Genetics & Breeding of Vegetable Crops
HOS 5242

Course Description: Traditional and molecular breeding methods for vegetable crops and the influence of scientific research, government policies, and consumer preferences on vegetable crop improvement.

Learning Objectives:
At the conclusion of this course, the student will be able to:

- Apply traditional and molecular breeding methods for the enhancement of vegetable crops.
- Interpret how plant breeding, scientific research, genetic diversity, germplasm resources and conservation, government policies, and consumer preferences can affect vegetable crop improvement programs.
- Design and present a vegetable breeding and research program that meets specific and long-term goals.

Instructor:
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Horticultural Sciences Department
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Office hours: Monday, Wednesday & Friday 2-4pm, or by appointment.

Prerequisites: AGR 3303 or equivalent

Credit hours: 3

Frequency: Offered Fall semester in even numbered years

Meeting Times: MWF, 12:50 - 1:40 p.m. (period 6)

Location: PSF-4 (Plant Science Facility, located behind Fifield Hall)

Course format: Lecture, discussion and student presentations

Text: There is no required textbook for this course.


Required Assigned Readings:


Additional or alternative readings may be selected from current literature and will be made available to the students in the form of a photocopy or an electronic file.
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<th>Week:</th>
<th>Topics</th>
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| 1     | Introductions, review of class syllabus and discussion topics  
World food needs and supply  
The genetic diversity of wild plant species |
| 2     | The domestication of plants  
Conservation of plant biodiversity |
| 3     | Germplasm resources and collections  
Public and private breeding programs  
Intellectual property – protecting plants & plant products |
| 4     | Genetics - a review  
The strategy of plant breeding  
Mass and recurrent selection breeding methods and the sweet potato |
| 5     | The pedigree breeding method and the eggplant  
The backcross breeding method and the pea |
| 6     | Triploid development in watermelon  
Genetic and cytoplasmic male sterility in onion |
| 7     | Andromonoecism in asparagus  
Synthetic varieties and faba bean |
| 8     | Hybrid development and tomatoes  
Breeding methods and squash (summer and winter)  
Plant transformation and genetic engineering |
| 9     | GMOs – review and discussion  
Molecular markers |
| 10    | Molecular markers (continued)  
Linkage maps |
| 11    | Identifying QTL using backcross-type populations  
Identifying QTL using bulked segregant analysis  
Vegetable improvement using marker-assisted-selection |
| 12    | Student presentations |
| 13    | Student presentations |
| 14    | Student presentations |
| 15    | Student presentations |
Class Assignment:

Each student will investigate, write-up, and present a vegetable breeding or research program that meets specific and long-term goals using traditional breeding and/or molecular methods. The assignment will be graded by the instructor based on completeness, writing skills, and class presentation (see below for details). The vegetable crop chosen cannot be that which the student is currently working on as a graduate student. A list of vegetable crops to choose from for this assignment will be provided by the instructor on the first day of class. This assignment is designed to encourage critical thinking and communication skills.

Written Report: Students will be required to submit a written report for their class assignment. This report is expected to be typed, double spaced, and no more than 15 pages. The written report should include:

I. An introduction to the vegetable crop including
   a. Global distribution
   b. Dollar value of crop (worldwide and regional)
   c. Taxonomy and center of origin (if known)
   d. Genetics
   e. Reproductive biology
   f. Germplasm resources/collections available
   g. Other interesting information
II. Breeding and/or scientific research objectives
III. Traditional breeding methods that are used to achieve breeding and/or research objectives (describe both past and current methods used)
IV. Molecular methods that are used to achieve breeding and/or research objectives
V. A review of past and present scientific findings from research
VI. References

Presentation: Each student will be required to present their class assignment as a 20-35 minute PowerPoint presentation (length of time for presentation may depend on number of students enrolled), based on their written report, allowing time for questions and answers by the audience. Each student will provide fellow students and instructor handouts of their PowerPoint presentation on the day it is scheduled.

Evaluation & Grades: (Students will be evaluated based on the following)

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<th>Points</th>
<th>Percentage of Grade</th>
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<tbody>
<tr>
<td>Class attendance</td>
<td>10</td>
<td>10%</td>
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<tr>
<td>Class assignment - written report</td>
<td>45</td>
<td>45%</td>
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<tr>
<td>Class assignment - presentation</td>
<td>45</td>
<td>45%</td>
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<td>Total:</td>
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Grades for this course will be assigned according to established university policy.
90-100 = A  85-89 = B+  80-84 = B  75-79 = C+  70-74 = C  65-69 = D+  60-64 = D  <60 = E
Course Policies:

Attendance: Students are expected to arrive on time, be present and participate in all classroom activities and discussions. Please notify the instructor as soon as possible if you will have to miss a class. In general, acceptable reasons for absence from class include illness, serious family emergencies, special curricular requirements (e.g., field trips, professional conferences), military obligation, severe weather conditions, religious holidays and court-imposed legal obligations (e.g., jury duty or subpoena).

Class Assignment- written report and presentation: The written report is due the same day as the scheduled class presentation. Turning in the written report late or missing scheduled class presentation of assignment will result in a decrease in grade of 5% for each day late. Make-up or turning in class assignment late will be given for only documented emergencies.

University Policies:

Academic Honesty, Software Use, UF Counseling Services, Services for Students with Disabilities

In 1995 the UF student body enacted a new 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.

In adopting this honor code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the university community. Students who enroll at the university commit to holding themselves to the high standard of honor required by the honor code. Any individual who becomes aware of a violation of the honor code is bound by honor to take corrective action. The quality of a University of Florida education is dependent upon community acceptance and enforcement of the honor code.

The Honor Code: 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.”

The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge is diminished by cheating, plagiarism and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will take severe action against dishonest students. Similarly, measures will be taken against faculty, staff and administrators who practice dishonest or demeaning behavior.
Students should report any condition that facilitates dishonesty to the instructor, department chair, college dean or Student Honor Court.

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. Both the Counseling Center and Student Mental Health Services provide 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. The Counseling Center is located at 301 Peabody Hall (next to Criser Hall). Student Mental Health Services is located on the second floor of the Student Health Care Center in the Infirmary.

- *University Counseling Center*, 301 Peabody Hall, 392-1575, [www.counsel.ufl.edu](http://www.counsel.ufl.edu)
- *Student Mental Health Services*, Rm. 245 Student Health Care Center, 392-1171, [www.shcc.ufl.edu/smhs/](http://www.shcc.ufl.edu/smhs/)

Alcohol and Substance Abuse Program (ASAP)

Center for Sexual Assault / Abuse Recovery & Education (CARE)

Eating Disorders Program

Employee Assistance Program

Suicide Prevention Program

*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, 392-8565, www.dso.ufl.edu/drc/