

## SYLLABUS AND COURSE SCHEDULE

### H&CS 625V - Crop Breeding

Spring Quarter - 2005

**I. INSTRUCTOR:** Richard C. Pratt  
Maize Genetics and Breeding  
Department of Horticulture and Crop Science  
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**II: PREREQUISITE:** Molecular Genetics 500 or 501 or equivalent undergraduate genetics course, e.g. HCS325; or concomitant enrollment in Mol. Gen. 500/1; or consent of instructor.

**III. TEXTBOOKS:** Required text – Principles of Crop Improvement by N.W. Simmonds and J. Smartt, 2nd Edition, Blackwell Science (1999).

**CLASS MEETINGS:** Monday and Wednesday 10:30 AM to 12:00 PM Room 244 Kottman Hall (Columbus students) and Fisher Video Class room (Wooster Campus).

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#### IV. METHODS OF EVALUATION:

A. Undergraduates:

Quizzes (2)	0%	(20 pts.*)
Mid-term exam I	25%	(100 pts.)
Mid-term exam II	25%	(100 pts.)
Final Exam	50%	(200 pts.)
	Total	400 pts.

B. Graduate Students:

Quizzes (2)	0%	(20 pts.*)
Mid-term exam I	22%	(100 pts.)
Mid-term exam II	22%	(100 pts.)
Final exam	39%	(175 pts.)
Special Topic Report	17%	(75 pts.)

Total 450 pts.

\*Pretest quizzes will be arranged as needed, no make-up quizzes will be given. Up to 10 bonus points will be awarded for each quiz. Special topic reports are subject to instructor's approval. Periodically, special problems may be assigned for extra credit (5 points each.)

Make-up exams must be rescheduled before time of the regular exam. Either a pre-approved absence (by instructor) or evidence of illness (requires document with physician's signature and exact time of visit) will be required.

The special topic report may be on any subject germane to the course, but not be too closely related to the student's thesis or dissertation topic. The written report must be double-spaced, either 11-12 pt. character font, of letter quality (near-letter quality must receive prior approval), and should be 10-12 pages in length. (9-10 pages not including cover page, figures, references etc.)

## **V. ORGANIZATION OF THE COURSE:**

- A. Distribution and use of class time: The class will meet for two, one hour and thirty minute periods per week. The first 50 minutes will be dedicated to lecture, and the remaining time to additional lecture, discussion of the reading assignments, and/or questions related to the lecture and upcoming course activities. Additional time will be devoted to web-based exercises.

At the beginning of certain class periods, questions pertaining to quiz or exam questions, and/or guest lectures will be addressed.

## **VI. COURSE OBJECTIVES:**

This course will serve as a general introduction to the principles of plant (crop) breeding. We will examine concepts relevant to students in plant breeding, genetics, biotechnology, crop sciences, and allied fields of plant pathology and entomology. The course objectives do not include a thorough examination of breeding methods applicable to any particular crops. The course will present information pertaining to a wide range of crops, including both agronomic and horticultural crop species important in temperate and tropical areas.

Specific objectives will include the following:

- A. To develop general familiarity with the overall science of plant breeding, especially as it relates to the improvement of agronomic and horticultural crops.
- B. To understand how directed selection for crop improvement is affected by plant mating systems, available genetic variation, environmental influences, selection strategies, and the social context.
- C. To gain an appreciation and understanding of the processes involved in natural evolution and directed selection and manipulation by humans.
- D. To become familiar with prominent techniques for directed plant improvement.
- E. To assist the development of critical thinking, and to improve skills in written and oral analysis of specific topics related to crop breeding.
- F. To lay the foundation for the study of more advanced plant breeding methodology and quantitative genetics e.g. molecular-marker assisted determination of quantitative trait locus variation.

## VII. TOPICAL OUTLINE OF THE COURSE

### TOPICAL OUTLINE HCS625V [dates of lectures, exams in brackets – to be finalized]

1. The Evolution of Crops	Mar. 28
2. Basic Features of Plant Breeding	Mar. 30
3. Objectives of Plant Breeding	Apr. 4
4. cont'd	Apr. 6
5. Genetic Aspects: Populations and Selection	Apr. 11
6. cont'd	Apr. 14
7. [Midterm Exam I]	Apr. 18
8. Breeding Plans	Apr. 20
9. cont'd	Apr. 25
10. cont'd	Apr. 37
11. Trials and Multiplication	May 2
12. Disease Resistance	May 4
13. cont'd	May 9
14. [Midterm Exam II]	May 11
15. Special Techniques	May 16
16. Biotechnology and Crop Improvement	May 18
17. cont'd	May 23
18. New Crops and Genetic Conservation	May 25
19. Plant Breeding for Low-Input Agriculture/Social Context	
June 1	

**[Final examination: June 6 to 9 period]**

## VIII. ADDITIONAL RESOURCES:

- A. Copies of class notes will be distributed to students following lecture presentations (typically within 24 hrs.)
- B. Articles in scientific journals. (Please note that graduate students will be required to read and cite at least five original articles published during the last ten years from at least two of the listed journals as part of the special topic paper.)

Crop Science  
Euphytica  
Genetics  
Genome  
Journal of Heredity  
Journal Am. Soc. Horticultural Science  
Journal of Plant Pathology  
Molecular Breeding  
Phytopathology  
Plant Breeding  
Plant Disease  
Proceedings National Acad. Science

Science  
Theoretical and Applied Genetics

The journals are available in the AGI and ARD libraries or via the Internet:

C. Annual Reviews, and other texts for reference include:

Plant Breeding Reviews  
Annual Review of Genetics  
Advances in Genetics  
Annual Review of Plant Pathology

Hybridization of Crop Plants  
W. R. Fehr and H. Hadley (Ed.)  
American Soc. Agronomy  
CSSA, Publishers (1980)

Plant Population Genetics, Breeding, and Genetic Resources  
A.H.D. Brown, M. T. Clegg, A.L. Kahler, and B.S. Weir (ed.)  
Sinauer Associates Inc., Publishers (1990)

Principles of Cultivar Development  
Walter R. Fehr; with the assistance of Elinor L. Fehr  
and Holly J. Jessen  
Macmillan, New York (1987) V.1 and 2

Principles of Plant Breeding  
Robert W. Allard  
2<sup>nd</sup> Edition, Academic Press (2000)

#### **IX. CODE OF CONDUCT:**

- 1) Respect of others (including instructors and guests) is required of everyone in the classroom at all times.
- 2) Students are expected to adopt the honor system during quizzes and exams. This system requires no cheating during exams and quizzes, and reporting of any observed, suspected violations. Suspected violations will be handled in accordance with university procedures on misbehavior and academic dishonesty as described in the Student Handbook and Faculty Rules.
- 3) Plagiarism is not allowed. Suspected misconduct will be handled in accordance with established university policy as stated in the Student Handbook and Faculty Rules.

#### **X. ACCOMODATIONS FOR STUDENTS WITH DISABILATIES:**

It is the student's responsibility to advise the instructor of chronic disabilities during the first week of the quarter. The instructor and student will work with the Office of Disability Services to provide appropriate accommodations. No special accommodations will be made for students who do not inform the instructor in a timely fashion, or who do not involve the Office of Disability Services. Temporary disabilities will be accommodated at the instructor's discretion.