

**PLSC446/646 - Fall 2008 Syllabus**  
**Genetics and Plant Improvement (3 Credits)**  
**Course Numbers: PLSC446: 3034 & PLSC646: 3044**

**Instructor:** M. S. McMullen  
**E-mail:** michael.mcmullen@ndsu.edu  
**Class Time:** MWF 10:00 – 10:50am  
**Class Location:** Loftsgard 102

**Office:** 370D Loftsgard  
**Phone:** 231-8165  
**Office Hours:** Mondays 8 to 9:30am  
or by appointment

**Coverage:**

- Genetic principles and their application to plant improvement
- Improvement methodologies and techniques as applied to crop plants
- Development of genetically modified crop plants and their impact on plant improvement
- Strategies and procedures relating to the release of improved cultivars

**Objectives are to foster:**

- 1) An understanding and appreciation of the genetic principles underlying plant improvement
- 2) An understanding of plant improvement strategy and methodologies
- 3) *Critical thinking* in relation to plant improvement strategy and methodology

**Required Text:** *Title:* Breeding Field Crops, 5<sup>h</sup> edition  
*Authors:* D. A. Sleper  
*Publisher:* Iowa State Univ. Press, Ames, Iowa, USA  
(Approx. cost \$85 new and \$64 used)

**Additional Recommended**

**Study Materials:**

(not required)

On reserve in Plant Sciences Study Center (*Basement of Loftsgard*)

1.) *Title:* Principles of cultivar development, Vol. 1 Theory & technique

*Author:* W. R. Fehr

*Publisher:* MacMillian Publishing Comp.

2) *Title:* Genetics Manual: Current theory, concepts, terms

*Author:* G. P. Redei

*Publisher:* World Scientific, River Edge, NJ, USA

3.) References to selected plant breeding/genetics articles

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*Disabilities:* Any students with disabilities who need accommodations in this course are encouraged to speak with the instructor as soon as possible to make appropriate arrangements for these accommodations.

*College Honor System/Academic Dishonesty:* All work in this course must be completed in a manner consistent with NDSU University Senate Policy, Section 335: Code of Academic Responsibility and Conduct. <http://www.ndsu.nodak.edu/policy/335.htm>

## Evaluation and Breakdown of Grading:

### Undergraduate Students

- Four 50-minute exams\*, each evaluating student understanding of content covered since the prior exam *or* content as described by the instructor. **Note:** Lowest 50-minute exam score of the four exams will be dropped from calculation of the final grade (**24 pts. each = 72 pts. total**).
- One cumulative final exam (**20 pts.**).
- Participation in year-end plant breeder “interview” and group summary/presentation (**8 pts.**).
- **Extra-credit** – Complete written research paper based on the plant breeder interview (**4 pts.**).

**Total Possible Points = 104**

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### Graduate Students

- Four 50-minute exams\*, each evaluating student understanding of content covered since the prior exam *or* content as described by the instructor. **Note:** Lowest 50-minute exam score of the four exams will be dropped from calculation of the final grade (**20 pts. each = 60 pts. total**).
- One cumulative final exam (**30 pts.**)
- Participation in year-end plant breeder “interview” and group summary/presentation (**5 pts.**)
- Written research paper based on the plant breeder “interview” (**5 pts.**)

**Total Possible Points = 100**

\* **Note** : The 50-min. exams generally consist of a approx. 8 definitions (1/2 pt. each) of terms/concepts and 6 to 8 short essay-type questions (2 pts. each) intended to assess “critical thinking” and the application of genetic concepts to plant improvement.

## Description of Plant Breeder “Interview” Assignment

Purpose - To expose students to practical plant improvement programs and their procedures so that they can understand how the concepts and methodologies discussed in class are applied. The assignment is structured *to encourage* a better student understanding of the concepts and methodologies by having students explain to and discuss with their peers how they are applied.

Procedure - Students will be divided into groups and each group will decide on a single individual to conduct an interview with a plant breeder (a list of participating plant breeders will be provided). Each student, *except the student who conducted the interview*, in a group will present information to the class on different aspects of the plant improvement project being discussed.

Coverage -

- Description of the crop species and breeding program (private/public program, personnel, crop significance to region, reproductive mech., and abiotic/biotic stresses, breeding goals and strategies)
- Description of breeding methodologies used (methods of selection, breeding method(s) -- e.g. pedigree, bulk, SSD, backcross, supplemental method(s) -- e.g. DH method, cytogenetics, MAS)
- If relevant, description of the impact of biotechnology and development of GM technologies on improvement program

Written Assignment -

Graduate Students - A max. 4-page written summary of the interview, including a literature cited section referring to relevant papers (*required*).

### **Overall Course**

#### **Grading Scale:**

A = 90 < 100%	C = 70 < 80%
B = 80 < 90%	D = 60 < 70%
	F = < 60%