

**CSES 5144: ADVANCED PLANT BREEDING AND GENETICS**  
**SYLLABUS-SPRING 2006: First Half of Semester**  
**M-W-F Jan20-Mar15 (Classroom to be announced)**

<u>TOPICS</u>	<u>REQUIRED READING</u>
<b>I. PLANT GENETICS – CONCEPTS AND THEORY</b>	
A. History of Plant Breeding as Art & Science	Handout
B. Allelism and Complex Loci	Morris: Genetics Ch 4
C. Genetic Principles	Fehr Chapter 3
D. Non-Allelic Gene Interactions	Morris: Genetics Ch 3
E. Crossing Over and Recombination	Fehr Chapter 3
F. Linkage	Morris: Genetics Ch 5
<b>II. GENETIC DIVERSITY, PARENTAL SELECTION &amp; POPULATION DEVELOPMENT</b>	
A. Plant Introduction and Genetic Diversity	Fehr Chapter 11
B. Four Stages of the Plant Breeding Process	Jensen Chapter 34 Fehr Chapter 31
C. Goal of Hybridization and Criteria for Selecting Parents	Fehr Chapter 10 Jensen Chap. 28-29
D. Population Formation by Hybridization	Fehr Chapter 12
<b>IV. INBREEDING AND BREEDING &amp; SELECTION METHODS</b>	
A. Inbreeding	Fehr Chapter 8
B. Bulk Method and Modified Bulk	Fehr Chapter 22
C. Mass and Pure-Line Selection in Self-Pollinating Populations	Fehr Chapter 24
D. Pedigree Method	Fehr Chapter 25
E. Single-Seed Descent Method	Fehr Chapter 23
F. Backcross Method	Fehr Chapter 28
<b>V. LINE SELECTION, TESTING &amp; FIELD PLOT TECHNIQUE</b>	
A. Predicting and Choosing Crosses and Lines	Jensen Chapter 30
B. Selection in Segregating Populations	Jensen Chapter 24 Stoskopf Chapter 6
C. Field Plot Techniques	Fehr Chapter 19
D. Selection and Screening Methods	Stoskopf Chapter 5
E. Breeder Seed Development & Cultivar Release	Fehr Chapter 36
<b>VII. BREEDING FOR PEST RESISTANCE</b>	
A. Types of Genetic Resistance	Fehr Chapter 21
B. Durability of Resistance	Handout
C. Breeding Strategies for Pest Control	
D. Genetic Studies and Inheritance of Resistance	
<b>VIII. MARKER-ASSISTED SELECTION-BREEDING</b>	

**The Course grade will be based on:**

Critique of one recent journal article: <b>Due Feb 17</b>	5%
EXAM 1-Mid-term: <b>March 17</b>	30%
Term paper: <b>Due April 14</b>	15% (10% paper– 5% seminar*)
EXAM 2- <b>DATE-TBA by Dr. Veilleux</b>	20%
EXAM 3- Final-exam: <b>May 5 (1:05 – 3:05 p.m.)</b>	20%
LAB <b>(Wed 1:30 – 4:30) 1<sup>st</sup> lab date TBA-Dr. Veilleux</b>	10%

**\*Students give 15 minute seminar based on their Term Paper summarizing “Use of Marker Assisted Selection in Plant Breeding & Variety Development”**

**Texts used in First half of this course (Instructor Griffey):**

Required:

**Principles of Cultivar Development, Vol. 1: Theory and Technique. Walter R. Fehr. 1987.**

Topics in Plant Genetics: Rosalind Morris. Provided by Instructor.

Topics in Plant Cytogenetics. Rosalind Morris. Provided by Instructor.

Supplemental Texts:

Plant Breeding Theory and Practice. Neal C. Stoskopf et al. 1993.

Plant Breeding Methodology. Neal F. Jensen. 1988.

Principles of Plant Breeding. R. W. Allard. 1960.

Genetics of Flowering Plants. Verne Grant. 1975.

Glossary of Genetics and Cytogenetics: Classical and Molecular. 4<sup>th</sup> Edition. R. Rieger, A. Michaelis, and M. M. Green. 1976.