

ALS 3104-10319 Animal Breeding and Genetics

3 credits

Spring 2022

Instructor

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Graduate Teaching Assistants

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Office Hours: Tuesdays & Thursdays 9 - 10:30 am

Time and Location

- Tue/Thu 11:00 - 12:15 pm
- Steger Hall N 145

Prerequisites

- BIOL 1105
- STAT 2004 *or* STAT 3005
- APSC 1454 *or* DASC 2474 *or* DASC 2484

Required Materials

- Bourdon, Richard M. UNDERSTANDING ANIMAL BREEDING, Second edition, Prentice-Hall, Inc., 2000. 538 pp. [[Link](#)]

- A calculator that is not your phone or any electronic device that connects to the internet.

Course Description

Principles of genetics applied to improvement of domestic animals: factors affecting genetic improvement of economically relevant traits, estimation of breeding values, heritability, genetic correlations, relationships, inbreeding, crossbreeding, genetic abnormalities, genomic selection, and gene editing; ethical reasoning in animal breeding decisions.

Learning Objectives

Upon completion of the course, students will be able to:

- Assess factors that affect genetic improvement in animals
- Design appropriate breeding systems for animals through the application of structured selection and mating decisions
- Manage genetic conditions in animals, taking into account inherent economic and ethical considerations
- Estimate and interpret the genetic merit of domestic animals for economically relevant traits
- Critically evaluate new technologies in quantitative and molecular genetics for use in genetic improvement programs.

Tentative Schedule

Week	Day	Topic	HW	Exam
1	Tuesday, 1/18	Mendelian Inheritance and Population Genetics		
	Thursday, 1/20			
2	Tuesday, 1/25		HW 1 release	
	Thursday, 1/27			
3	Tuesday, 2/1	Mating Systems		
	Thursday, 2/3			Exam 1
4	Tuesday, 2/8			
	Thursday, 2/10			
5	Tuesday, 2/15		HW2 release	
	Thursday, 2/17			
6	Tuesday, 2/22			
	Thursday, 2/24			Exam 2
7	Tuesday, 3/1	The Genetic Model and Direct Selection		
	Thursday, 3/3			

8	Tuesday, 3/8	No class (Spring Break)		
	Thursday, 3/10	No class (Spring Break)		
9	Tuesday, 3/15		HW3 release	
	Thursday, 3/17			
10	Tuesday, 3/22			
	Thursday, 3/24			Exam 3
11	Tuesday, 3/29	Correlated Response and Multiple Trait Selection	HW4 release	
	Thursday, 3/31			
12	Tuesday, 4/5			
	Thursday, 4/7			Exam 4
13	Tuesday, 4/12	Genetic Prediction		
	Thursday, 4/14			
14	Tuesday, 4/19		HW5 release	
	Thursday, 4/21			
15	Tuesday, 4/26	No class		
	Thursday, 4/28			Exam 5
16	Tuesday, 5/3	Final Review		
	Thursday, 5/5	No class		
	Wednesday, 5/11			Final Exam

Course grades and grading policy

Homework assignments are due one week from the assigned class by 5:00 pm via canvas. No late assignments will be accepted. No extra credit will be awarded; the grade you earned for the class will be the grade you receive. Grades will be assigned using the (+/-) system as outlined by Virginia Tech. All materials used in class (i.e., lecture, notes, handouts, book...) will be tested on. Final exams are scheduled for May 11 from 1:05 to 3:05 PM. Official final exam schedules can be found on the Virginia Tech Timetable.

Item	Points
In-class problems	150
Homework	250
Exams	200*
Final exam	100
Total	700

*The final exam will be **optional for students with an A-** and higher. Including the final exam, only the top 5 exam grades will be included in the final grade. You will be informed by May 2 what your grade is before the final exam.

Point Percentage	Grade
≥ 93.5%	A
89.5 – 93.4%	A-
86.5 – 89.4%	B+
83.5 – 86.4%	B
79.5 – 83.4%	B-
76.5 – 79.4%	C+
73.5 – 76.4%	C
69.5 – 73.4%	C-
66.5 – 69.4%	D+
63.5 – 66.4%	D
59.5 – 63.4%	D-
≤ 59.4%	F

Navigation of the course website

Most course materials will be available through the course website, which is constructed using an online course management system called Canvas.

Principles of community

Virginia Tech is a public land-grant university, committed to teaching and learning, research, and outreach to the Commonwealth of Virginia, the nation, and the world community. Learning from the experiences that shape Virginia Tech as an institution, we acknowledge those aspects of our legacy that reflected bias and exclusion. Therefore, we adopt and practice the following principles as fundamental to our on-going efforts to increase access and inclusion and to create a community that nurtures learning and growth for all of its members:

- We affirm the inherent dignity and value of every person and strive to maintain a climate for work and learning based on mutual respect and understanding.

- We affirm the right of each person to express thoughts and opinions freely. We encourage open expression within a climate of civility, sensitivity, and mutual respect.
- We affirm the value of human diversity because it enriches our lives and the University. We acknowledge and respect our differences while affirming our common humanity.
- We reject all forms of prejudice and discrimination, including those based on age, color, disability, gender, national origin, political affiliation, race, religion, sexual orientation, and veteran status. We take individual and collective responsibility for helping to eliminate bias and discrimination and for increasing our own understanding of these issues through education, training, and interaction with others.
- We pledge our collective commitment to these principles in the spirit of the Virginia Tech motto of Ut Prosim (That I May Serve).

Honor policy

As do all courses, this course subscribes to the Virginia Tech Honor Code. It is your responsibility to know the code. Each assignment must be your work alone unless it has been explicitly designated as a group project. In fact, work submitted should be original for this course, not a topic recycled from a prior course or previous use. We will turn cases over to the Honor Court if we have strong evidence of copying, plagiarism, or any other violation of the code.

Students with disabilities

If you have a physical, sensory learning, or psychological disability and require accommodations, please let me know as soon as possible. You will need to register with, and provide documentation of your disability to, Services for Students with Disabilities at <http://www.ssd.vt.edu/>.

***Please note that changes to the schedule may occur due to scheduling conflicts or requests to cover a given procedure/design.

Virginia Tech Wellness Principles: If you are exhibiting even very slight signs of illness, you must not attend class in person. Notify me by email and follow the instructions posted at <https://vt.edu/ready/health.html>. Faculty and students are required to use masks in instructional and public spaces. Anyone not in compliance with university mask mandates will be 1) asked to be compliant or 2) asked to leave class. Continued escalation of insubordination could potentially result in class cancelation or involvement of authorities. This is to protect both the student and fellow classmates.

Copyright

All materials provided in this course are limited to use by those Virginia Tech students who are enrolled in this course for the current semester. As a student enrolled in this course, you are expressly prohibited from using these materials outside of the course without the instructor's specific consent. "Materials" includes all lectures, handouts, presentation slides, quizzes, tests, homework, and any other assignments and assessments as well as all information provided on Canvas for this course. Using the materials outside of this course includes, but is not limited to, selling the information to any organization that then makes the information available to other students for study guides.