

2026 Fall Biol 2171 Genetics Course Outline (2026-09-12)

Instructor: Dr. Wensheng Qin

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Office Hours: CB4016, Mondays, 1:00 pm to 2:00 pm (or by appointment or by Zoom, the TA and the instructor, we prefer you to email us your requests or questions before you come to meet with us for discussion. This is to make our work and discussion more efficient.

The Zoom link: <https://lakeheadu.zoom.us/j/9062746109?pwd=SFIZVDQ3Ujl2aUZNMnNaTlFkZnBZdz09>
Meeting ID: 906 274 6109, Passcode: 853564. This zoom link will be used for discussion and/or even for one or a few classes when alternative arrangements are very necessary.

Lecture Location: BB 1021

Time: Mondays, Wednesdays: 2:30 pm-4:00 pm

Duration: 2026-09-08 to 2025-12-08

Credits: 0.50

TA: Yunpeng Chen (PhD Student)

TA's Tel: 807-343 8010 ext. 7141, Office: CB 3037

Email: ychen160@lakeheadu.ca

Textbook: Genetics Essentials (Benjamin Pierce-5th Edition of 2025 MacMillan). The fall of 2026 semester is our first time of using this textbook. For questions about e-access to the textbook, please contact Julia Park at julia.park@macmillan.com.

Students are highly encouraged to buy this textbook but not required. Whether you buy this 5th edition of the textbook or use other versions of the textbook or use other similar textbook, it is totally up to you, you do not need to ask me this question, because if you ask me, the answer is “it is totally up to you”. One copy of the book is reserved in the library. The printed copy of the loose-leaf book is \$99.99, and the eBook is \$71.99.

Additional Requirements: (1) Preview the textbook and think about the questions in the related chapter(s) before the applicable class. (2) Review the textbook and try to answer the questions in the chapter(s) after the class. (3) Study the entire lectured chapters 1-12 for exams. The PPT slides do not contain all the information needed for exams; you must study the textbook as well. (4) Students must understand well enough to solve all the problem questions in chapters 1-12. (5) The course covers 12 chapters, a lot of information, you should have daily study and prepare for exams early.

Genetics Learning Objectives

Understand Mendel's genetic laws, experimental design, and how they apply to the heredity patterns which Mendel observed in pea plants.

Understand the link between genotype and phenotype.

Understand the difference between a character and a trait.

Understand the difference between dominant and recessive alleles and the difference between homozygous and heterozygous.

Understand extensions to the Mendel's laws.

Learn chromosome and inheritance and sex chromosomes.

Learn gene linkage, recombination, and gene mapping.

Learn DNA replication, gene mutation, and gene functional analysis.

Learn genome annotation and genomic analysis.

Outcomes After Your Study

At or after the end of the course, students should be able to finish the following tasks after their theoretical and experimental studies.

(1) Explain the mechanisms of simple Mendelian inheritance of traits, including X-linked traits, lethal traits and other gene linkage. (2) Explain what epistasis is, how a few types work, and how they generate the phenotype ratios observed. (3) Create a Punnett square for multiple generations to predict genotypes and phenotypes of progeny. (4) Conduct a Chi-squared analysis (Goodness of Fit, as well as Test for Independence) with a properly formatted Chi-Squared table, an appropriate null hypothesis, correct calculations, and conclusions. (5) Set up and maintain cultures of *Drosophila melanogaster* (fruit flies). (6) Anesthetise and manipulate *Drosophila melanogaster* to observe traits. (7) Identify and sort *Drosophila melanogaster* based on sex and

deviations from wild-type features. (8) Create and evaluate a pedigree using standard nomenclature and symbols. (9) Explain the inheritance method, probability of inheritance, and pedigree flags of the BRCA1 gene and its associated cancers. (10) Discuss the effect of mutation, reproduction, and selection on the evolution of organisms, and how that affects speciation or conservation efforts. (11) Effectively communicate opinions on genetics related societal topics e.g., GMO foodstuffs, species interpretation in canids. (12) Describe how Single Nucleotide Polymorphisms (SNPs) and Genome Wide Association Studies (GWAS) can help increase our knowledge of genes and loci involved with traits and diseases across multiple organism models, specifically in dogs and humans. (13) Identify phenotypes and likely genotypes for simple genes in cats, corn, fast plants, and fruit flies. (14) Describe how epigenetics and transposable elements affect traits and gene expression. (15) Discuss how data collection, sample size, and biases may affect scientific results.

Grading Scheme: (The PowerPoint slides do not cover all the information for exams, so intensive reading and understanding of the whole lectured chapters 1-12 are necessary).

1. Exam One: October 7, 2026: Exam One covers chapters 1-3 (25%). The exam one may include (1) Fill in the blank questions, (2) Multiple choice questions, (3) True/False questions, (4) Essay questions, etc. TA will help to administer and mark the exam. Duration is up to 75 minutes.
2. Exam Two: November 25, 2026: Exam Two covers chapters 4-9 (35%). Covering the chapters 4-9. The exam two may include (1) Fill in the blank questions, (2) Multiple choice questions, (3) True/False questions, (4) Essay questions, etc. TA will help to administer and mark the exam. Duration is up to 75 minutes.
3. Exam Three: December 7, 2026: Exam Three covers chapters 10-12 (10%, only 2% of questions are from chapter 12). Covering the chapters 10-12. The exam may include (1) Fill in the blank questions, (2) Multiple choice questions, (3) True/False questions, (4) Essay questions, etc. Duration is up to 75 minutes.
4. Lab components [20%]. This will be assigned and evaluated by the lab instructor Mr. Michael Moore. His office is CB 3011A, and his phone number is 807-343 8010 ext. 8909 and his email is mnmoore@lakeheadu.ca. All lab related concerns or questions and

scheduling, please address to Mike Moore only. If you email me, I only can forward your email to Mike Moore and ask him to answer your concerns or questions.

5. Class Attendance Marks (10%): [1] Random checks will be conducted on attendance at 20 classes by signing the attendance sheets, with 0.5% of students attending in each class, for a total of 20 classes (including attending exams in the originally planned times), amounting to 10%. Sometimes, we may also use pop quizzes/in class exams as checks. As long as you attend more than 80% of the class you will receive the full class attendance marks (10%). [2] If you voluntarily email us (the TA and Instructor) beforehand with a valid reason for not being able to attend a class, you are appreciated, but you will not receive this class attending marks, because as long as you attend more than 80% of classes you will receive full class attendance marks. [3] Please email us (the TA and Instructor) beforehand if you have any very special circumstances or reasons for special consideration. [4] For the students who attend all the classes, they may receive extra 2 bonus points.
6. Bonus point marks: Some bonus points for raising your final grades may be offered when necessary (see the notes below).

Notes: If you miss any examination (midterm exams or final exam), we strictly follow the university regulations of “Missed Examinations Due to Illness or Other Extenuating Circumstances”. If you are permitted to write your missed exam, an alternative test paper (Test B or even Test C, Test D, etc.) will be made. Test B, C, or D will be different or even totally different in formats and questions from the test questions in Test A for the class. Please try your best to avoid missing an exam.

Extra notes:

- (1) We strictly follow the course outline as rules for the course.
- (2) The important contents and information for examinations will often be emphasized in class. Occasionally, I will provide a few example questions in the class, and those questions may be directly used in the midterm or final examinations. The example questions will be related to our contents but may not be from the textbook.
- (3) Slides in D2L and slides for lecturing may be slightly different. To encourage students to take good notes of the lectures, the lectured slides will not be sent to the students. Please do not email me to request for the lectured slides.

(4) Bonus points: [1] If you actively participate in class discussion, you may obtain extra bonus point(s). Therefore, I strongly encourage you to upload your clear photo in D2L as early as possible (for an extra bonus point). This will help the TA and instructor to identify you when you answer questions and credit you bonus point(s). [3] Each bonus point can value more or less than 1% adding to the student's final grade. The bonus point value depends on class average marks. If the class average marks are too low, pop quizzes may be arranged for extra bonus points. Pop quizzes (if any) are ONLY for students who attended the classes. No excuse or exception for students who do not attend the classes for whatever reason, unless your case is very special and with special approval from the department chair or other officer.

Lecturing Schedule & Course Contents

Week	Date	Chapter	Contents
1	September 7-11	1	Introduction to Genetics
			Introduction to Genetics
2	September 14-18	2	Chromosomes and Cellular Reproduction
			Chromosomes and Cellular Reproduction
3	September 21-25	3	Basic Principles of Heredity
			Basic Principles of Heredity
4	Sept 28-Oct 2	4	Extensions and Modifications of Basic Principles
			Extensions and Modifications of Basic Principles
5	October 5-9	5	Linkage, Recombination, and Eukaryotic Gene Mapping
			October 7, 2026: Exam One covers Chapters 1-3 (25%)
6	October 12-16		Fall Reading Week
7	October 19-23	6	Chromosome Variation
			Chromosome Variation
8	October 26-30	7	Bacterial and Viral Genetic Systems
			Bacterial and Viral Genetic Systems
9	November 2-6	8	DNA: The Chemical Nature of the Gene
			DNA: The Chemical Nature of the Gene
10	November 9-13	9	DNA Replication and Recombination
			DNA Replication and Recombination
11	November 16-20	10	From DNA to Proteins: Transcription and RNA Processing
			From DNA to Proteins: Transcription and RNA Processing

12	November 23-27	11	From DNA to Proteins: Translation
			November 25, 2026: Exam Two covers chapters 4-9 (35%)
13	Nov 30-Dec 4	12	Control of Gene Expression
			Control of Gene Expression
14	December 7-11		December 7 (or maybe December 2), 2026: Exam Three covers chapters 10-12 (10%, only 2% of questions from chapter 12)

Lakehead University 2026 Fall Term Courses

First Day of Classes	September 8, 2026
Final Day of Classes	December 8, 2026
Final Date to Register (Add)	September 21, 2026
Fall Reading Week	October 12 - October 16, 2026
Final Date to Withdraw (Drop)	November 6, 2026
Study Days	December 9 - December 10, 2026
Examination Period	December 11 - December 20, 2026
Exam Contingency Date	December 21, 2026
Marks Due	December 24, 2026

Lakehead	Grading System	Biol 2171 Grading Plan (only for your reference)	Grading Scheme
A+	90-100	~20% of the students	20% x 95 = 19.00
A	80-89	~30% of the students	30% x 85 = 25.50
B	70-79	~30% of the students	30% x 75 = 21.50
C	60-69	~10% or less of the Students with C or Fail	10% x 65 = 6.50
Fail	01-59	~10% or less of the Students with C or Fail	10% X 55 = 5.50
		The class average marks will be around 70-75%. We will have class average not higher than 78%. If the class average is too high, the marks will be reduced by percentage.	*Average by calculation = 78%.
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