



**University of Manitoba  
Faculty of Agricultural and Food Sciences  
Department of Animal Science**



**ANSC 3500 PRINCIPLES OF ANIMAL BREEDING**

**Winter 2024**



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**COURSE DETAILS**

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<b>Course Title &amp; Number:</b>	ANSC 3500 Principles of Animal Genetics
<b>Number of Credit Hours:</b>	3.0
<b>Class Times &amp; Days of Week:</b>	9:30 – 10:20 on Monday, Wednesday, and Friday
<b>Location for classes</b>	220 Animal Science
<b>Prerequisites:</b>	PLNT 2520 (or 039.252)

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**Instructor Contact Information**

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<b>Instructor(s) Name:</b>	G. N. Gozho
<b>Office Location:</b>	226 Animal Science Building
<b>Office Hours or Availability:</b>	Open door policy – no necessary appointment e-mail so we can set up a telephone call if you want to discuss anything about the course. Feel free to e-mail any time – I will reply within 48 hours during the week. My calendar is publicly available with all the times that I will be in class.
<b>Office Phone No.</b>	204-474-9443
<b>E- mail:</b>	<a href="mailto:George.gozho@umanitoba.ca">George.gozho@umanitoba.ca</a>  All e-mail communication must conform to the <a href="#">Communicating with Students</a> university policy. (Please familiarize yourself with the policy). Use the subject line to state the reason for your e-mail and add the course number. This will help me to determine which e-mails need urgent attention. I do not check my work e-mail over the weekend.
<b>Contact:</b>	In-person or via e-mail

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## Course Description

Formerly 035.350) Topics discussed will include population genetics, quantitative genetics, selection of breeding animals based on qualitative and quantitative traits, and mating systems with particular reference to domestic species.

This course describes population and quantitative genetics principles, and it fits between the first genetics course and advanced applied genetics course or other species-oriented production courses. This course aims to attract students interested in agricultural animals, but students interested in natural populations and genetics in general can benefit from taking the course.

The Prerequisite for this course is PLNT 2520, an introductory genetics course offered through the Department of Plant Science. Familiarity with genetic fundamental principles is essential since these we intend to build upon such basics in the present course. Though not stated in the paper calendar, another equivalent prerequisite is BOTN 2460, and students often take this course from the Faculty of Science.

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## General Course Information

Modern farm animals are managed as populations. Therefore, knowledge of the behaviour of genes in populations is important. The forces that affect gene frequencies and their relative importance in creating changes in gene frequencies are discussed. In farm animals, economically important traits are determined by genes located at one or a few loci (qualitative traits); or genes located on several loci (quantitative traits). Examples of both these types of traits will be discussed. This course also explores recent advances in genomic mapping in mammals and the biochemical mechanisms of specific genes that lead to particular phenotypes' manifestations for some qualitative traits. Additionally, the interaction between genes and the environment on some traits is also explored. The management of animal populations and the forces that affect gene frequencies will be discussed. Tools for selecting superior animals for economically important traits are discussed.

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## Course Goals

The goals of the courses are:

- a) To convey principles of population and quantitative genetics, incorporating recent knowledge in the area of DNA markers and maps.
- b) To give students a basic understanding of modern techniques of genetic evaluation of farm animals, and how genetic differences between individual animals as well as breed differences are utilized to improve animal characteristics in modern production systems.

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## Intended Learning Outcomes

At the end of the course, students will be able to:

- a) Gain a clear understanding of the principles of animal genetics and modern techniques of genetic evaluation.
- b) Apply genetic principles and techniques to improve the economic value and performance of farm animals.
- c) Critically analyze and apply some of the animal improvement tools that are used, notwithstanding their limitations.
- d) Evaluate commonly used animal breeding programs and practices, and enunciate their relevance, using the correct animal breeding terminology.

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### Using Copyrighted Material

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Please respect copyright. The content used in this course is appropriately acknowledged and is copied in accordance with copyright laws and university guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission.

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### Recording Class Lectures

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Lectures **will not** be recorded and posted to UMLearn but 'PowerPoint slides will be uploaded to UMLearn.

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### Textbook, Readings, Materials

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#### Recommended Reference Materials

1. **Bourdon, Richard, M. 2000.** Understanding Animal Breeding, 2<sup>nd</sup> ed. Prentice-Hall. {SF 105 B67 2000}
2. **Nicholas, F.W. 2000.** Introduction to Veterinary Genetics, Oxford Univ Press. {SF 756.5 N52 2000}
3. **Van Vleck, L.D., E.J. Pollak and E.A.B. Oltenacu. 1987.** Genetics for the animal sciences. W.H. Freeman and Company. {QH 432 V36 1987}

#### Online resource

1. **Online Mendelian Inheritance in Animals.** This Australian site contains descriptions of an ever-growing database of referenced inherited characteristics of animals, which can be browsed by species, inherited disorder, or other keywords.

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### Course Technology

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Lecture notes will be posted on UMLearn. Assignments will be posted on UMLearn, and students must complete and upload an electronic copy to the assignment folder on UMLearn.

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### Class Communication

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The University requires all students to activate an official University e-mail account. For full details of Electronic Communication with Students, please visit:  
[http://umanitoba.ca/admin/governance/media/Electronic\\_Communication\\_with\\_Students\\_Policy\\_-\\_2014\\_06\\_05.pdf](http://umanitoba.ca/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf)

Please note that all communication between you and myself must comply with the electronic communication with student policy:  
([http://umanitoba.ca/admin/governance/governing\\_documents/community/electronic\\_communication\\_with\\_students\\_policy.html](http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html)). You are required to obtain and use your U of M e-mail account for all communication between yourself and the University.

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### Expectations: I Expect You To

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- a) Attend class on time.
- b) Ask for help.
- c) Work together on assignment problems other than exams (but prepare your individual answers independently)
- d) To have the prerequisite background i.e., basic genetics as well as basic knowledge of Excel spreadsheet functions and also basic knowledge of statistics.
- e) To act in a civil, respectful, and responsible manner toward all members of the U of M community

#### **Academic Integrity:**

Plagiarism or any other form of cheating in the final examination, term tests or academic work is subject to serious academic penalty. Cheating in examinations or tests may take the form of copying from another student or bring unauthorized materials into the exam room. Exam cheating can also include exam impersonation. A student found guilty of cheating in examinations or term assignments is also subject to a serious academic penalty. Students should acquaint themselves with the University's policy on plagiarism, cheating, exam impersonation and duplicate submission in the online calendar:

<https://catalog.umanitoba.ca/undergraduate-studies/general-academic-regulations/#text>

For assignment work, students are encouraged to work in groups on problems – the purpose of assignments is to understand the material. The completed assignment work that students pass for grading must be in their own words. If the Internet or published material is used in preparing such work, they must be appropriately referenced.

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### Students Accessibility Services

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#### **Student Accessibility Services**

If you are a student with a disability, please contact SAS for academic accommodation support and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

*Student Accessibility Services* <http://umanitoba.ca/student/saa/accessibility/>

520 University Centre

204 474 7423

[Student\\_accessibility@umanitoba.ca](mailto:Student_accessibility@umanitoba.ca)

### **Expectations: You Can Expect Me To**

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- a) Attend and deliver lectures on time.

A large part of my teaching practice includes the use of PowerPoint presentations in class.

- b) Help you to understand the content and subject matter related to this course.

I expect students to either interrupt me or come and see me immediately after the lecture if there is anything that is not clear. I will help you as much as I can to succeed in this course.

### **Class Schedule**

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This schedule is subject to change at the discretion of the instructor and/or based on the learning needs of the students, but such changes are subject to Section 2.8 of the – [ROASS](#)- Procedure.

#	TOPIC	
0	Introduction to the course	
1	A Brief Overview of Domestication	
2	Common Breeds of Livestock	
3	Systems Approach to Genetic Improvement	Assignment 1
4	An Overview of Animal Breeding	
5	Mendelian Inheritance	Assignment 2
6	Genes in Populations	
	<b>Test 1 Friday February 9, 2024</b>	
7	Selection For Simply Inherited Traits	
8	Factors Influencing the Effectiveness of Selection	Assignment 3
9	Genetic Differences in Animals	
10	Genetic Model For Quantitative Traits	
11	Statistics and Their Application to Quantitative Genetics	Assignment 4
	<b>Term Test 2 Wednesday, March 15, 2024</b>	
12	Heritability and Repeatability	
13	Quantitative Genetics – Predicting Breeding Values	Assignment 5
14	Genomic Breeding Values	
15	Selection Based on Quantitative Traits	Assignment 6/ Practice Questions

### **Course Evaluation Methods**

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Students will be assessed using term tests, assignments, and final examinations. Tests will be made up of multiple-choice, fill in blanks or short-answer questions

#### **Missed Exams**

A missed test or assignment deadline will receive a zero score if proper procedures are not followed. Please familiarize yourself with the 'Self-Declaration for Brief or Temporary Student Absences' policy, procedures, and form found here:

[Self-Declaration for Brief or Temporary Students Absences](#)

Re-tests or late submission of assignment may not always be feasible. In such situations, I will suggest one or two solutions to you.

Assessment Tool	Value of Final Grade
Midterm test 1	20%
Midterm test 2	20%
Attendance (iClicker)	5%
Assignments	15%
Final Examination	40%

For class attendance, students will be evaluated based on whether they attend class or are absent. Attendance will be taken using iClickers.

Attendance will be based on the number of lectures attended using the following:

25 – 30 = 100% attendance → 5%

20 – 24 = 75% attendance → 3.75%

15 – 19 = 50% attendance → 2.5%

9 – 14 = 25% attendance → 1.25%

### Grading

Indicate your grading scale. A sample is given below that you can adjust to your course expectations.

Letter Grade	Percentage out of 100	Grade Point Range	Final Grade Point
A+	92-100	4.25-4.5	4.5
A	84-91	3.75-4.24	4.0
B+	77-83	3.25-3.74	3.5
B	70-76	2.75-3.24	3.0
C+	65-69	2.25-2.74	2.5
C	60-64	2.0-2.24	2.0
D	50-59	Less than 2.0	1.0
F	Less than 50		0

### Assignment Descriptions

Assignments will be short exercises that may include simple calculations to reinforce concepts covered in lectures. About 5 assignments will be given during the course.

### Assignment Due Dates

Assignments are passed out when we complete or near the end of the relevant section and, the due dates are assigned and stated on each assignment.

### Assignment Grading Times

Assignments must be uploaded to the appropriate assignment folder before the deadline. If you are unable to complete the assignment on time, let me know in advance if possible.

### Assignment Extension and Late Submission Policy

#### Late Assignments

All students are encouraged to complete all assignments because they contribute to the final grade. Late assignments will be graded if an extension has been sought and been granted. Otherwise, failure to communicate with me will be deemed to mean you do not intend to complete the assignment.