INSTRUCTOR: Anne L. McKendry Ph.D.  
Wheat Breeding and Genetics  
106 Curtis Hall  
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DESCRIPTION: The study of theoretical and applied topics in plant breeding through an examination of classical and current literature. No required text. Agronomy 9425 will combine the study of conventional breeding concepts and methodology with current biotechnological approaches to plant improvement. The course format involves lectures, discussions and student presentations of selected topics in plant breeding. (3 credits – Tuesday and Thursday)

PREREQUISITES: Plant Science 4325/7325 and Statistics 4530 (ANOVA) or equivalents.

COURSE OUTLINE

Introduction: Plant Breeding - Past Successes, Future Directions

Genetic variation - Where does it come from and how do we use it?
- Genetic diversity
- Epistasis
- De Novo Variation
- Impact of linkage on plant breeding
- Wide Crosses

Breeding for grain yield
- Yield stability analyses

Breeding for physiological/biochemical processes impacting plant productivity:
- Drought tolerance and water use efficiency
- Heat tolerance
- Cold/freezing stress resistance
- Mineral toxicity/deficiency
- Genetics, breeding and physiological mechanisms of nutrient uptake and use efficiency

Genetic manipulation for crop protection:
- Resistance to fungal pathogens:
  - Qualitative versus quantitative resistance;
  - Conventional and current trends in resistance breeding
  - Case study - Fusarium resistance
- Nematode resistance: conventional and current trends
- Resistance to viruses: conventional approaches and current trends
- Insect resistance: conventional approaches and current trends

Molecular Breeding:
- Marker-assisted-selection
- Genomics and crop improvement
- Transgenic approaches to crop improvement - tour of transformation laboratory
Case Study – Merging conventional, molecular and biotechnical approaches

Quality improvement and modification

Student Seminars:

**EVALUATION:**
Assignments (4): - 20 points
Midterm exam: - 20 points
Seminar: - 20 points
Seminar paper: - 10 points
Final Examination: - 30 points

**GRADING**

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<td>A</td>
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(1) Fractions of a percentage point will be rounded to the nearest whole number.
(2) Individual test/exams will not be curved; however, the instructor reserves the right to curve the final grades if it is appropriate to do so.

**Academic integrity** is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards breaches of the academic integrity rules as extremely serious matters. Sanctions for such a breach may include academic sanctions from the instructor, including failing the course for any violation, to disciplinary sanctions ranging from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, collaboration, or any other form of cheating, consult the course instructor.

If you need accommodations because of a **disability**, if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately. Please see me privately after class, or at my office. To request academic accommodations (for example, a note taker), students must also register with the Office of Disability Services, (http://disabilityservices.missouri.edu), S5 Memorial Union, 882-4696. It is the campus office responsible for reviewing documentation provided by students requesting academic accommodations, and for accommodations planning in cooperation with students and instructors, as needed and consistent with course requirements. For other MU resources for students with disabilities, click on "Disability Resources" on the MU homepage.

The University community welcomes **intellectual diversity** and respects student rights. Students who have questions concerning the quality of instruction in this class may address concerns to either the Departmental Chair or Divisional leader or Director of the Office of Students Rights and Responsibilities (http://osrr.missouri.edu/). All students will have the opportunity to submit an anonymous evaluation of the instructor(s) at the end of the course.
If you have any questions about academic integrity or intellectual pluralism, please feel free to contact Associate Vice Provost Michael Prewitt (882-1422) who oversees the Office of Student Rights and Responsibilities (http://osrr.missouri.edu/). For questions about ADA classroom accommodations, please contact the Office of Disability Services at 882-4696.