

AGR5321 Genetic Improvement of Plants
Spring 2015
Section 159F

Instructor: Dr. M A Babar

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Office Hours: Students are welcomed to visit instructor's office at any time but it is wise to schedule an appointment (e-mail) to make sure the instructor is available.

Instructor: Dr. F. Altpeter

Office: 3085 McCarty

Office phone: (352) 273-3418

E-Mail: altpeter@ufl.edu

Course Description:

AGR5321 "Genetic improvement of plants" presents a comprehensive coverage of the principles, theory and applications of plant breeding for the genetic improvement of plants. Topics include basic genetic and breeding principles, chromosome numbers and manipulation, genetic recombination, monogenic and polygenic traits, continuous and discontinuous variations, concepts of direct and indirect selection, objectives of selection, genetic gain, heritability and use those in breeding, genotype-environment interaction, fertility manipulation in breeding, methods for self and cross pollinating crops, breeding techniques for major self-pollinating and cross-pollinating crops, double haploid breeding technique, development of hybrid varieties, cultivar release, maintenance, and seed increase. In addition, the course will also cover basic introductory concepts to Biotech crops, gene technologies for crop improvement, molecular markers, marker assisted breeding, transgenic approach of plant improvement.

Course Learning Objectives/Outcomes:

Upon completion of this course, student will

1. Apply the basic principles of genetics and plant breeding for genetic improvement of plants
2. Describe how total phenotypic variations are partitioned into different component and how the genetic portion is manipulated.
3. Discuss how to use selection parameter, heritability, and genetic gain concept for plant improvement
4. Describe how mode of pollination, fertilization, and reproduction impacts the ability to manipulate genetic variation.
5. Discuss how special breeding techniques like double haploid, fertility gene manipulation, etc and how to use those for genetic improvement of plants.

- 6 Describe various selection techniques and methods that can be used in genetic improvement of self and cross pollinated crops.
7. Describe various molecular breeding techniques and methods those could be used for genetic improvement of crops

Class Meeting Time: T and R; T 11:45-12:35 RNK 110, R 12:50 - 2:45 MCCA 2196.

Prerequisites:

AGR 3303 or PCB 3063.

Text: Breeding Field Crops Fifth Edition by Sleper and Poehlman. An outline of lecture notes will be available on the web site prior to the beginning of each major topic.

Course website:

E-Learning system, Sakai <http://lss.at.ufl.edu> is the online source for majority of the learning resources. All lecture handouts will be uploaded under the “Resource” section of Sakai. Course announcements regarding general course information will be posted in Sakai throughout the semester. Students need to login with GatorLink username and password for access. If you do not have a GatorLink ID go to <http://gatorlink.ufl.edu> or to the Help Desk: 392-HELP for assistance.

CLASS POLICIES:

ATTENDANCE- Students are expected to attend all classes. Students are required to e-mail the course instructor if they need to be excused from any lecture or laboratory. Any student who makes an appointment for any review session is required to be present five (5) minutes before the beginning of the session.

MAKEUP EXAMS- Make-up exams will be accepted only by special permission of the course instructor. Permission to make up work will be granted on a case by case basis and not all requests will be approved.

Grading: There will be two major progress exams, administered during the Thursday laboratory period January 29, February 26, and third major exam will be held during the lecture period (in class) on April 21. The fourth exam will be at 10 am to 12 noon on April 29. Each of these exams will count 100 points = 400 points. The four laboratory assignments will each count 50 points = 200 points. The grade for each lab assignment will be determined from a formal laboratory written report. Students will have additional assignments for each laboratory and will be expected to conduct more detailed statistical analyses of laboratory data and provide a library referenced literature review for each laboratory exercise. A review paper on a “**recent plant breeding technique**” is required to submit by April 10 and is worth of 100 points. Total points = 700.

Grades will be assigned according to the following scale:

% of available marks	Grade
92-100	A
90-91.9	A-
88-89.9	B+
82-87.9	B
80-81.9	B-
78-79.9	C+
72-77.9	C
70-71.9	C-
68-69.9	D+
62-67.9	D
60-61.9	D-

Bonus Points: Bonus quizzes worth 2 points each are given randomly during classes. These quizzes are unannounced and are presented on the screen at any moment during class. **Students will be given 5 minutes to answer the question and turn in the answers on a piece of paper with their name and UFID.** There is no make-up quiz. It is your responsibility to make sure your answer sheet is handed in for grading. **Bonus discussion points can be awarded** either providing discussion topics or participating in the discussion of two selected topics posted by students in Sakai. Students who want to provide discussion topics should send a description of the topic in 3-10 sentences to instructor for uploading. You will earn **one bonus point** if 5-10 students (yourself is not counted) participate in the discussion of your topic, or **two bonus points** if more than 10 students participate in the discussion. Students, who do not provide the topics or who provide the topics having less than five students participated, can choose two posted topics to participate the discussion. One point is counted as bonus towards relevant, non- redundant (not contributed by a previous participant), and complete ideas and information under each chosen discussion topic. The discussion participation is worth 2 bonus points in total.

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Schedule of Lecture Topics and Exams

Lecture	Topic	Date
1	Plant breeders and their work (Ch. 1)	01/06
	Lab-1: Review of meiosis, Mendel's law of inheritance; Reproduction in crop plants (Ch. 2)	01/08
2	Gene recombination in plant breeding (Ch. 3); Discontinuous variation and plant breeding	01/13
3	Lab-2: Statistical Procedures for Plant Breeding & Genetic Linkage	01/15
4	Quantitative inheritance in plant breeding (Ch.4)	01/20
5	Lab-3: Qualitative traits and Chi Square	01/22
6	Variations in chromosome number and plant breeding (Ch.5)	01/27
7	Exam 1	01/29
8	Selection parameters, heritability, genetic gain, indirect selection, selection efficiency	02/03
9	Lab-4: Quantitative traits and G X E interaction	02/05
10	Fertility-regulating mechanisms and their manipulation (Ch. 7)	02/10
11	Selection objectives & techniques for self & cross-pollinating plants (Ch. 9, 10 & 12)	02/12
12	Breeding methods suitable for hybrid cultivars (Ch. 11)	02/17
13	Breeding methods of wheat, soybean (Ch 14 & 16)	02/19
14	Double Haploid and plant breeding (Ch.6)	02/24
15	Exam 2	02/26
16	Breeding method in corn, potatoes and forage crops (Chs 17, 21, 20)	03/10
17	Breeding method in corn, potatoes and forage crops (Chs 17, 21, 20)	03/12
18	Introduction to Biotech crops (Dr. Altpeter)	03/17
19	Introduction into Biotech Crops II (Dr. Altpeter)	03/19
20	Gene technologies for crop improvement (Dr. Altpeter)	03/24
21	Lab-5: Prunus Breeding in Gainesville (Tentative)	03/26
22	Molecular characterization of (transgenic) plants, Regulatory approval for transgenic crops (Dr. Altpeter)	03/31
23	Lab-6: Strawberry Breeding at PSREU (Tentative)	04/02
24	Molecular markers (Dr. Altpeter)	04/07
25	Lab-8: Biotechnology Lab 3062 McCarty (Dr. Altpeter)	04/09
26	Marker assisted plant breeding (Dr. Altpeter)	04/14
27	Lab-9: Blueberry Breeding at PSREU (Tentative)	04/16
28	Exam 3 (Molecular Breeding and Biotechnologies) (Dr. Altpeter)	04/21
29	Exam 4 (10 am to 12 noon) (RNK110)	04/29

*We will attempt to maintain the exam schedule; however, material may be altered for any given exam depending on time and coverage of lectures.

General Class Demeanor:

- 1) Students arrive to class on time
- 2) Students convey superior work ethic and perform to high standards
- 3) Students share questions and ideas in and out of the class
- 4) Students keep an open mind
- 5) Students respect one another
- 6) Students turn off all electronic devices
- 7) Computer and iPad are not allowed for note taking purposes during class time.

Academic Honesty

In 1995 the UF student body enacted an [honor code](#) and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students.

The Honor Pledge: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

On all work submitted for credit by students at the university, the following pledge is either required or implied: **"On my honor, I have neither given nor received unauthorized aid in doing this assignment."**

Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean, Student

Honor Council, or Student Conduct and Conflict Resolution in the Dean of Students Office.

(Source: 2012-2013 Undergraduate Catalog)

It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor.

This policy will be vigorously upheld at all times in this course.

Software Use

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

1. *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/*

Counseling Services

Groups and Workshops Outreach and Consultation Self-Help Library

Training Programs

Community Provider Database

2. *Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/*

Services for Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues.

0001 Reid Hall, 352-392-8565,
www.dso.ufl.edu/drc/

NOTE: The instructors reserve the right to change any information contained in this and other handouts in this course.