



ANSC*6370 - Quantitative Genetics and Animal Models

Fall 2026 Course Outline

Section: 01

Credits: 0.50

Land Acknowledgement: Guelph

The University of Guelph resides on the ancestral lands of the Attawandaron people and the treaty lands and territory of the Mississaugas of the Credit. We recognize the significance of the Dish with One Spoon Covenant to this land and offer respect to our Anishinaabe, Haudenosaunee and Métis neighbours. Today, this gathering place is home to many First Nations, Inuit, and Métis peoples and acknowledging them reminds us of our important connection to this land where we work and learn.

Calendar Description

The course covers quantitative genetics theory associated with animal models; linear models applied to genetic evaluation of animals; estimation of genetic parameters for animal models; and computing algorithms for large datasets.

Department(s): Department of Animal Biosciences

Lecture Schedule

TuTh 1pm-2:20pm in ANNU*030 (9/10 to 12/22)

Instructor Information

Flavio Schenkel

Email: schenkel@uoguelph.ca

Additional Support

Office hours: Thursdays from 2:30-3:30 pm in room ANNU 121.

Learning Resources

Required Resources

All lectures slides and assignments are posted on the course website: Course link (<https://courselink.uoguelph.ca/>)

Course Resources

Course notes by Dr. Lawrence Schaeffer (Animal Models and Variance Component Estimation) will be used during the semester, which will be available in the course's web-page.

Students are advised to take their own notes during lectures.

Extra pertinent information, such as papers, chapters of books, etc. will be accordingly recommended.

Campus Resources

If you are concerned about any aspect of your academic program: Make an appointment with a Program Counsellor (<https://www.uoguelph.ca/uaic/programcounsellors>) in your degree program. If you are struggling to succeed academically: There are numerous academic resources offered by the Learning Commons (<https://www.lib.uoguelph.ca/using-library/spaces/learning-commons>) including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills.



Cost of Textbooks and Learning Resources

Textbook / Learning Resource	Required / Recommended	Cost
There are no costs for notes, textbooks and learning resources used in this course.	NA	NA

Students are advised that prices are often determined by the publisher or bookstore and may be subject to change.

Course Learning Outcomes

1. Understand basic concepts of quantitative genetics and basic matrix algebra notation and operations
2. Integrate quantitative genetics and linear model methodology to genetically evaluate livestock
3. Accurately and effectively communicate scientific analyses in written form
4. Perform and understand data analyses using linear models in livestock
5. Appreciate differences among alternate statistical models
6. Discuss the relative merits of linear models used for estimation of genetic values and genetic parameters
7. Have a proficient command terminology common in quantitative genetics and breeding values prediction
8. Integrate knowledge of quantitative genetics and linear models to estimate covariance components and genetic parameters

Schedule of Topics and Assignments

Day	Date	Topic	Activities	Due
Thu	9/10	Lecture		
Tue	9/15	Lecture		
Thu	9/17	Lecture Assignment 1	Basic concepts in quantitative genetics	9/29
Tue	9/22	Lecture		
Thu	9/24	Lecture		
Tue	9/29	Lecture Assignment 2	Basic concepts in matrix algebra	08/2
Thu	10/1	Lecture		
Tue	10/6	Lecture		
Thu	10/8	Lecture Assignment 3 Lecture	Linear model writing and hypothesis tests	10/20
Tue	10/13	Fall Study Break		
Thu	10/15	Lecture		
Tue	10/20	Lecture Assignment 4	Mixed model equations	10/27
Thu	10/22	Lecture		
Tue	10/27	Lecture Assignment 5	Relationship matrix and its inverse and mixed model equations with genetic groups	11/05
Thu	10/29	Midterm	In class midterm exam	
Tue	11/3	Lecture		
Thu	11/5	Lecture Assignment 6	Individual animal model and reduced individual animal model	11/12
Tue	11/10	Lecture		
Thu	11/12	Lecture Assignment 7	Repeatability animal model and maternal effect animal model	11/19
Tue	11/17	Lecture		



Thu	11/19	Lecture Assignment 8	Multiple trait model with missing records	11/26
Tue	11/24	Lecture		
Thu	11/26	Lecture Assignment 9	Random regression animal models	12/03
Tue	12/1	Lecture		
Thu	12/3	Lecture Final exam	Take-home final exam	12/17
Thu	12/17	Final Exam due date		

Assessment Breakdown

Description	Weighting (%)	Due Date
Assignments	33.3%	Several dates
Midterm	33.3%	29/10
Final	33.3%	17/12

Assessment Details

Assignment

Assignment 1 3.7

Course Learning Outcomes Assessed: 1

Assignment 2 3.7

Course Learning Outcomes Assessed: 1

Assignment 3 3.7

Course Learning Outcomes Assessed: 1, 2, 3

Assignment 4 3.7

Course Learning Outcomes Assessed: 1, 2, 3, 4

Assignment 5 3.7

Course Learning Outcomes Assessed: 1, 2, 3, 4

Assignment 6 3.7

Course Learning Outcomes Assessed: 1, 2, 3, 4, 5

Assignment 7 3.7

Course Learning Outcomes Assessed: 1, 2, 3, 4, 5, 6

Assignment 8 3.7

Course Learning Outcomes Assessed: 1, 2, 3, 4, 5, 6, 7

Assignment 9 3.8

Course Learning Outcomes Assessed: 1, 2, 3, 4, 5, 6, 7, 8

Midterm

Midterm 33.3

Course Learning Outcomes Assessed: 1, 2, 3, 4

Exam

Final exam 33.3

Course Learning Outcomes Assessed: 1, 2, 3, 4, 5, 6, 7, 8

Grading Schemes

The final grade will be based on the 9 Assignments, the Midterm Exam and the Final Exam.

The 9 assignments during the semester will have a percentage weight of 33.3% (3.67% each) of the final grade and the midterm exam and the final exam will have a percentage weight of 33.3% each.

Last Day to Drop Course

The final day to drop Fall 2026 courses without academic penalty is the last day of classes: December 04

After this date, a mark will be recorded, whether course work is completed or not (a zero is assigned for missed tests/assignments). This mark will show on the student's transcript and will be calculated into their average.

Course Grading Policies

Submission of Assignments

All the Assignments (including the Final Exam) must be submitted by 5:30 pm of the due date.

Late Assignment

Late assignments will be penalized as follow:

- 1 day late – 25% penalty (i.e. discount) applied to the obtained grade
- 2 days late – 50% penalty applied to the obtained grade
- 3 days late – 75% penalty applied to the obtained grade
- >3 days late – 100% penalty applied to the obtained grade

Course Standard Statements

Course Policies

Course Policy regarding use of electronic devices and recording of lectures

Electronic recording of classes is expressly forbidden without consent of the instructor. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor.

Netiquette Expectations

The course website is considered the classroom and the same protections, expectations, guidelines, and regulations used in face-to-face settings apply. Inappropriate behaviour will not be tolerated. Examples of inappropriate online behaviour include:

- Posting inflammatory messages about your instructor or fellow students;
- Using offensive language;
- Copying or presenting someone else's work as your own;
- Adapting information from the Internet without using proper citations or references;
- Buying or selling term papers or assignments;
- Posting or selling course materials to course notes websites;
- Having someone else complete your quiz or completing a quiz for/with another student;
- Stating false claims about lost quiz answers or other assignment submissions;
- Threatening or harassing a student or instructor;
- Discriminating against fellow students, instructors, and/or TAs;
- Using the course website to promote profit-driven products or services;
- Attempting to compromise the security or functionality of the learning management system; and
- Sharing your username and password.

Course Technology Requirements

System and Software Requirements

This course will use the following technology:

- CourseLink (main classroom)

To help ensure you have the best learning experience possible, please review the list of system and software requirements.

<https://opened.uoguelph.ca/student-resources/system-and-software-requirements>

CourseLink System Requirements



You are responsible for ensuring that your computer system meets the necessary system requirements. Use the browser check tool to ensure your browser settings are compatible and up to date. (Results will be displayed in a new browser window).

<http://spaces.uoguelph.ca/ed/system-requirements/>

<https://courselink.uoguelph.ca/d2l/systemCheck>

CourseLink

This course is being offered using CourseLink (powered by D2L's Brightspace), the University of Guelph's online learning management system (LMS). By using this service, you agree to comply with the University of Guelph's Access and Privacy Guidelines. Please visit the D2L website to review the Brightspace privacy statement and Brightspace Learning Environment web accessibility standards.

<http://www.uoguelph.ca/web/privacy/> <https://www.d2l.com/legal/privacy/> <https://www.d2l.com/accessibility/standards/>

Technical Support

If you need any assistance with the software tools or the CourseLink website, contact CourseLink Support.

Email: courselink@uoguelph.ca

Tel: 519-824-4120 ext. 56939 Toll-Free (CAN/USA): 1-866-275-1478

Support Hours (Eastern Time):

Monday thru Friday: 8:30 am–8:30 pm

Saturday: 10:00 am–4:00 pm

Sunday: 12:00 pm–6:00 pm

Technical skills

As part of your learning experience, you are expected to use a variety of technologies for assignments, lectures, teamwork, and meetings. In order to be successful in this course you will need to have the following technical skills:

- Manage files and folders on your computer (e.g., save, name, copy, backup, rename, delete, and check properties);
- Install software, security, and virus protection;
- Use office applications (e.g., Word, PowerPoint, Excel, or similar) to create documents;
- Be comfortable uploading and downloading saved files;
- Communicate using email (e.g., create, receive, reply, print, send, download, and open attachments);
- Navigate the CourseLink learning environment and use the essential tools, such as Dropbox, Quizzes, Discussions, and Grades
- Submit all assignments and final exam in PDF format
- Access, navigate, and search the Internet using a web browser (e.g., Firefox, Internet Explorer); and
- Perform online research using various search engines (e.g., Google) and library databases.
- Learn to login on to Linux servers and use basic Linux commands.

Dropbox Submissions

Assignments should be submitted electronically via the online Dropbox tool. When submitting your assignments using the Dropbox tool, do not leave the page until your assignment has successfully uploaded. To verify that your submission was complete, you can view the submission history immediately after the upload to see which files uploaded successfully. The system will also email you a receipt. Save this email receipt as proof of submission.

Be sure to keep a back-up copy of all of your assignments in the event that they are lost in transition. In order to avoid any last-minute computer problems, your instructor strongly recommend you save your assignments to a cloud-based file storage (e.g., OneDrive), or send to your email account, so that should something happen to your computer, the assignment could still be submitted on time or re-submitted.

It is your responsibility to submit your assignments on time as specified on the Schedule. Be sure to check the technical requirements and make sure you have the proper computer, that you have a supported browser, and that you have reliable Internet access. Remember that technical difficulty is not an excuse not to turn in your assignment on time. Don't wait until the last minute as you may get behind in your work.

If, for some reason, you have a technical difficulty when submitting your assignment electronically, please contact your instructor or CourseLink Support. <http://spaces.uoguelph.ca/ed/contact-us/>

Standard Statements for Graduate Courses

Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.



Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/academic-misconduct/>) is outlined in the Graduate Calendar.

Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Use of the SAS Exam Centre requires students to make a booking at least 10 business days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). For students at the Guelph campus, information can be found on the SAS website. (<https://www.uoguelph.ca/sas>)

Accommodation of Religious Obligations

If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements.

See the Academic calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/academic-accommodation-religious-obligations/>)

Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Drop Date

Courses that are one semester long must be dropped by the end of the last day of classes; two-semester courses must be dropped by the last day of classes in the second semester. The regulations and procedures for Dropping Courses (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/registration/>) dropping courses are available in the Graduate Calendar (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/registration/>).

Email Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

Health and Wellbeing

The University of Guelph provides a wide range of health and wellbeing services at the Vaccarino Centre for Student Wellness (<https://wellness.uoguelph.ca/>). If you are concerned about your mental health and not sure where to start, connect with a Student Wellness Navigator (<https://wellness.uoguelph.ca/navigators>) who can help develop a plan to manage and support your mental health or check out our mental wellbeing resources. (<https://wellness.uoguelph.ca/shine-this-year>) The Student Wellness team are here to help and welcome the opportunity to connect with you.

Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

Recording of Materials

Presentations that are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The Academic Calendars (<http://www.uoguelph.ca/registrar/calendars/?index>) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the Graduate Calendar for information



on regulations and procedures for Academic Consideration (<https://calendar.uoguelph.ca/graduate-calendar/general-regulations/grounds-academic-consideration/>).