suit our purposes for thousands of years. More specifically defined plant biotechnology often refers to ways to make and analyze transgenic plants. Comparisons are made between “traditional” plant improvement methods and more modern methods of plant improvement. Note that this line is of course blurring over time with molecular markers being used in “traditional” plant breeding and “non-transgenic” transgenic plants being created.

This course has two components, 2 credits of lecture and a 1 credit lab component. A year or so ago, MSU began requiring defined learning outcomes for each course.

The objectives for this course are to:

- Understand the history of plant improvement from simple plant selection to modern day transgenic plants.
- Understand the process required to research, develop, and test transgenic plants.
- Ably perform a number of plant molecular biology techniques.
- Demonstrate proficiency in DNA preps, PCR, and agarose gel electrophoresis.

Enrollment in the course has averaged ~10-15 students and the lectures emphasize the theories and principles behind the creation and analysis of transgenic plants. Given the importance of developing plant molecular biology techniques for plant science majors, and the scarcity of classes that offer labs, great effort is made to help each student develop proficiency in some common lab techniques.

Fortunately, assistance from the department in the form of a teaching assistant has always been available for the lab portion of the course and Anna Snapp, Alanna Schlosser, and Andy Hogg (it was a long time ago now for Andy) have all served as excellent TAs. Anna even added a separate lab section so that we could give each student more personal instruction. The techniques emphasized in lab include DNA cloning, sequence analysis, gene expression analysis, PCR, and creation and analysis of transgenic plants. Some components being considered for further emphasis in the course for spring 2014 are manipulation and analysis of gene sequences and data management. An example of a new method of importance is the manipulation of data sets as in examining the expression of all genes in a tissue using RNAseq and whole genome sequencing.

The course requires that students demonstrate proficiency (sometimes just understanding if lab skills are not their forte) in a range of methods required to manipulate plant genomes. At the end of the semester each student turns in a research paper on a topic of their choice related to the use of plant biotechnology.

Overall, it is quite an enjoyable course to teach given the high level of interest and enthusiasm exhibited by the students and the fact that it dovetails well with my research interests.