



# **ANSC\*6390 QTL and Markers**

Winter 2020

Section(s): C01

Department of Animal Biosciences

Credit Weight: 0.50

Version 1.00 - December 10, 2019

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## **1 Course Details**

### **1.1 Calendar Description**

Advanced training in QTL mapping and selection assisted by genetic markers.

### **1.2 Course Description**

This graduate course is intended to teach statistical models and methods used in the detection of Quantitative Trait Loci (QTL) and selection assisted by genetic markers in livestock.

### **1.3 Timetable**

Mondays and Wednesdays from 1:00 to 2:20 pm. ANNU building, Room 030

### **1.4 Final Exam**

The final exam is a take home assignment. It will be released on April 8 at 1:00 pm and will be due on April 22 by 5:30 pm.

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## **2 Instructional Support**

### **2.1 Instructional Support Team**

**Instructor:**

Flavio Schenkel

**Email:**

schenkel@uoguelph.ca

**Telephone:** +1-519-824-4120 x58650  
**Office:** ANNU 121  
**Office Hours:** Wednesdays from 3:00-4:00 pm

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## 3 Learning Resources

### 3.1 Additional Resources

#### Other Resources (Other)

Course notes from Dr. Ben Hayes (“Gene detection and marker assisted selection: Putting the theory into practice”) and Dr. Lawrence Schaeffer (“ANSC\*6390 Quantitative Genetics”) will be used during the course (both available in the course’s webpage).

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

Students are advised to take their own notes during lectures.

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## 4 Learning Outcomes

### 4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Integrate quantitative genetics, genetic markers and statistics to detect and map QTL and hunt for candidate genes.
  2. Perform and understand data analyses for detecting and mapping QTL in livestock.
  3. Appreciate differences among mapping designs and mapping methods.
  4. Integrate knowledge of quantitative genetics and mapping techniques and evaluate how the results from these techniques are applied to breeding programs.
  5. Discuss the relative merits of methods and designs used for mapping QTL.
  6. Optimize QTL detection and mapping to maximize power and genetic variance accounted for the genetic markers.
  7. Accurately and effectively communicate scientific analyses in written form.
  8. Have a proficient command terminology common in QTL mapping, selection assisted by genetic markers and genomics.
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## 5 Teaching and Learning Activities

### 5.1 Lecture

**Topics:** Course Content

This graduate course will teach statistical models and methods used in the detection of Quantitative Trait Loci (QTL) and selection assisted by genetic markers in livestock. By the end of the course, a student will be able to use quantitative genetics, genetic marker information, and statistics to map QTL and describe factors that affect mapping and how QTL can be exploited in selection assisted by genetic markers.

**Topics:** Lecture Content

Block 1

Review of Mendelian, Population, and Quantitative Genetics. Foundations of linkage mapping.

Block 2

Different designs of linkage mapping experiments.

Block 3

Linkage and linkage disequilibrium (LD) mapping.

Block 4

Bioinformatics tools to hunt for causative mutations.

Block 5

Selection assisted by linked, LD and direct markers, and genomic selection.

## 6 Assessments

### 6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Assignment 1	3.7
Assignment 2	3.7
Assignment 3	3.7
Assignment 4	3.7
Assignment 5	3.7

Name	Scheme A (%)
Assignment 6	3.7
Assignment 7	3.7
Assignment 8	3.7
Assignment 9	3.7
Midterm Exam	33.35
Final Exam	33.35
Total	100

## 6.2 Assessment Details

### Assignment 1 (3.7%)

Due: Jan 29

Learning Outcome: 1

### Assignment 2 (3.7%)

Due: Feb 5

Learning Outcome: 1

### Assignment 3 (3.7%)

Due: Feb 12

Learning Outcome: 1

### Assignment 4 (3.7%)

Due: March 4

Learning Outcome: 1, 2

### Assignment 5 (3.7%)

Due: Mar 11

Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8

### Assignment 6 (3.7%)

Due: Mar 18

Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8

### Assignment 7 (3.7%)

Due: Mar 25

Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8

### Assignment 8 (3.7%)

Due: April 1

Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8

### Assignment 9 (3.7%)

Date: April 8

Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8

**Midterm Exam (33.35%)**

**Date:** Sun, Feb 24, 1:00 PM - , 2:20 PM, ANNU 030

The midterm is a closed book, in class, exam

**Final Exam (33.35%)**

**Date:** It will be released on April 8 at 1:00 pm and will be due on April 22 by 5:30 pm.

The final exam is a take home assignment.

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## 7 Course Statements

### 7.1 Grading Policies

All assignments (including the take home final exam) must be submitted by 5:30 pm of the due date. Late assignments will be penalized as follows:

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

## 8 University Statements

### 8.1 Email Communication

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

### 8.2 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. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions

<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

### 8.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The

deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

## 8.4 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.

## 8.5 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.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website

<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website

<https://www.ridgetownc.com/services/accessibilityservices.cfm>

## 8.6 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 encourages academic integrity. 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.

Undergraduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

## 8.7 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.

## 8.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars

<https://www.uoguelph.ca/academics/calendars>

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