

Plant Sciences 9440 Quantitative Genetics and Statistical Genomics

Instructor: Georgia Davis

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Class Schedule:

Class Location:

Reference Number: 74690

Course Description: This course examines the concepts and techniques relating: 1) to genetic and/or phenotypic dissection of quantitative traits and 2) tests for genome wide changes in structure or function. The subject material covers both plant and animal examples where appropriate. Students are expected to apply critical thinking skills in problem solving, literature reviews, and in class discussions.

Text: This course covers a broad set of concepts and topics in quantitative genetics. A listing of relevant literature related to each topic will be provided and readings will be assigned from these lists.

Statistical software: The majority of assignments will utilize either SAS and/or R for statistical analysis. SAS is available either through the University of Missouri's Software Anywhere access (<http://doit.missouri.edu/software/software-anywhere.html>) or by purchasing a copy of the software for \$50 from the Division of IT (<http://doit.missouri.edu/software/sales/sas.html>). R is available as freeware according to the terms outlined at <http://www.r-project.org/> under the "What is R?" heading. It can be downloaded from one of the Comprehensive R Archive Network (CRAN) mirror sites listed under the "download, packages CRAN" heading at the R project website (<http://www.r-project.org/>). Each student is responsible for obtaining access to both SAS and R to complete their homework assignments.

Statement for Academic Dishonesty (taken from <http://provost.missouri.edu/faculty/syllabus.html>) : Academic honesty is important not only as a student at the university but in our professional lives. Each of us needs to be assured that all students have the same resources and opportunities in completing their coursework and exams. Attempts to circumvent this process are dishonest regardless of your success in the attempt. The university takes academic dishonesty seriously. Penalties range from academic sanctions by the instructor to expulsion. If you are unsure whether your actions constitute plagiarism or how to properly acknowledge someone else's work, consult your instructor.

Instructor's Policy on Academic Dishonesty: Any individual not in compliance with the university academic honesty policy (ex. found to have plagiarized an assignment or exam) will receive an automatic F for that work and must meet with the instructor and their thesis advisor at the earliest possible time pending further consideration of additional disciplinary action. A copy of the documenting material will be placed in the student's graduate file in their home department. A second instance of non-compliance

in the course will lead to an F for the course. Additional disciplinary action may be taken at the discretion of the university.

ADA Statement: If you have special needs as addressed by the Americans with Disabilities Act (ADA) and need assistance, please notify the Office of Disability Services, S5 Memorial Union, 2-4696 or your instructor as soon as possible. To request accommodations for a disability, an individual must register with the Office of Disability Services

Statement on Intellectual Pluralism (taken from <http://provost.missouri.edu/faculty/syllabus.html>) : The university 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 Director of the Division of Plant Sciences, Dr. Michael Collins (collinmic@missouri.edu, 2-3001) or the Director of the Office of Student Rights and Responsibilities (<http://osrr.missouri.edu/>). All students will be given the opportunity to submit an anonymous evaluation of the instructor at the end of the course.

Policy on absence: Students missing class should notify the instructor by email before the day of lecture for planned absences and as soon as possible in the event of illness.

Assignment due dates: All assignments are due at the beginning of class on the date provided at the time they are assigned unless prior arrangements have been made with the instructor to turn them in late. There will be no late submissions granted on the due date except for documented illness. There will be no exceptions to this rule.

Grading: Exams are non-cummulative and count for 25% of the grade each (75% total). Homework is the remaining 25% of the grade.

Lecture	Topic
1	Assumptions in population and quantitative genetics
2	Population and mating structures
3	Factors affecting gene frequency over generations
4	Selection, gene action, and genotype
5	Selection response
6	Review of GLM
7	Phenotypic variance and heritability
8	Models for genotypic performance
9	G x E
10	Partitioning genetic variance Handout take home EXAM 1
11	Variance and co-variance
12	Mating designs-diallel (estimating effects)
13	Mating designs- North Carolina and Griffings
14	Generation means analysis
15	Genetic changes/gene action in mass and family selection
16	Genetic changes and gene action in recurrent selection
17	Effects of inbreeding Handout take home EXAM 2
18	DNA forensics
19	DNA forensics
20	Assessing genetic diversity using molecular techniques
21	QTL analysis-Inbred Parents
22	QTL analysis-Outcrossing Parents
23	QTL analysis-Wrap up
24	Issues in marker assisted selection
25	Dissecting multivariate phenotypes through Principle Component Analysis
26	Association genetics, part I
27	Association genetics, part II
28	Methods for analysis of differences in whole genome structure
29	Methods for analysis of differences in genome wide expression

Final