

# AN SC 485 ANIMAL GENETICS AND BREEDING

Winter 2026

College of Natural and Applied Sciences • Faculty of Agricultural, Life & Environmental Sciences • Department of Agricultural, Food & Nutritional Science • University of Alberta

## Course at a Glance

<b>Instructors</b>	Dr. Paul Stothard (stothard@ualberta.ca, 2-31 GSB) Dr. Chinyere Ekine-Dzivenu (ekine@ualberta.ca, 2-31 GSB)
<b>Lab TA</b>	Sonja Allen (smallen@ualberta.ca, 2-21 GSB)
<b>Office Hours</b>	By appointment (send email)
<b>Lectures</b>	Mon, Wed, Fri, 13:00-13:50 in GSB 8-59
<b>Lab</b>	Fri, 14:00-15:50 in GSB 8-66 (see schedule for dates)
<b>Prerequisites</b>	AN SC 384 (waiver requests: contact ALES USSO)
<b>Course Site</b>	Canvas (assignments, readings, announcements)

**Calendar Description:** *Application of genetic/genomic principles and methods to the improvement of livestock and poultry.*

**Lab Format:** The lab period is a scheduled time for students to work on assignments and data analysis exercises using R. Typically there is no in-person meeting; you work independently with instructor/TA support available. When an in-person lab is required, you will be notified in advance.

## Recommended Texts:

- *Understanding Animal Breeding*, 2nd ed., by Richard Bourdon
- *R for Data Science* by Wickham & Grolemund (free online: <https://r4ds.hadley.nz>)

**Recorded Lectures:** Some lectures may be pre-recorded due to instructor travel; advance notice will be provided.

## Learning Outcomes

Upon successful completion of this course, students will be able to:

- Develop and apply reproducible data analysis workflows for animal breeding datasets using R to analyze phenotype, pedigree, and genotype data.
- Identify and interpret systematic non-genetic sources of variation affecting animal performance and explain how these factors are accounted for in animal breeding analyses.
- Compare animal evaluation and ranking approaches based on different information sources, including raw performance records, environmentally adjusted records, pedigree relationships, progeny information, and genotype data, and explain the limitations of each.
- Describe the principles of genetic evaluation and predict the genetic merit of breeding stocks using pedigree/phenotype/DNA marker data for quantitative traits.
- Make genetic selection decisions based on single/multiple traits and predict and monitor genetic improvement rates.

- Apply knowledge of non-additive genetic influence on performance traits to develop strategies to maximize animal performance.

### Course Overview

Students will develop practical skills in the analysis and interpretation of animal breeding data, with an emphasis on reproducible workflows and the use of phenotype, pedigree, and genotype information. Lectures and hands-on activities will focus on understanding sources of variation affecting animal performance, comparing alternative evaluation and ranking approaches, and interpreting the strengths and limitations of different data sources used in genetic evaluation. Assignments and laboratory exercises will involve analysis of realistic breeding datasets using R. Students will be evaluated through assignments, a midterm exam, and a final exam.

### Assessment & Grading

Assessment Type	Date	Marks
Assignment 1	Jan 19	5
Assignment 2	Jan 30	5
Assignment 3	Feb 23	5
Assignment 4	Mar 20	5
Assignment 5	Apr 1	10
Assignment 6	Apr 10	5
Midterm exam <sup>1</sup>	Feb 13	25
Final exam <sup>1</sup>	Apr 16	40
<b>Course Total</b>		<b>100</b>

<sup>1</sup> Exams are at 1:00 pm in GSB 8-59 (lecture room)

### Key Policies

Assignment due time	11:00 pm on the specified date (unless otherwise noted)
Late penalty	-25% per day (or portion thereof)
Submission	Upload to Canvas; if Canvas issues arise, email instructor
Exams	Closed-book, in-person in lecture room
Final exam	Not cumulative (covers post-midterm material); formula sheet provided
Calculators	Non-programmable calculators allowed for final exam
Academic misconduct	Posting/using assignment answers online is cheating; poor paraphrasing is plagiarism

### Exam and Grading Details

**Missed Midterm Exam:** A mark of zero will normally be given if a student misses the midterm examination. Whenever possible, students are expected to notify the instructor prior to

missing the exam. In some circumstances, where there is an acceptable reason for missing the midterm, the value of the midterm exam will be moved to the final exam.

**Missed Final Exam:** The University policy on deferred exams can be found in Section 23.3.2 of the University Calendar. It includes specific instructions on how to obtain a deferral. The Instructors can neither give permission to a student to miss the final exam nor grant a request for a deferred final exam. Students are encouraged to check exam schedules prior to making travel or event plans. The decision to grant a deferred final exam can only be granted by their own Faculty (e.g., ALES students go to 206 Agriculture/Forestry Centre; Science students go to 1-001 CCIS).

**Final Grade Assessment:** Final grade assessment is the responsibility of the instructors. Letter grades will be assigned only to the final distribution of aggregate raw scores. There will be no predetermined “curving” to assign final grades; instead, cut-offs for different grades will be based on real breakpoints in the overall distribution of raw marks within the class for the current academic year.

**Access to Representative Evaluative Material:** Students will be given access to representative evaluative materials through Canvas.

### **Academic Integrity and Student Conduct**

The University of Alberta is committed to the highest standards of academic integrity and honesty, as well as maintaining a learning environment that fosters the safety, security, and the inherent dignity of each member of the community, ensuring students conduct themselves accordingly. Students are expected to be familiar with the standards of academic honesty and appropriate student conduct, and to uphold the policies of the University in this respect.

Students are particularly urged to familiarize themselves with the provisions of the Student Academic Integrity Policy and the [Student Conduct Policy](#), and avoid any behaviour that could potentially result in suspicions of academic misconduct (e.g., cheating, plagiarism, misrepresentation of facts, participation in an offence) and non-academic misconduct (e.g., discrimination, harassment, physical assault). Academic and non-academic misconduct are taken very seriously and can result in suspension or expulsion from the University.

All students are expected to consult the [Academic Integrity website](#) for clarification on the various academic offences. All forms of academic dishonesty are unacceptable at the University. Unfamiliarity of the rules, procrastination or personal pressures are not acceptable excuses for committing an offence. Listen to your instructor, be a good person, ask for help when you need it, and do your own work—this will lead you toward a path to success.

Any academic integrity concern in this course will be reported to the College of Natural and Applied Sciences. Suspected cases of non-academic misconduct will be reported to the Dean of Students. The College, the Faculty, and the Dean of Students are committed to student rights and responsibilities, and adhere to due process and administrative fairness, as outlined in the [Student Academic Integrity Policy](#) and the [Student Conduct Policy](#).

The College of Natural and Applied Sciences (CNAS) has created an [Academic Integrity for CNAS Students](#) Canvas site. Students can self enroll and review the various resources provided, including the importance of academic integrity, examples of academic misconduct & possible sanctions, and the academic misconduct & appeal process.

*“Integrity is doing the right thing, even when no one is watching.” – C.S. Lewis*

**Additional Information**

Policy about course outlines can be found in Course Requirements, Evaluation Procedures and Grading of the University Calendar.

Audio or video recording, digital or otherwise, of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan. Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the content author(s).