UNIVERSITY OF FLORIDA
Horticultural Sciences Department

Genetics & Breeding of Vegetable Crops
HOS _4xxx, Section ______ and HOS 5242, Section 04EE
Spring 2019

Instructors:

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Professor,
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Dr. Kevin Folta,
Professor & Chair,
Horticultural Sciences Department,
University of Florida, Gainesville, FL 32611
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Office hours: By appointment.

Prerequisites: AGR 3303 or equivalent

Credit hours: 3

Frequency: Offered Spring semester

Meeting Days and Times:
Tue, 1:55 to 2:45 p.m. (period 7) and Thu 1:55 to 2:45 and 3:00 to 3:50 (periods 7 and 8).

Location: Room 4, PSF

Course format: Lectures, discussion, student research and student presentations

Course Description: Traditional and molecular breeding methods for vegetable crops and the influence of scientific research, government policies, industry needs 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, industry needs and consumer preferences can affect vegetable crop improvement programs.
• Design and present a vegetable breeding research project that meets specific short-term and long-term goals.

Textbooks: There is no required textbook for this course. Optional textbooks are listed below:


Assigned Reading List:


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.

Tentative List of Topics:

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1, Thu</td>
<td>Introductions, review of class syllabus and discussion topics</td>
<td>BR, KF</td>
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<tr>
<td>Week 1 Thu</td>
<td>Activity 1. Introduction to pepper breeding program</td>
<td>BR</td>
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<tr>
<td>Week 2, Tue</td>
<td>The domestication of plants and genetic diversity in vegetable crops</td>
<td>KF</td>
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<td>Week 2, Thu</td>
<td>Qualitative traits and review of Mendelian genetics</td>
<td>BR</td>
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<tr>
<td>Week 2, Thu</td>
<td>Activity 2: Making a genetic cross</td>
<td>BR</td>
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<tr>
<td>Week 3, Tue</td>
<td>Modes of reproduction in vegetable crops</td>
<td>BR</td>
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<tr>
<td>Week 3, Thu</td>
<td>Breeding schemes</td>
<td>BR</td>
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<tr>
<td>Week 3, Thu</td>
<td>Activity 3: Planting a mapping population</td>
<td>BR</td>
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<td>Week 4, Tue</td>
<td>Induced mutagenesis</td>
<td>BR</td>
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<tr>
<td>Week 4, Thu</td>
<td>Activity 4: Analysis of quantitative data</td>
<td>BR</td>
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</tbody>
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Week 4, Thu  Basics of quantitative genetics  BR
Week 5, Tue  QTL mapping  BR
Week 5, Thu  Activity 5: Linkage analysis  BR
Week 5, Thu  Heritability  BR
Week 6, Tue  Genome-wide association mapping  BR
Week 6, Thu  Activity 6: Collection of quantitative data from peppers  BR
Week 6, Thu  Heterosis and sweet corn breeding  BR
Week 7, Tue  Genic and cytoplasmic male sterility  BR
Week 7, Thu  Activity 7: Collection of quantitative data on fruit traits II  BR
Week 7, Thu  Polyploidy and breeding Brassicas  BR
Week 8, Tue  Anther culture and doubled haploids  BR
Week 8, Thu  Activity 8: Anther culture  BR
Week 8, Thu  Seedless watermelon  BR
Week 9, Tue  Plant tissue culture, embryo rescue, somaclonal variation  KF
Week 9, Thu  Chimeras  KF
Week 9, Thu  Activity 9: Attempts on inter-specific crosses  BR
Week 10, Tue  Spring break - No class  KF
Week 10, Thu  Spring break - No class  KF
Week 11, Tue  Genetic transformation  KF
Week 11, Thu  Genome editing technologies  KF
Week 11, Thu  Activity 10: Students work on their projects  KF
Week 12, Tue  Virus-resistant squash breeding  KF
Week 12, Thu  Vegetable variety patents  KF
Week 12, Thu  Activity 9: Analysis of vegetable variety patents  KF
Week 13, Tu  Potential for transgenic vegetable crops  KF
Week 13, Thu  New breeding objectives in vegetable crops  KF
Week 13, Thu  Activity 11: Students work on their projects  KF
Week 14, Tue  Student presentation  KF
Week 14, Thu  Student presentation  KF
Week 14, Thu  Student presentation  KF
Week 15, Tu  Student presentation  KF
Week 15, Thu  Student presentation  KF
Week 15, Thu  Activity 10: Greenhouse clean up, Seed extraction  BR
Week 16, Tue  Review for final exam, Last day of class  BR, KF

*Instructors: BR- Bala Rathinasabapathi and KF – Kevin Folta

Class Assignment:

(a) Each student will do the lab exercises set for each week related to vegetable breeding, keep a journal of notes about what has been done and write reports for grade. Even if some of the exercises may be done in groups, each student should write the notebook and reports individually.
(b) Students will develop a research project in vegetable breeding in consultation with the instructors. Opportunities for the choice of the projects will be discussed in class.

**Written Report:** Lab reports are expected to be typed, double-spaced, and should be no more than 5 pages each. Quantitative data need to be shown in tables or figures and qualitative data using images. Tables and figures should have descriptive legends. Please include your name, date, a title for the exercise, a statement of objective of the exercise, description of what you did, the results observed and a discussion of your results. Include complete citations of any references or websites consulted.

**Level and expectations in this course:** This course is taught combined with graduate students. Activities assigned to undergraduate students will have only one objective while activities assigned to graduate students will contain 2-3 objectives. Graduate students are required to interpret their observations in the light of previous research work in that domain based on a literature search, while undergraduate students are expected to write simpler interpretations of their observations and data. Problems using bioinformatics tools (for mapping quantitative trait loci) are assigned only for graduate students while undergraduate students will be taught the concepts but not have to do hands-on exercises regarding mapping. Both graduate and undergraduate students have to make one presentation about their semester-long project and the goals set in these projects will vary between undergraduate and graduate students in that graduate student presentations will be expected in the light of the literature and undergraduate student presentations are expected to be centered on methods used and observed results with less reference to previous research in the field.

**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 the number of students enrolled), 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)

<table>
<thead>
<tr>
<th>Points</th>
<th>Percentage of Grade</th>
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<tbody>
<tr>
<td>Class attendance and participation</td>
<td>10</td>
</tr>
<tr>
<td>Class assignment - written reports*</td>
<td>15</td>
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<tr>
<td>Tests 2</td>
<td>15</td>
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<tr>
<td>Project &amp; presentation</td>
<td>30</td>
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<tr>
<td>Final Exam</td>
<td>30</td>
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<td>Total:</td>
<td>100</td>
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*The assignments, tests and the final exam will differ in their levels of difficulty between students attending the undergraduate and graduate sections of this course.*

Grades for this course will be assigned according to established university policy.
90-100 = A  85-89.9 = B+  80-84.9 = B  75-79.9 = C+  70-74.9 = C  65-69.9 = D+  60-64.9 = D  <60 = E
Course policies and procedures

Grades and Grade Points: For UF policies for assigning grade points, see https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx.

Attendance: Requirements for class attendance are consistent with university policies found at https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Online Course Evaluation Process: At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard evaluation tool online at https://evaluations.ufl.edu.

Academic Honesty: As a student at the University of Florida, you have committed yourself to uphold the Honor Code. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.

Software Use: All faculty, staff and students of the University are required and expected to obey the laws and legal agreements governing software use and the policy is found here: https://hr.ufl.edu/forms-policies/policies-managers/software-copyright-policy/

Services for Students with Disabilities: The Disability Resource Center coordinates the needed accommodations of students with disabilities. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation: 0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

Campus Helping Resources:
University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/
U Matter We Care, www.umatter.ufl.edu/
Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/

Student Complaints:
Residential Course: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf
Online Course: http://www.distance.ufl.edu/student-complaint-process