

Introduction to Animal and Veterinary Genetics
Animal Sciences/Dairy Science 361
Spring 2015

Lecture: 8:50 MWF, 212 Animal Sciences Building
Laboratory: 2:25 – 4:20 Wed. or Thu. 204 Animal Science Building (computer lab); 128
Animal science Building (wet lab)

Lecture and Laboratory Instructors (call or email for an appointment):

Hasan Khatib, 632 Animal Science Building, Phone: 263-3484
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David L. Thomas, 438 Animal Science Building, Phone: 263-4306
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Teaching Assistants (email for an appointment):

First 4 weeks on molecular genetics:

Jenna Kropp; Email: jkropp@wisc.edu

Second 4 weeks on quantitative genetics:

Vera Ferreira; Email: vcardosoferr@wisc.edu

Arthur Fernandes; Email: afernandes2@wisc.edu

Required Text for AS/DS 361:

For students who will take AS/DS 362, Veterinary Genetics: No Required Text

For students who will take AS/DS 363, Principles of Animal Breeding:

Bourdon, R. M. 2000. Understanding Animal Breeding. 2nd Edition. Prentice-Hall.

Required supplementary reading materials will be provided on the course web site.

Course web site: <https://learnuw.wisc.edu/>

User name and password are the same as you use for My UW.

Assignments, handouts, grades, and other materials will be available to students at this address.

Course objectives:

- Gain a clear understanding of the concepts, principles, and models of animal molecular and quantitative genetics.
- Apply those concepts and principles toward methods for improving the health, production, and well-being of livestock and companion animals.
- Critically evaluate scientific and popular information related to animal genetics.
- Learn the processes of scientific inquiry and critical thinking as applied to animal genetics.
- Confidently discuss animal improvement programs and practices using the terminology and concepts of scientific animal genetics.

Expectations of students:

- Purchase the textbook – for students who will take AS/DS 363.
- Study reading assignments prior to class time.
- Attend every class prepared to begin work at the start of the period.
- Come to class prepared to discuss the material and share your insights and understandings with other students in the class.
- Participate actively as both a listener and a speaker in class discussions.

Modes of instruction:

- Virtually all of the basic concepts and principles are explained in the reading assignments available on the course web site or in the text book. We will rely heavily on students studying these materials to gain an understanding of the topics. Lectures will not be used to reiterate the material in the text.
- Class time will be used to develop understanding and application of the concepts and principles that are presented in the reading assignments.
- We will use student-to-student interaction to share knowledge among students, identify and clear up misconceptions, practice communication in the language of animal genetics, and discuss issues and options in animal genetics.

Grading: The elements of the final grade are:

Quizzes will be given at the beginning of some class periods. Quizzes will be focused only on that day's reading assignment. They will be designed to test that the assignment has been studied before class. They will not test mastery of the subject. On random days no quiz will be given, but students should prepare for a quiz at the beginning of each class. We plan to have quizzes on 25 to 40% of lecture periods.

Homework problems or exercise will be given periodically to give students practice in the material in the readings, lectures, and laboratories.

Class discussion or group activity of some kind will take place during many lecture periods.

Groups will prepare and submit at the end of the activity a consensus summary of the group's work.

Lab assignments or reports will be due after each lab period. Specific instructions will be provided for each lab.

Exams are scheduled at the end of four and eight weeks of instruction. Each exam will cover the previous four weeks of lectures and labs.

Final grade will weight these elements as follows:

Quizzes/homework	15%
Class discussion	15%
Lab assignments	20%
Exams	50%

Graduate students' requirements: Graduate students taking AS/DS 361 for credits will be required to complete a project proposal during the semester on a topic related to topics taught in class. The final grade of graduate students will weigh the following elements:

Final Exam: 50%; Project: 30%; Discussions and quizzes: 20%.

No make-ups for quizzes and discussions. Missed quizzes and discussions will be given a grade of zero. The two lowest quiz and discussion grades will be dropped.

Course schedule and reading assignments [any changes will appear on the Learn@UW course website or be announced by email]

Day	Date	Topic	Bourdon ^a
From Phenotype to Genotype: production, disease, and reproduction			
Wed	Jan 21	Course introduction	
Fri	Jan 23	Animal Biotechnology	-- ^b
Lab 1		NCBI	
Mon	Jan 26	Genomic selection (guest lecturer, Dr. Kent Weigel)	-- ^b
Wed	Jan 28	Leukocyte Adhesion Deficiency in cattle (BLAD) and dogs (CLAD)	-- ^b
Fri	Jan 30	Muscular dystrophy in dogs	-- ^b
Lab 2		Molecular methods in individual identification	
Mon	Feb 2	Citrullinaemia in cattle; Von Willebrand disease in dogs	-- ^b
Wed	Feb 4	Genetics of reproduction in sheep	-- ^b
Fri	Feb 6	Genetics of reproduction in cattle	-- ^b
Lab 3		Searching Genomics Databases, etc.	
Mon	Feb 9	Mapping and identifying single genes	-- ^b
Wed	Feb 11	Molecular methods and applications I	-- ^b
Fri	Feb 13	Molecular methods and applications II	-- ^b
Lab 4		Sequence analysis, search, BLAST, course evaluation	
Mon	Feb 16	Exam 1	-- ^b
Quantitative Genetics for Animal Health and Production			
Wed	Feb 18	Allele frequency, Hardy-Weinberg equilibrium	56-70
Fri	Feb 20	Qualitative, quantitative, and threshold traits	71-76, 118-119
Lab 5		Forces that change gene frequency	
Mon	Feb 23	Basic genetic model for quantitative traits, breeding value, additive and non-additive gene effects	102-114
Wed	Feb 25	Inbreeding	333-342
Fri	Feb 27	Testing for recessives	79-91
Lab 6		Quantifying inbreeding	343-351
Mon	Mar 2	Statistical concepts: variation, correlation, regression	124-158
Wed	Mar 4	Statistical concepts: variation, correlation, regression	
Fri	Mar 6	Heritability, correlation, and regression	161-172
Lab 7		Selection intensity and selection differential	199
			201-207
Mon	Mar 9	Predicting rate of genetic change from selection I	198-201 206-213
Wed	Mar 11	Predicting rate of genetic change from selection II	
Fri	Mar 13	Exam 2 – Quantitative genetics concepts	
Lab 8		Genetic gain, course evaluation	

- ^a Students planning to take Principles of Animal Breeding (AnSci/DySci 363) are expected to read these pages in Bourdon prior to class time. Reading material for students planning to take Veterinary Genetics will be provided on the course web site.
- ^b Reading material for this class period will be provided on the course web site.