GENETICS (BIOL 2171)
Course Syllabus F2025

Faculty Information

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Land Acknowledgement

We respectfully acknowledge that Lakehead University and Georgian College campuses are located on the traditional lands of Indigenous Peoples. Lakehead Thunder Bay is located on the traditional lands of the Fort William First Nation, Signatory to the Robinson Superior Treaty of 1850. Lakehead Orillia and Georgian College are located on the traditional territory of the Anishinaabeg. The Anishinaabeg include the Ojibwe, Odawa, and Pottawatomi nations, collectively known as the Three Fires Confederacy. Lakehead University and Georgian College acknowledge the history that many nations hold in the areas around our campuses. We are dedicated to honouring Indigenous history and culture and committed to a relationship with all First Nation, Métis and Inuit people based on the principles of mutual trust, respect, reciprocity, and collaboration in the spirit of reconciliation.

Calendar Description

Genetics. 3-3; 3-3. An introduction to the principles of inheritance, modern gene concepts and basic population genetics is presented in a lecture, laboratory, and problem-solving format.

General Description

In this introduction to a fascinating and controversial area of contemporary science, students are presented with basic terms, principles, and research methods used in the study of genetics. Students learn about the transmission, distribution, arrangement, and alteration of genetic information and how it functions and is maintained in populations.

Topics Covered

- Personal genomics;
- Natural genetic variation in populations (humans and others);
- Structure and function of genes and chromosomes;
- Genetic variation arises by mutation;
- Genetic variation and evolution (selection for function, phylogeny, homologs, gene families);

- How genes affect phenotypes: pathways, regulatory interactions, heterozygosity, dominance effects;
- Genetic variation also arises by chromosome reassortment and homologous recombination;
- Mitosis and meiosis: mechanisms and genetic consequences ;
- Linkage and sex linkage;
- Genetic analysis: investigating gene action using inheritance of simple (‘‘Mendelian’’) alleles and phenotypes in crosses and pedigrees;
- Organelle genetics;
- Epigenetic inheritance;
- Genome structure, function and evolution; causes and consequences of chromosomal changes;
- Phenotypic effects of natural genetic differences, heritability;
- Genome-wide association studies and related studies linking genes to phenotypes;
- Genetics of cancer; inheritance of alleles affecting risk.

Course Learning Outcomes

Upon successful completion of this course, the student will have reliably demonstrated the ability to:

- Develop an improved understanding of the fundamental concepts of genetics;
- Gain a deeper understanding of the relationship between genotype and phenotype;
- Relate the structure and function of the DNA molecule to its functional role in encoding genetic material.
- Apply the principles of inheritance as formulated by Mendel.
- Apply the principles of extensions to Mendelian inheritance, including multiple allelism, lethal alleles, gene interactions, and sex-linked transmission.
- Analyze genetic data using statistical procedures.
- Describe normal chromosome number, structure, and behaviour in human cells, and understand the cause and effect of alterations in chromosome number and/or structure.
- Understand how to identify and classify mutations in DNA.
- Describe the basic aspects of the flow of genetic information from DNA to proteins.
- Explain and make deductions about gene regulation with emphasis on the lac operon model.
- Deduce the relationship between genetic, physical, and cytogenetic maps.
- Illustrate how information generated by genome sequencing projects can be used to discover practical knowledge about gene expression and relationships between species.
- Apply the Hardy-Weinberg Law in analyzing population genetics for gene frequency, sex linkage, equilibrium, and heterozygote frequency.
- Demonstrate proficiency in experimental design, data collection, statistical analysis, and interpretation of scientific results;
- Improve both oral and written scientific communication skills;
- Cultivate the ability to work as a productive member of a team.

Brightspace
All course information is on the *myCourselink (Brightspace (D2L)*) Lakehead University course shell. Students must have access to the course Brightspace to access assignments, quizzes, lessons, labs, etc.

To log into your course website:

1. Go to https://mycourselink.lakeheadu.ca/d2l/home.
2. Enter your Login/ID (your Lakehead University e-mail username) and your Password/PIN number.
3. Click on the course title to enter the course.

If you encounter any difficulties logging into the course site, please contact: mycourselink@lakeheadu.ca.

Textbook
Good text, not required: Klug, S.K., Cummings, M., Spencer, C.A., Palladino, M.A., Killian, D. (2018) Concepts of Genetics (12th ed.). Upper Saddle River, NJ: Pearson Education Inc. (ISBN: 0134787323)

- LibreTexts™ **Biology's free (0$)** online Introduction to Genetics (https://bio.libretexts.org/Courses/City_College_of_San_Francisco/Introduction_to_Genetics) can be a useful reference.

Course textbooks can be ordered online through the Lakehead University bookstore (http://bookstore.lakeheadu.ca/home). Purchases can be shipped to students' home addresses. For more information, contact Lakehead University bookstore (http://bookstore.lakeheadu.ca/contact-us).

Class Schedule

Lecture	Mondays and Wednesdays	8:30-10:00am	OA2008
Lab	Wednesdays	11:30am-2:30pm	OA3002

No classes on:
Monday Sept. 1, 2025 (Labour Day; Classes begin on Sept. 2)
Tuesday Sept. 30, 2025 (National Day for Truth and Reconciliation)
Monday Oct. 13, 2025 (Thanksgiving)
Monday, Oct. 13 to Friday, Oct. 17, 2025 (Study Week)
Wednesday, Dec. 3 to Thursday, Dec. 4, 2025 (Exam Preparation Days)

Exam Period runs Friday, Dec. 5 to Sunday, Dec. 14, 2025 (Includes two weekends) with Monday, Dec. 15, 2025, as a contingency date. This course will have an assigned time for an exam. Further details to be released.

- This course will be offered in person in a synchronous format, employing a flipped classroom, inquiry-based learning pedagogical approach. As such, we will meet in person every Wednesday while Mondays will be reserved for independent work. Some lectures may be conducted online via Zoom. Students will be notified in advance.
- A **course schedule** will be provided separately including readings and assignment due dates.

Laboratories
Laboratory sessions are designed to introduce you to some of the common laboratory techniques of genetics and give you some hands-on experience with some of the basic concepts covered in lectures. **This year all the labs have been adapted to be offered online.** There will be 10 synchronous lab sessions that you must attend, each with a pre-lab quiz and lab assignment or report. The lab instructor will demonstrate the techniques and experiments and guide you through each lab.

It is mandatory to attend all synchronous laboratory sessions. If you miss a laboratory session you will receive 0% on the report and/or on the assignment that week. There is only one lab session and therefore there are no opportunities for make up lab classes. Exceptions to this policy will only be granted in cases of verifiable medical emergency related to you, or a personal reason, disclosed to and accepted by the instructor. In the case of an allowable absence, the instructor may decide to apply the missing grade(s) to the final, with an appropriate scoring percentage adjustment. **If you miss a lab it is your responsibility to contact the lab instructor.**

To be fair to those who hand their lab reports in on time, **10% of the lab report mark will be deducted for each day your report is late.** Reports submitted more than one week following the original due date will not be accepted for marking.

Lab supplies: The lab manual will be supplied in pdf format via the lab Brightspace.

- *More information about the labs can be found on the **separate Biol 2171 Lab Brightspace page**.*
- ***Labs start the week of Sept. 8, 2025.***

Grading Scheme and Dates

Component		Value
Term tests	Midterm test (Oct. 22, 2025) Final test (during exam period)	= 20% = 25% **= 45%**
Online discussion forums	4 x 3.5%	= 15% **= 15%**
Debate podcast	Proposal Podcast Discussion post	= 2% = 10% = 3% **= 15%**
Labs	Participation Lab quizzes Tutorials Reports	= 5% = 5% = 5% = 10% **= 25%**
Total		**= 100%**

Exam and Assignment Policies

Term Test Policies: Term tests will consist of a variety of question types including multiple choice, mix-and-match, true/false, diagrams, and short answer. Term tests are non-cumulative, but it should be understood that material covered prior to the test may be included indirectly if it is essential to the understanding of the topics being tested. All term tests will be written online via the course Brightspace page. More detailed instructions will be provided.

A student who misses a term test will receive a zero. Exceptions to this policy may be granted at the discretion of the course director if either a medical or family emergency occurs and documentation is provided. Failure to make contact within 48 hrs. will result in a forfeiture of any opportunity to do a re-write. In the event of a missed term exam the value of the exam will be redistributed to the next term test.

Assignment Due Date Policies

Assignment due dates are indicated in the course schedule and on the course Brightspace page. Assignments submitted past the due date will be deducted 10% each day for 5 days after which the student will receive a grade of 0%. Exceptions to this policy may be granted at the discretion of the course director if either a medical or family emergency occurs and documentation is provided. It is your responsibility to contact the course director.

No Extra Credit: There is no possibility of **extra credit** (i.e. doing extra work if you did not do well on something) to increase your mark either during the term or after the final exam. Anyone receiving a final course grade of 49% will **automatically** have their final exam re-graded

Learning Environment

Everyone learns more effectively in a respectful, safe, and equitable learning environment free from discrimination or harassment. I invite you to work with me to create a classroom space—both real and virtual—that fosters and promotes values of human dignity, equity, non-discrimination and respect for diversity. These values and practices are in accord with the Lakehead University Equity, Diversity, and Inclusion Plan 2019-2024, which can be found at https://www.lakeheadu.ca/faculty-and-staff/departments/services/human-rights-and-equity/edi-action-plan-2019-2024. Please feel free to discuss with me any questions or concerns you have about equity in our classroom or in the Lakehead community. If I cannot answer your questions or help you address your concerns, I encourage you to contact the Office of Human Rights and Equity at humanrights@lakeheadu.ca or visit their contact page (https://www.lakeheadu.ca/faculty-and-staff/departments/services/human-rights-and-equity/contact).

Behaviour and Conduct

- Students are expected to ensure that the classroom and laboratory learning environments are inclusive, respectful, peaceful, and safe.
- Interactions and relationships with instructors and other students (in person, online, in email, etc.) within the academic context should be professional and characterized by integrity, courtesy and mutual respect.
- Lectures should be interactive - please get engaged in the material and ask as well as answer questions!
- I fully encourage a reduction in the use of paper but if you bring your laptop to take notes, please refrain from using the internet in class (otherwise you will be banned from bringing your computer).
- Please be considerate in lectures and refrain from talking as it will disturb the learning environment.
- For your benefit and the benefit of students around you, turn your phone off to ensure it does not ring during lecture and to avoid the urge to text or you may be asked to leave the lecture hall.
- Students are expected to attend all lectures and labs.
- Recording devices of any kind are not permitted to be used in lectures.

Email Policies and Etiquette

I will try to respond to email within two working days, but this is not always possible as there are many students and only 1 professor. I may also answer your question in the next class meeting if appropriate. Questions and answers that I deem of interest to the entire class may be posted (anonymously) on Brightspace or sent via course announcements if urgent. Emails that do not meet the requirements below will not be answered:

- Use your @lakeheadu.ca or @georgiancollege.ca email address when emailing instructors and others within the university. Email from other sources may be filtered out and not reach the intended recipient.
- SUBJECT LINE - Include the course code, and a brief indication of topic.
- Lecture email example: BIOL 3250 – question regarding plasma membranes
- Lab email example: BIOL 3250 Tuesday am – missed lab 2 because of illness.
- Include your NAME and STUDENT NUMBER at the end of each email. I work with many students and this facilitates my ability to help you.

- Remember, you are in a professional environment and thus all your written correspondence, including emails, should be professional. This means full sentences, proper grammar, NO text message lingo.
- Before emailing the instructor, consider the nature of your question and whether another resource should be consulted first. For example, lab-related queries should be directed to the Lab Instructors.

Accessible Learning

The University is committed to principles of respect, inclusion, and equality of all persons. The University provides services for students with disabilities (including physical, medical, learning, and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. For access to the resources and services available at Lakehead visit: https://www.lakeheadu.ca/students/student-life/student-services/accessibility/. Students requiring accommodation are asked to register by contacting Alisia Johnston, the Accessibility and Academic Skills Advisor for the Orillia Campus, at oraccess@lakeheadu.ca. ***Students are encouraged to contact their professor to discuss accommodation needs or any way in which they can help you succeed.***

Academic and Student Code of Conduct Policies

- Academic and student policies and procedures for those enrolled in the Lakehead-Georgian programs can be found on the Lakehead-Georgian Student Portal.
- All Lakehead-Georgian programs will follow the Lakehead Regulations as list in the Lakehead University Academic Calendar (http://csdc.lakeheadu.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&loaduseredits=False).The University Regulations include but are not limited to Registration, Examinations, Reappraisals and Academic Appeals, Special Examinations, Academic Misconduct, Withdrawal, and Timely Feedback. Additional Faculty Regulations may also apply. Please review the Academic Calendar.
- The Lakehead University Student Code of Conduct - Academic Integrity (https://www.lakeheadu.ca/students/student-life/student-conduct) will apply to all Lakehead-Georgian students regardless of campus of study.
- The Lakehead University Student Code of Conduct - Appeals (https://www.lakeheadu.ca/students/student-life/student-conduct) will apply to all Lakehead-Georgian students regardless of campus of study.
- The Georgian College Student Code of Conduct (http://www.georgiancollege.ca/student-code-of-conduct/) will apply to the Lakehead-Georgian students studying at the Barrie campus. Additional campus policies of Sexual Violence Procedure and Protocol (https://www.georgiancollege.ca/about-georgian/campus-safety-services/tab/sexual-violence), Alcohol, Drugs and Tobacco (https://www.georgiancollege.ca/about-georgian/campus-safety-services/tab/alcohol-drugs-and-tobacco), and Information Technology Acceptable Use Procedure (http://www.georgiancollege.ca/wp-content/uploads/2-117IT-acceptable-use.pdf) also apply.
- The Lakehead University Student Code of Conduct – Non-Academic (https://www.lakeheadu.ca/students/student-life/student-conduct) will apply to the Lakehead-Georgian students studying at the Orillia campus.

Plagiarism and Academic Dishonesty

A breach of Academic Integrity is a serious offence. The principle of Academic Integrity, particularly of doing one's own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should view the Student Code of Conduct -Academic Integrity (https://www.lakeheadu.ca/students/student-life/student-conduct) for a full description of academic offences, procedures when Academic Integrity breaches are suspected and sanctions for breaches of Academic Integrity.

COPYRIGHT NOTICE

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