



# MBG\*2400 Fundamentals of Plant and Animal Genetics

Fall 2020  
Section(s): C01

Department of Animal Biosciences  
Credit Weight: 0.50  
Version 1.00 - September 23, 2020

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## 1 Course Details

### 1.1 Calendar Description

Fundamental aspects of plant and animal genetics are covered in this course including the chromosomal basis of inheritance, natural and artificial selection, domestication, epigenetics and quantitative traits. Population dynamics and the effect of selection on allele frequencies will be introduced with examples from agricultural crop and animal species and companion animal species. Genomics will be introduced with an emphasis on the development and use of molecular genetic markers in marker assisted selection.

**Pre-Requisites:** (BIOL\*1050 or BIOL\*1070), BIOL\*1090

### 1.2 Course Description

Fundamental aspects of plant and animal genetics are covered in this course to provide a solid foundation for future courses in plant or animal genetics. This course reviews and covers the chromosomal basis of inheritance, natural and artificial selection, domestication, epigenetics, qualitative and quantitative traits. This course introduces population dynamics and the effect of selection on qualitative and quantitative traits with examples from agricultural crop and animal species and companion animal species. Genomics will be introduced with an emphasis on the development and use of molecular genetic markers in marker-assisted selection. This course includes a hands-on lab to reinforce lecture material and provide real examples of the concepts introduced in class. By the end of the course, you will have been introduced to everything from Mendel to modern molecular genetics.

### 1.3 Timetable

Classes are Monday / Wednesday / Friday from 11:30am to 12:20pm online. Links to class events can be found in the "Content" section of the Courselink site. Labs meet online as well and your TA will provide information for how you are to access the lab sessions. See the list of lab sections below for the details on the lab schedule.

## 1.4 Final Exam

Monday December 7, 2020 from 2:30pm-4:30pm, online. See Courselink for access details.

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## 2 Instructional Support

This course is team taught by three instructors, two from Plant Agriculture - Drs. Wolyn and Lee - and one from Animal Biosciences - Dr. Robinson - in that order. Drs. Wolyn and Lee with split the first half of the course teaching about 1/4 each while Dr. Andy Robinson will teach the second half of the course. Dr. Andy Robinson is also the course coordinator from Animal Biosciences. Contact Andy via the course email, [mbg2400@uoguelph.ca](mailto:mbg2400@uoguelph.ca), for all concerns regarding scheduling, academic consideration and grade inquiries.

### 2.1 Instructional Support Team

**Instructor:** Andy Robinson  
**Email:** [mbg2400@uoguelph.ca](mailto:mbg2400@uoguelph.ca)  
**Telephone:** +1-519-824-4120 x53679  
**Office:** ANNU 122  
**Office Hours:** See CourseLink or by appointment  
 Andy is the course coordinator so any emails about academic consideration, scheduling, grades etc should be sent to Andy

**Instructor:** Elizabeth Lee  
**Email:** [lizlee@uoguelph.ca](mailto:lizlee@uoguelph.ca)  
**Telephone:** +1-519-824-4120 x53360  
**Office:** CRSC 223/225  
**Office Hours:** By appointment

**Instructor:** David Wolyn  
**Email:** [dwolyn@uoguelph.ca](mailto:dwolyn@uoguelph.ca)  
**Telephone:** +1-519-824-4120 x53092  
**Office:** ECBA 4236

### 2.2 Teaching Assistants

**Teaching Assistant:** Alexandra Ficht  
**Email:** [ficht@uoguelph.ca](mailto:ficht@uoguelph.ca)  
 Sections 0101 and 0110

**Teaching Assistant:** Ryley Vanderhout  
**Email:** [rvande02@uoguelph.ca](mailto:rvande02@uoguelph.ca)  
 Sections 0103 and 0109

**Teaching Assistant:** Nicholas Werry  
**Email:** [nwerry@uoguelph.ca](mailto:nwerry@uoguelph.ca)  
 Help TA - weekly help sessions

**Teaching Assistant:** Emma Hyland  
**Email:** [ehyland@uoguelph.ca](mailto:ehyland@uoguelph.ca)

Sections 0104 and 0106

**Teaching Assistant:** Ashley Skillings  
**Email:** skillina@uoguelph.ca

Sections 0102 and 0108

**Teaching Assistant:** Sierra Schaus  
**Email:** sschaus@uoguelph.ca

Sections 0105 and 0107

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## 3 Learning Resources

### 3.1 Required Resources

#### None (Textbook)

There is no required textbook for this course any longer. In past years we used:

“Genetic Analysis – An Integrated Approach” 2nd Custom Edition by Saunders and Bowman

(ISBN 978-1-323-47021-3)

You may be able to find copies of this book on the used market if you would really like to have a textbook that pertains to the course.

### 3.2 Other Resources

Please note that different versions of the textbook are available in hardcover or softcover and including or excluding the online learning material provided by the publisher. If you are interested in additional practice material, you have the option of the online learning material or there is also a Student Handbook and Solutions manual available. None of the additional material is required but if you feel it will help your learning, it is available.

Extensive use is made of Courselink. Check Courselink for the individual schedule and deadlines for the lab activities for your section since each lab section meets at different times and therefore will have different schedules and deadlines.

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## 4 Learning Outcomes

### 4.1 Course Learning Outcomes

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

1. Demonstrate an ability to model the transmission of qualitative and quantitative variation in plant and animal phenotypes.

2. Demonstrate an understanding of methods of genetic analysis for plants and animals.
  3. Demonstrate the ability to synthesize the current state of knowledge regarding the mechanisms of genetic variation in plants and animals.
  4. Demonstrate an ability to model the transmission of qualitative and quantitative variation in plant and animal phenotypes.
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## 5 Teaching and Learning Activities

### Lectures:

Class content information will be posted on CourseLink throughout the semester. The proposed topics covered throughout the semester are presented below. Note that this list is a proposed list of topics provided as a guide and actual lecture content may vary due to class pace through the material, instructor preference, coordinating with lab scheduling and unforeseen circumstances relating to the ongoing Covid-19 pandemic.

### Labs:

Labs are two hours each week per section. There are nine lab activities throughout the semester, the first for one week and labs 2-5 each one spanning two weeks. The first lab activity is an Excel tutorial to brush up on your Excel skills to help you with labs 2-5. For Labs 2-5, the first week is devoted to an activity that will generate data or information required for the second week where the data will be analyzed. Details of the activities, requirements and deadlines for each lab assignment are posted on CourseLink. Please note that you must attend the lab section for which you are scheduled, the number of students is balanced across the lab sections as evenly as possible to make the online learning and facilitation work as well as possible. Students who attempt to switch lab sections will be refused access to the online session for any lab other than their scheduled lab. Your TA will be posting the details on how to connect to the online session for your lab section.

### 5.1 Lecture

#### Week 1

**Topics:** Introduction, Plant and Animal Life Cycles

#### Week 2

**Topics:** Modes of Reproduction and Sex Chromosomes

#### Week 3

**Topics:** Transmission Genetics, Extensions to Mendelism

#### Week 4

**Topics:** Extensions to Mendelism-Continued, Recombination & Linkage

**Week 5**

**Topics:** Thanksgiving, Genome Structure

**Week 6**

**Topics:** Reverse and Forward Genetics, **Midterm Exam**

**Week 7**

**Topics:** Population Genetics, Hardy-Weinberg Equilibrium, Migration

**Week 8**

**Topics:** Single Locus Selection, Quantitative Traits

**Week 9**

**Topics:** Quantitative Trait Selection

**Week 10**

**Topics:** Quantitative Trait Selection, Genetic Diversity

**Week 11**

**Topics:** Genetic Diversity, Predicting Genotypes

**Week 12**

**Topics:** Wrap-up and Review

**5.2 Lab**

**September 21**

**Topics:** Excel Tutorial and Quiz

**September 28**

**Topics:** Lab 2.1 Data Collection

**October 5**

**Topics:** Lab 2.2 Data Analysis

**October 12**

**Topics:** **SHORT WEEK - NO LABS SCHEDULED**

**October 19**

**Topics:** Lab 3.1 Data Collection

**October 26**

**Topics:** Lab 3.2 Data Analysis

**November 2**

**Topics:** Lab 4.1 Data Collection

**November 9**

**Topics:** Lab 4.2 Data Analysis

**November 16**

**Topics:** Lab 5.1 Data Collection

**November 23**

**Topics:** Lab 5.2 Data Analysis

**November 30**

**Topics:** **Short week due to revised Thursday / Friday schedule - no lab scheduled**

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## 6 Assessments

### 6.1 Marking Schemes & Distributions

For the midterm exam, we may have an alternate midterm date in the week following the midterm ***for students who have approved academic consideration requests with appropriate***

**documentation** for missing the midterm. Should a student be unable to write either the scheduled midterm or an alternate, then there are two options to resolve the midterm grade:

1. receive a grade of zero for the midterm or
2. write a special version of the final exam covering the entire course with a value of 70% of the final grade equally distributed between the material for the midterm (35%) and the material for the final exam (35%).

Name	Scheme A (%)
Labs	30
Midterm Exam	35
Final Exam	35
Total	100

## 6.2 Assessment Details

### Labs (30%)

**Date:** See CourseLink for details of activities

**Learning Outcome:** 1, 2, 3, 4

Labs start the week of September 21 for all sections and meet weekly after that except for the short weeks at the Fall Study Break and the last week of the semester. Note that sections are paired up so that 2 different sections are meeting with 2 different TAs at the same time. Make sure you know which section you are in and attend the correct section meeting online. TAs are monitoring attendance to lab sections and only admitting students who are registered in that particular section in order to keep the sections balanced for numbers of students and access to learning support from the TAs. If you want to change lab sections, you must do so via WebAdvisor / the registrar's office. **Since the CourseLink grade book cannot follow you across sections, once the Lab 1 quiz opens Sept 20, you CANNOT CHANGE LAB SECTIONS, not even temporarily.**

### Section      Schedule

Section 0101 Tuesday 11:30 am – 1:20pm

Section 0102 Tuesday 3:30 am – 5:20pm

Section 0103 Thursday 11:30 am – 1:20 pm

Section 0104 Thursday 2:30 pm – 4:20 pm

Section 0105 Monday 2:30 pm – 4:20 pm

**Section      Schedule**

Section 0106 Tuesday 11:30 am – 1:20 pm

Section 0107 Tuesday 3:30 pm – 5:20 pm

Section 0108 Thursday 11:30 am – 1:20 pm

Section 0109 Thursday 2:30 pm – 4:20 pm

Section 0110 Monday 2:30 pm – 4:20 pm

**Midterm Exam (35%)**

**Date:** Saturday October 24, 2020 7:00pm to 9:00pm, Online

**Learning Outcome:** 1, 2, 3

The midterm exam will cover all material presented by Drs. Lee and Wolyn. The midterm exam will use the Respondus lock-down browser so make sure you use the Sample Respondus Quiz that will be available on Courselink as the midterm approaches to ensure Respondus will work for you. Due to the very fluid nature of the fall semester schedule with the ongoing Covid-19 pandemic, in the event of an unexpected conflict or a semester schedule change by the University, it is possible that the midterm may need to be rescheduled. The instructors reserve the option to reschedule the midterm with 2-weeks prior notice.

**Final Exam (35%)**

**Date:** Monday December 7, 2020 2:30pm-4:30pm, TBD

**Learning Outcome:** 1, 2, 3, 4

The final exam will cover all material presented by Dr. Robinson. The final exam will use the Respondus lock-down browser so make sure you use the Sample Quiz that will be available on Courselink as the midterm approaches to ensure Respondus will work for you.

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## 7 Course Statements

### 7.1 Grading Policies:

**There is a “no late” policy in this course. All lab deadlines are posted in CourseLink and labs are submitted through CourseLink.** The Data Collection Quizzes have deadlines connected to the schedule of your lab section (i.e. when you have finished that part of the lab and have the information) and the Data Analysis Quizzes have generous deadlines to give you time to complete your analysis after getting guidance from your TA. **Any labs not submitted by the deadline will receive a grade of zero.** If you are unable to complete your lab and would

like to seek academic consideration, contact the course coordinator, preferably before your lab component is due (Dr. Andy Robinson, [mbg2400@uoguelph.ca](mailto:mbg2400@uoguelph.ca)).

Please note that we have had some challenges in the past with students switching lab sections or relying on classmates to collect the data / information for them. This is not acceptable in this course. **You cannot change lab sections after September 20.** CourseLink and the lab activities do not support randomly changing sections. Lab attendance will be controlled by your TA and you will not be able to attend alternate lab sections. Why are we being so strict? The lab sections are balanced for the number of students so each student has the same reasonable expectation of getting assistance with the learning activities. If students randomly change sections, that balance is thrown off and affects all students. In addition, teaching assistants cannot track student progress across sections in CourseLink due to limitations in the grade book function.

## 7.2 Course Policy on Group Work:

Students are encouraged to work in groups on the lab learning activities. Each student must submit an individual lab assignment via the appropriate quiz that will be individually graded.

## 7.3 Course Policy on E-Mail:

The instruction team for this course is involved with other courses also, just as you are. Email is used as an important source of updates about this course. All official email from the instruction team will be sent to your University email account (@uoguelph.ca) - university policy prohibits us from responding to non-UofG emails with any course information. It is expected that you are checking your official email account on a frequent basis. If you email the course instruction team, please keep in mind that with over 300 students in this course and lots of students in their other courses, the instructors receive a lot of email in a day. In order to facilitate a response to your email, please consider the following guidelines:

- if you are unsure of who to ask, address your email to [mbg2400@uoguelph.ca](mailto:mbg2400@uoguelph.ca) where it will be directed appropriately by the course coordinator.
- if you have a specific question for one of the instructors about their class material specifically, you can email the individual instructor - Dr. Wolyn ([dwolyn@uoguelph.ca](mailto:dwolyn@uoguelph.ca)), Dr. Lee ([lizlee@uoguelph.ca](mailto:lizlee@uoguelph.ca)) or Dr. Robinson ([andyr@uoguelph.ca](mailto:andyr@uoguelph.ca))
- if the answer to your email query can be found in the course outline or other material posted on the MBG-2400 CourseLink site, you might not receive a reply so please check those resources first
- include your section number (01xx) in the subject along with a few relevant key words indicating what your message is about
- include your full name and student number in the email signature
- allow 24 to 48 hours for a response (if you send an email late at night, we may not even see it until the next day)

## 7.4 Course Policy on Technology:

This semester, technology is vital to success in this course. It is your responsibility to make sure you have access to a good Internet connection and a suitable computer or electronic device such as a tablet or smartphone along with a web camera, microphone and speakers/headphones. Your device needs to be capable of browsing and reviewing recorded or live video, audio and printed content from Courselink and across the internet. The University of Guelph's online Learning Management System (aka CourseLink) is integral to the delivery of this course. It is also your responsibility to ensure that you can access the course materials and complete online course requirements, such as quizzes on CourseLink, within the time allotted. If CourseLink is not accessible for a significant period of time (not including scheduled maintenance) deemed by the instructor to have had an impact on students' abilities to complete quizzes, deadlines will be extended.

In addition to accessing the Courselink website via a suitable web browser, due to the ongoing Covid-19 restrictions additional software and applications will be used in the delivery of this course. These will include but not be limited to Zoom, Webex, MS Teams, MSOffice365 (Word, PowerPoint, Excel), Slido, email and a multi-purpose media player. The instructors will provide recommendations for software applications that are suitable for the purposes of the course but you will be ultimately responsible for finding, installing and maintaining any applications you use for this course.

In online classes, you need to use technology to connect to course events as well as take notes and interact with the course material. This should be done in a way that respects your fellow students by not creating undue distractions (see below under Online Behaviour). Also keep in mind that if your technology uses the University's network, the University's acceptable use policy also comes into play. [http://www.uoguelph.ca/cio/sites/uoguelph.ca.cio/files/CIO-ITSecurity-03.1.3-AUP-Approved\\_0.pdf](http://www.uoguelph.ca/cio/sites/uoguelph.ca.cio/files/CIO-ITSecurity-03.1.3-AUP-Approved_0.pdf)

## 7.5 Recording of Online Course Activities

Due to the ongoing Covid-19 pandemic, the learning activities in this course have been shifted from face-to-face instruction to remote online instruction. As a result of accessibility needs, learning activities may be recorded by the instructor or TAs and posted to CourseLink, Zoom, YouTube or another appropriate platform for grading and dissemination. As a result, individual students may be recorded during these sessions.

By enrolling in this course, it is assumed that students agree to the possibility of being recorded during classes or other "live" course activities.

If you prefer not to be distinguishable during a recording, you may:

1. turn off your camera
2. mute your microphone (you should always mute your microphone when not participating anyway)
3. edit your identification in the online session or application (e.g. use your

initials instead)

4. use the chat function to pose questions (again with identifying information adjusted).

Students who express to the instructors or TAs that they, or a reference to their name or person, do not wish to be recorded may discuss possible alternatives or accommodations with the instructors or TAs.

## 7.6 Course Policy regarding use of electronic devices and recording of lectures:

In keeping with University policy, electronic recording of classes is expressly forbidden without consent of the individual instructor for that class. 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.

If the instructor provides a recording of the class or learning activity, these recordings are also 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. Please note that, if provided, these recordings are an optional additional tool for assisting with your learning and there is no guarantee a recording will be available for every online activity.

## 7.7 Online Behaviour - "Netiquette"

In light of the ongoing Covid-19 pandemic and restrictions and the resulting online delivery of this course in Fall 2020, the University has provided the following wording about netiquette.

**Inappropriate online behaviour will not be tolerated.** Examples of inappropriate online behaviour include:

- Posting inflammatory messages about your instructor or fellow students
- Using obscene or offensive language online
- 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 online
- 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

- Sharing your user name and password
  - Recording lectures without the permission of the instructor
- As a specific note about online classes, when joining online classes, **please ensure your microphone is muted when you first connect**. Most of the issues around online class connection quality and background distractions come from open microphones. For your own bandwidth management, you may also want to mute your video to reduce the amount of information passing through your internet connection.

## 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>

## 8.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

## 8.10 Illness

The University will not normally require verification of illness (doctor's notes) for fall 2020 or winter 2021 semester courses. However, requests for Academic Consideration may still require medical documentation as appropriate.

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