



BIOL 2171 – WAO/WAB Genetics
Department of Biology
Winter Term 2023

Instructor Information

Instructor: Maryam Honari, Ph.D.
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Office Hours: Thursdays, 2:00 P.M. - 4:00 P.M.

Teaching Assistant (TA) Information: Chase Moser

Course Identification

Course Number: BIOL 2171
Course Name: Genetics
Course Location: Synchronous virtual meeting via Zoom
Class Times: Monday and Wednesday, 5:30 P.M. - 7:00 P.M.
Lab Time: Mondays 8:00 A.M. - 11:00 A.M.

Course Description/Overview

We will attempt to examine these areas of genetics from the perspective of the experimental and historical geneticist so that we can see the relationship between procedures and methods and the development of ideas, hypotheses, concepts and theories, i.e. the processes and products of science. The objective is to provide students with a broadly-based and fundamental understanding of genetics, and shows how molecular genetics serves to explain many areas of genetics (including Mendelian genetics) and so provides a firmer conceptual basis for all of genetics.

Course Learning Objectives

- Demonstrate the principles and mechanisms of the inheritance of traits and genes in individuals from one generation to the next.
- Explain the relationship between genotype and phenotype.
- Evaluate scientific data using the rules of probability.
- Demonstrate the position and distance of genes on chromosomes and genetic linkage mapping.
- Identify the structure, function of genes, as conceptualized in the so-called "Central Dogma" of molecular biology: DNA>DNA>RNA>PROTEIN.
- Explain how genetic information changes such as mutation, leading to variation within a population and adaptation and evolution of a species.
- Identify basic population genetics, or the genetic "structure" of populations; Genes changes in time, a concept which naturally leads to a consideration of

heritability, evolution and other explanations for genetic variation, adaptation, and diversity.

Course Resources

Course Website(s)

- myCourseLink

Required Course Text(s)

- *Schaum's Outline of Genetics*, 5th edition, (2010), by Susan Elrod and William Stansfield, published by McGraw Hill, ISBN 978-0071625036, is **highly recommended**.
- *Principles of Genetics*, 7th edition, (2015), by D. Peter Snustad and Michael J. Simmons, published by Wiley, ISBN 9781119227984 is **recommended**. Additional material may also be added. Every effort will be made to provide the lecture slides on Canvas a day or more before class. However, not all the slides from each lecture will be provided on Canvas. Some slides will **only be shown** in class. Students are responsible for knowing **all** the material that is presented in class, even if that material is not provided on Canvas and textbook.

Course Schedule/Outline

Some topics may require more or less time to cover than indicated on this schedule, so the actual topics covered on given days are subject to change depending on the rate of progress. Dates of exams and holidays are NOT flexible.

Date	Tentative Topic	Readings
Week 1		
Mon. 01/09	Pre-Mendelian theories	
Wed. 01/11	Introduction to genetics	
Week 2		
Mon. 01/16	Mendelian genetics	Ch 1
Wed. 01/18	Extensions of Mendelian genetics	Ch 2
Week 3		
Mon. 01/23	Extensions of Mendelian genetics	Ch 2
Wed. 01/25	Probability basics	Ch 2
Week 4		
Mon. 01/30	Pedigrees analysis	Ch 2
Wed. 02/01	Co-dominant - Incomplete dominance - Multiple alleles	Ch 4
Week 5		
Mon. 02/06	Linkage - Epistasis - Polygenes	Ch 4, 8
Wed. 02/08	Cytoplasmic inheritance - environmental effect - Lethal alleles	Ch 4, 8
Week 6		

Mon. 02/13	DNA structure	Ch 3
Wed. 02/15	Chromosome packing	Ch 3
Week 7		
Mon. 02/20	Holiday (Family Day)	
Wed. 02/22	Chromosomal theory of inheritance	Developing the Chromosome Theory Clare O'Connor, Ilona Miko, 2008, Nature Education.
Week 8		
Mon. 02/27	Study Break	
Wed. 03/01	Midterm Exam #1	
Week 9		
Mon. 03/06	Complementation test	
Wed. 03/08	Errors in meiotic chromosome segregation	Ch 7
Week 10		
Mon. 03/13	Chromosomal abnormalities	Ch 7
Wed. 03/15	Chromosome mapping in eukaryotes (part 1)	Ch 6
Week 11		
Mon. 03/20	Chromosome mapping in eukaryotes (part 2)	Ch 6
Wed. 03/22	Genetic analysis and mapping in yeast	Ch 6
Week 12		
Mon. 03/27	Gene mutations and its role in molecular evolution	Ch 3
Wed. 03/29	Genetic drift & Natural selection	Ch 9
Week 13		
Mon. 04/03	Gene flow & Hardy-Weinberg	Ch 9
Wed. 04/05	Midterm Exam #2	
Mon. 04/10	Holiday (Easter Monday)	

Assignments and Evaluations

Item	Date(s)	Value
In-class Assignment(s)		10
Lab Report(s)/Participation		25
Research Paper(s)	TBA	3
Mid-Term Test(s)	02/22/23 & 04/05/23	12
Final Examination	TBA	50
Total		100

*subject to change

Late Assignments

1. All required materials must be submitted/ completed by the stated due date and time.
2. A late (date and/or time) assignment will be assessed and graded with a five percent (5%) decrement for each day it is late, including holidays and weekends, up to a maximum of 14 calendar days, after which a grade of zero will be assigned.

Details on assignments

Homework assignments will be posted on **Wednesday** of the week during which the **assignment** material is discussed in class, and they can be a variety of questions including multiple-choice, short answer, computational forms.

Another type of homework is based on either an historic article that provides a context for important discoveries from the past, whereas cases provide a present application of scientific knowledge to current practices. In answering the homework questions on articles or cases, you are free to use the article or case, the lectures, the internet, books, or reference materials (but not each other!) to help you work through the questions. The questions on historic articles rely on statements in the articles and hopefully will provide a sense of science at the time the article was written.

Course Policies

- Regular and punctual attendance in their classes is expected of all students (including lectures, seminars, laboratories, etc.).
- Laboratory participation that includes quizzes, abstract/summaries, and lab reports will be counted in the final points.
- By completing the test/exam or in submitting their assignment, it is expected that the student has read, understands and agree to the following integrity statement.

Academic Integrity Statement:

I understand and agree that:

(1) Unless otherwise allowed by the course instructor, I must complete the assignments in this course without the assistance of anyone else.

(2) Unless otherwise allowed by the course instructor, I must not access any sources or materials (in print, online, or in any other way) to complete any course exam.

I further understand and agree that, if I violate either of these two rules, or if I provide any false or misleading information about my completion of course assignments or exams, I may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University's academic values.

University Related Requirements

Regulations

It is the responsibility of each student registered at Lakehead University to be familiar with, and comply with all the terms, requirements, regulations, policies and conditions in the Lakehead University [Academic Calendar](#). This includes, but is not limited to, Academic Program Requirements, Academic Schedule of Dates, University and Faculty/School Policies and Regulations and the Fees and Refund Policies and Schedules as follow:

(<https://csdc.lakeheadu.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=29&chapterid=9659&loaduserredits=False>, 12/30/22).

Academic Integrity

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 are strongly advised to familiarize themselves with the Student Code of Conduct - Academic Integrity ("[The Code](#)") - and, in particular, **sections 26 and 83 through 85**. Non-compliance with the Code will NOT be tolerated in this course and the Code will be adhered to in terms of disciplinary action. The Code provides a full description of academic offences, procedures when Academic Integrity breaches are suspected and sanctions for breaches of Academic Integrity.

Copyright

Students should be aware that all instructional, reference, and administrative materials prepared for this course are protected in their entirety by copyright. Students are expected to comply with this copyright by only accessing and using the course materials for personal educational use related to the course, and that the materials cannot be shared in any way, without the written authorization of the course instructor. If this copyright is infringed in anyway, students may be prosecuted under the Lakehead University Student Code of Conduct – Academic Integrity, which requires students to act ethically and with integrity in academic matters and to demonstrate behaviours that support the University's academic values.

Supports for Students

There are many resources available to support students. These include but are not limited to:

- [Health and Wellness](#)
- [Student Success Centre](#)
- [Student Accessibility Centre](#)
- [Library](#)
- [Lakehead International](#)
- [Indigenous Initiatives](#)

Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities and/or medical conditions to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a disability and think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please contact [Student Accessibility Services](#) (SC0003, 343-8047 or sas@lakeheadu.ca)

Mental Health Syllabi Statement

As a university student, you may sometimes experience mental health concerns or stressful events that interfere with your academic performance and negatively impact your daily activities.

All of us can benefit from support during times of struggle. If you or anyone you know experiences academic stress, difficult life events or feelings of anxiety or depression, Student Health and Wellness is here to help. Their services are free for Lakehead Students and appointments are available. You can learn more about confidential mental health services available on and off campus at lakeheadu.ca/shw.

Remember that getting help is a smart and courageous thing to do- for yourself, for those you care about, and for those who care about you. Asking for support sooner rather than later is almost always helpful.