



MBG*2400 - Fundamentals of Plant and Animal Genetics

Fall 2026 Course Outline

Section: 01

Credits: 0.50

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.

Prerequisite(s): (BIOL*1050 or BIOL*1070), BIOL*1090

Department(s): Department of Animal Biosciences

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 experiential learning activities 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.

Timetable

The MBG-2400 course timetable has been complicated by a lack of lecture hall space available. Due to the lack of availability of a classroom of suitable size, a virtual lecture section has been created by Enrollment Services to accommodate all the students requiring the course. This certainly wasn't the choice of the instructor team. Along with that virtual lecture came an additional 12 seminar sections (0201 thru 0212) that are sharing the time and space with the seminar sections for the original lecture sections (0101 thru 0112). Lectures will be delivered in a HyFlex format - synchronous or asynchronous Zoom presentation of the lecture. Details of the Zoom meetings will be posted on Courselink.

You are scheduled into specific sections in order to balance the number of students across all the seminars. **Seminars are optional drop-in help sessions to assist you with the weekly quizzes and the course material. You do not need to attend seminars unless you need additional help.** If you would like additional help, please attend the seminar that you are scheduled for. There are 2 reasons for this, one is that this will provide everyone with an equal opportunity to seek help and the other is that the seminar room has a maximum capacity limit that is set by the Fire Marshall. Should it happen that seminar room capacity is exceeded, the instructor or TA will immediately dismiss everyone from the room and end the seminar. **Basically the message is don't go to a different seminar than the one you are scheduled for!**

There are no seminars on Sept 10 or 11, the week of the Fall Break or the last week of classes.

Lecture Schedule

TuTh 1pm-2:20pm in THRN*1200 (9/10 to 12/22)

Seminar Sections

See above

Instructor Information

Andrew Robinson

Course Coordinator

Email: andyr@uoguelph.ca

**Angela Canovas**Email: acanovas@uoguelph.ca**Mohsen Yoosefzadeh Najafabadi**Email: myoosefz@uoguelph.ca**Mohammad Erfatpour**Email: erfatpom@uoguelph.ca

Instructional Support

This course is team taught by four instructors, two from Plant Agriculture - Drs. Erfatpour and Najafabadi - and two from Animal Biosciences - Drs. Robinson and Canovas - in that order. Drs. Erfatpour and Najafabadi will split the first half of the course teaching about 1/4 each while Drs. Robinson and Canovas will teach the second half of the course, also about 1/4 each. Dr. Andy Robinson is also the course coordinator from Animal Biosciences. Contact Andy via the course email, mbg2400@uoguelph.ca, for all concerns regarding scheduling, academic consideration and grade inquiries.

Learning Resources

Required Resources

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, primarily the first half of the course. Please note that different versions of the textbook are available in hardcover or softcover and including or excluding the access code for the online learning material provided by the publisher so be careful if you are looking on the used market.

Other Resources

Extensive use is made of Courselink (<https://courselink.uoguelph.ca/shared/login/login.html>). Seminar guides, instructional videos and other learning resources will be posted on Courselink. Check Courselink for the individual schedule and deadlines for the learning activities for your section since each section meets at different times and therefore may have different schedules and deadlines.

Cost of Textbooks and Learning Resources

There are no additional resources - textbook, lab materials etc - that you need to purchase separately for this course.

Course Learning Outcomes

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.

Schedule of Topics and Assignments

Week of	Topic	Activities	Due
9/10	Robinson First class, review of course outline Erfatpour Chromosomes and alleles, the major engines of genetic diversification, allelic diversity selection is based on life strategies of plants and animals	NO SEMINARS SCHEDULED Seminars are optional, drop-in help sessions. Go to your scheduled seminar	
9/15	Erfatpour How to test if a single gene is responsible for a phenotypic trait, independent assortment of genes located on different chromosomes, deviations from Mendel: Sex chromosomes, maternal inheritance, epistasis, epigenetics & embryo lethals	Seminars are optional, drop-in help sessions. Go to your scheduled seminar	
9/22	Erfatpour Linkage, crossing-over and gene mapping with two loci, applications of linkage and crossing over, and career mentoring, genetic diversification from altered chromosome (gene) dosage	Seminars are optional, drop-in help sessions. Go to your scheduled seminar	
9/29	Erfatpour Extensions to Mendelism-Continued, Recombination & Linkage	Seminars are optional, drop-in help sessions. Go to your scheduled seminar	
10/6	Najafabadi Genome structures	NO SEMINARS SCHEDULED ALL WEEK	
10/13		Fall Study Break	
10/20	Najafabadi Reverse and Forward Genetics - end of the material for the midterm exam	Seminars are optional, drop-in help sessions. Go to your scheduled seminar Seminars are optional, drop-in help sessions. Go to your scheduled seminar	
10/27	Robinson Population Genetics, Hardy-Weinberg Equilibrium, Migration	Seminars are optional, drop-in help sessions. Go to your scheduled seminar No weekly quiz this week.	MIDTERM EXAM Nov 2 3:30-5:30pm ROZH 104
11/3	Robinson Single Locus Selection, Quantitative Traits	Seminars are optional, drop-in help sessions. Go to your scheduled seminar	
11/10	Robinson Quantitative Trait Selection	Seminars are optional, drop-in help sessions. Go to your scheduled seminar	
11/17	Canovas Quantitative Trait Selection, Genetic Diversity	Seminars are optional, drop-in help sessions. Go to your scheduled seminar	
11/24	Canovas Predicting genotypes and phenotypes	NO SEMINARS SCHEDULED - Short week due to revised Thursday / Friday schedule	
12/1	Canovas Predicting genotypes and phenotypes, Wrap-up and Review (Robinson and Canovas)		



Lab / Seminar Schedule

Seminars are OPTIONAL drop-in help sessions. If you need additional help with course material, feel free to drop in **to the seminar section in which you were scheduled**.

Teaching and Learning Activities

Lectures:

As noted above, all classes are scheduled to be delivered in person and online in a HyFlex mode. Each instructor has their own approach to teaching in person. Class content information will be posted on CourseLink throughout the semester. The proposed topics covered throughout the semester are presented above. 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 seminar scheduling and unforeseen circumstances.

Seminars:

Seminars are **OPTIONAL**, drop-in help sessions. There are nine learning activities throughout the semester, the first for one week and virtual labs 2-5 have two activities each, spread over two weeks. The first learning activity is an Excel tutorial to brush up on Excel skills. For learning activities 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 assignment are posted on CourseLink. As noted above, students seeking help at the OPTIONAL drop-in help sessions must attend the section for which they are scheduled. Attending other, random seminar sections is not allowed due to room capacity limits. Overloaded seminars will be cancelled immediately due to fire regulations to the detriment of all.

Assessment Breakdown

Description	Weighting (%)	Due Date
Virtual Labs	30%	Throughout (see Courselink for dates)
Midterm Exam	35%	Oct 30 7-9pm MACN 105
Final Exam	35%	University will announce the date in October
Total	100%	

Assessment Details

Virtual Labs

Virtual Labs

30%

OPTIONAL drop-in help session seminars start the week of September 8 and meet weekly after that except for the short weeks at the Fall Study Break and the last week of the semester. Each optional help session will be focused on the current virtual lab learning activity.

Quizzes on Courselink are used to submit the results of the weekly virtual lab learning activities. The deadline for each quiz is shown in Courselink. The learning activity quiz deadlines are generous and there is no time limit on each quiz - until the deadline, students may open the quiz as much and as long as they like. As a result, there is a **"NO LATE"** and **"NO EXTENSION"** policy for these quizzes. Once a quiz closes, Courselink will not accept a quiz submission after the deadline and no marks will be awarded. Students who are unable to complete a quiz before the deadline may choose to submit a request for academic consideration with a reasonable and valid reason for missing the deadline.

See Courselink (lab quizzes or grade book) for details on the grades for each lab activity. Lab 1 Quiz is worth 6%, each Lab x.1 Quiz is worth 2% and each Lab x.2 Quiz is worth 4% where $x = \{2,3,4,5\}$

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

Midterm

Midterm Exam

35%

The date and time of the in-person midterm exam was not provided by Enrolment Services by the deadline for this course outline and will be announced in class and on Courselink. The midterm will cover all material presented by Drs. Erfatpour and Najafabadi.

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. If a student is unable to write the midterm exam at the scheduled time, they may **ask for academic consideration by submitting the academic consideration request form** found on the Courselink site along with their documentation to the course coordinator (mbg2400@uoguelph.ca). If a student is granted academic consideration for the midterm exam, they should



be prepared to write an alternate midterm exam the week following the scheduled midterm. Should a student be unable to write either the scheduled midterm or an alternate midterm, 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%).

Course Learning Outcomes Assessed: 1, 2, 3

Exam

Final Exam

35%

The in-person final exam will cover all material presented by Drs. Robinson and Canovas. A formula sheet will be provided with the exam and a calculator is allowed. A "calculator" is a device that can calculate but not communicate with any other devices so, for example, using a calculator app in a smartphone is not acceptable as a calculator for the exam.

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

Course Technology and System Requirements

System and Software Requirements

This course will use a variety of technologies including;

- CourseLink
- Zoom
- MS Teams

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

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 (<http://www.uoguelph.ca/web/privacy/>). Please visit the D2L website to review the Brightspace privacy statement (<https://www.d2l.com/legal/privacy/>) and Brightspace Learning Environment web accessibility standards (<https://www.d2l.com/accessibility/standards/>).

CourseLink 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

Additional Course Technologies

Zoom

This course may use Zoom for lectures. Check your system requirements (<https://opened.uoguelph.ca/student-resources/system-and-software-requirements>) to ensure you will be able to participate.

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 Statements

Grading Policies

There is a "no late" policy in this course. All virtual lab quiz deadlines are posted in CourseLink and quizzes are submitted through CourseLink. The Data Collection Quizzes and the Data Analysis Quizzes have generous deadlines to give you time to complete your analysis. **Any quizzes not submitted by the deadline will receive a grade of zero.** If you are unable to complete your quiz and would like to seek academic consideration, complete the request for academic consideration form found on Courselink and submit via email to the course coordinator, preferably before your quiz component is due (Dr. Andy Robinson, mbg2400@uoguelph.ca).

The virtual lab learning activities can be done with your colleagues. Each student must submit their own quiz but you may collaborate and work together to complete the activities. One of the best ways to learn something is to explain it to someone else! **To get assistance with these virtual learning activities, you may attend the OPTIONAL drop-in help session for your seminar section. You must attend the help session seminar for which you are scheduled.** Why are we being so strict? The sections are balanced for the number of students so each student has the same reasonable expectation of getting assistance from the TA with the learning activities. If students randomly change sections, it is not fair to the other students. It throws off the section balance which affects all students. If too many students attend the wrong seminar section, the room capacity may be exceeded which will lead to the immediate dismissal of the entire help session.

Course Policy on Group Work

Students are encouraged to work in groups on the lab learning activities. However, even if students work together, each student still must submit an individual lab assignment via the appropriate quiz that will be individually graded.

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) - the University's privacy policy prohibits instructors 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 any of the course instruction team, please use mbg2400@uoguelph.ca and keep in mind that with well over 400 students in this course, along with the other courses they teach, the instructor team receives a lot of email in a day. In order to facilitate a response to your email, please consider the following guidelines:

- address your email to mbg2400@uoguelph.ca where it will be directed appropriately by the course coordinator.
- 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 (for example, if you send an email late at night, it may not even be seen until the next day)

Course Policy on Technology

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 for accessing online activities. 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 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, additional software and applications may be used in the delivery of this course. These may include but not be limited to Zoom, MS Teams, MSOffice365 (Word, PowerPoint, Excel), Slido, email, web-based apps and media players. 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 activities, 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.

Recording of Online Course Activities

Some learning activities may also be recorded by the instructors or TAs. For dissemination and/or accessibility reasons, these recordings may be posted to CourseLink, Zoom, YouTube or another appropriate platform for grading and dissemination. As a result, individual students may be recorded during learning activities associated with this course.

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.

Course Policy regarding use of electronic devices and recording of lecture

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.

Online Behaviour - "Netiquette"

In light of the fluid situation with the ongoing Covid-19 pandemic and restrictions resulting in online activities in this course along with routine use of online tools like Courselink, 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 course activities, when joining, **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.

Standard Statements for Undergraduate 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/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-misconduct/>) is outlined in the Undergraduate 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.

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 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 Accommodations of Religious Obligations (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/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

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 undergraduate students 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 the Undergraduate Calendar - Dropping Courses (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/dropping-courses/>).

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 Undergraduate Calendar for information on regulations and procedures for Academic Consideration. (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-consideration-appeals-petitions/>)