

CropS 505

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Crops 505 Course Outline

1. Concepts of inheritance
 - Laws of Inheritance*
 - History of molecular biology and DNA technology*
2. Structural organization of Plant genomes
 - Coding vs. non-coding*
 - Distribution of genes*
 - Types of genes*
3. Strategies to map plant genomes
 - Concepts and methodologies of various marker systems*
 - Mapping populations*
 - Selection of marker systems*
 - Various types of maps*
 - QTL analysis*
4. Recombination
 - Genetic mechanisms of recombination*
 - Molecular mechanisms of recombination*
5. Utility of molecular maps
 - Marker-assisted selection*
 - Gene pyramiding*
6. Gene cloning strategies
 - Map-based cloning*
 - Chromosome landing*
 - Transposon Tagging*
 - Other novel approaches*
7. Various genomic tools
 - Large insert libraries*
 - EST mapping*
 - Microarrays*
 - genome sequencing projects*
8. Miscellaneous biotechnological strategies of crop improvement/utilization

CLASS FORMAT

The course will deal with the structural organization of the crop plant genomes; concepts, methodologies, and utility of various molecular marker systems relevant to crop improvement, marker-assisted selection, novel approaches to targeted crop improvement, various gene cloning strategies, approaches to understand gene function and its utility in

crop improvement. This is an advanced level course so do not expect straight lecture-exam-lecture format. Besides teaching Molecular Crop Improvement, the objective of the course is to generate independent and creative thinking, scientific discussions, and teach how to critically evaluate scientific literature.

Grading:

There will be a midterm exam (in class and/or take home) and a comprehensive final exam. Pop quizzes and take-home exercises will be given frequently.

Quizzes/Take-home exercises	15%
Term paper	20%
Class discussion/participation	05%
Midterm	20%
Final	40%

Term paper:

You will be expected to write and present a term paper on an assigned topic. The term paper is expected to be of **publication quality**.

You are expected to have textbook knowledge of:

- Laws of Inheritance
- DNA structure
- Meiosis and Mitosis
- Principles of Genetics

You will find these topics in any textbook on genetics, molecular genetics, or molecular biology.