I. **TITLE:**

Plant Breeding

II. **CATALOG DESCRIPTION:**

Basic principles and methods used in the improvement of important agronomic and horticultural crops.

*To receive graduate credit for this course, a student must be admitted to graduate studies prior to registering for the course.*

III. **PURPOSE:**

The purpose of this course is to acquaint the student with the basic methods used to improve both self- and cross-pollinated plants and to gain understanding of why these methods are effective.

IV. **COURSE OBJECTIVES:**

A. To develop an appreciation of the role of plant breeding in the improvement in crop yield and quality in recent years.
B. To develop an understanding of basic genetics.
C. To develop an understanding of the effect that mode of pollination has on the effectiveness of various plant breeding methods.
D. To develop a sense of the practicality of various plant breeding methods in real situations with various plants.
E. To acquaint the students with methods of plant improvements for the 21st century.

V. **CONTENT OUTLINE:**

A. Past, Present, and Future Significance of Plant Breeding.
B. Basic Genetics
   1. Terminology
   2. Basic Concepts
   3. Role of DNA
C. Plant Introduction
D. Significance of Mode of Pollination on the selection of the Proper Plant Breeding Method.

E. Breeding Methods for Self-Pollinated Crops
   1. Pure-line Methods
   2. Mass Selection
   3. Bulk-Population Method
   4. Pedigree Method
   5. Backcross Method

F. Inbreeding Depression and Heterosis

G. Breeding Methods for Cross-Pollination Plants
   1. Mass Selection
   2. Hybrid Varieties
   3. Recurrent Selection
   4. Synthetic Varieties

H. Other Common Breeding Methods
   I. Biotechnology

VI. **INSTRUCTIONAL ACTIVITIES:**

   A. Lectures
   B. Demonstrations
   C. Videos

VII. **FIELD AND CLINICAL EXPERIENCES:**

   Student will learn to analyze various plant breeding situations and determine appropriate plant breeding strategies.

VIII. **RESOURCES:**

   A. Greenhouse and laboratory facilities
   B. Agronomy and Horticulture Journals

IX. **GRADING PROCEDURES:**

   Grading: Three Regular Exams 300 points
   Final Exam 150 points
   Projects and Reports 150 points
   Research Paper 150 points
   Total 750 points

   Students obtaining the following amounts of total points are guaranteed the following grades.

   Grading Scale:
   \[ \geq 675 \quad \text{A} \]
   \[ \geq 600 \quad \text{B} \]
   \[ \geq 525 \quad \text{C} \]
The instructor reserves the right to lower this scale on a linear basis, as the need arises. Graduating Seniors are expected to take the final along with other students during finals week.

Three mid-semester exams will be given with each being worth 100 points. Points given for graded homework assignments will be considered a portion of the points given for the subsequent class exam. The final exam will be partly comprehensive and be worth 150 points.

Plant breeding projects and their subsequent reports will be worth a total of 150 points. Included are two small genetic experiments that will be worth 25 points each. An heritability experiment that will last all semester will be worth 100 points (50 points for plant culture and data acquisition and 50 points for data analysis and subsequent report).

Each student will write a research paper on a plant breeding topic that is at least eight pages long with double spaced text. One possible approach would be to review an older “classis” paper on plant breeding and explain how that paper was important to plant breeding. Allowing for possible changes, the class will follow the following timetable in the development of this paper. By the third week, topics of interest must be selected and brought to class for discussion. By the fifth week, each student must present a five to eight minute PowerPoint presentation on their topic. By the tenth week, rough drafts of each student's essay must be submitted for general suggestions. The instructor will give each research paper only a brief evaluation at this time. Students must reference their sources of information throughout the paper and list the full reference at the end of the essay in a “Cited Works” section. Part of the final grade will include whether or not reputable sources of information were utilized. Websites are OK, if they are from reputable sources; however, there are many questionable websites. By the fourteenth, the final research paper must be submitted both as a hardcopy and as a Microsoft Word computer file. To prevent past problems, all papers will be searched for plagiarism from the Internet. Please write the papers in your own words!!! This research paper will be graded as follows: selecting the topic and submitting it on time – 5 points, giving a PowerPoint presentation to class on topic at assigned time – 5 points, submitting the rough draft on time – 10 points, ideas clearly explained and topic adequately covered – 40 points, quality of writing – 20 points, and use of reputable sources or cited works and correct referencing of paper – 20 points.
X. **ATTENDANCE POLICY:**

Please refer to the most current copy of the Murray State University’s Undergraduate Bulletin and Graduate Bulletin.

XI. **ACADEMIC HONESTY POLICY:**

Please refer to the most current copy of the Murray State University’s Undergraduate Bulletin and Graduate Bulletin.

NOTE: The School of Agriculture Faculty have adopted and implemented an Academic Honesty Policy in addition to the University Honesty Policy, which can be found in the current Undergraduate Bulletin and Graduate Bulletin. The policy sets guidelines regarding acts of dishonesty and the procedure to follow should an event occur. It is each Agriculture student’s responsibility to obtain and read a copy of this document. The School’s Academic Honesty Policy can be obtained by asking for a copy from any Agriculture Faculty member or the Secretary.

XII. **TEXT AND REFERENCES:**


XIII. **PREREQUISITES:**

None

XIV. **STATEMENT OF AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY:**

Murray State University endorses the intent of all federal and state laws created to prohibit discrimination. Murray State University does not discriminate on the basis of race, color, national origin, gender, sexual orientation, religion, age, veteran status, or disability in employment, admissions, or the provision of services and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford individuals with disabilities equal access to participate in all programs and activities. For more information, contact Sabrina Y. Dial, Director of Equal Opportunity, Murray State University, 103 Wells Hall, Murray, KY 42071-3318. Telephone: 270-809-3155 (voice), 270-809-3361 (TDD).

XV. **MSU SCHOOL OF AGRICULTURE CELL PHONE POLICY**
The School of Agriculture recognizes that in today’s world cell phones are a familiar and often necessary form of communication for students.

It shall be the policy of the School that no cell phone usage shall be allowed in class and/or labs without the prior consent of the course instructor. This shall include verbal calling, incoming calls, email, text messaging, and use of cell phone calculators on tests and quizzes.

Cell phones must be kept off and out of sight (i.e. secured to a person’s belt or kept in a bag or purse away from desks and lab counters).

Should a student’s cell phone be visible, ring, or other form of unauthorized usage that is interruptive to the class or lab, the student may be asked to leave class and not return for that class/lab period.

Upon prior consent of the instructor, a student may obtain permission to have their phone on in case of an emergency or in critical family situations.

This policy also includes pagers and other electronic equipment such as blackberries and/or computers/laptops.