

WELCOME TO 'CHEZ GENETICS'

FEATURED CHEFS

Head Chef ~ Prof. Debra Grantham ~ *Please contact for assistance & suggestions for improvement*

Dr. Andrew Schofield ~ *Specialty: Mendelian genetics, problem solving, genetic evolution, use of genetics in society, molecular biology, control of gene expression & applications*

Dr. Paul Bentzen ~ *Specialty: Chromosomes, mutations, biotechnology, gene editing and sequencing*

APPETIZER

Why are you here? Why genetics?

Orientation Mixer in first meeting

What are the options? (Syllabus)

MAINS

Unit 1- How are traits transmitted from parents to offspring, really? Why do we all not look identical?
(Problem-solving skills through Achieve, flipped lectures, labs)

Unit 2- How are traits encoded, in what form, and how does a cell know to express them?
Why aren't all the cells in the body with identical DNA sequences the same?
(Critical thinking skills through flipped lectures and Achieve, researching and writing like a scientist in lab)

Unit 3- How do we know about genes? How do genes change spontaneously, and how do humans create changes?
(Authentic research making a difference, applications of genetic theory)

DESSERTS

Interact with diverse group of genetic researchers!

Explore connections between genetics and your broader interests in science and society

Integrate genetics into your unique vision for yourself in science, or in a science career

BEVERAGES

Building a cooperative and diverse learning community

Learning together through peer instruction

No deductions for trying and getting it wrong the first time

Genetics and Molecular Biology Syllabus

(Updated Jan 1, 2025)

Department of Biology BIOL 2030.03 Winter 2025

Dalhousie University acknowledges that we are in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People and pays respect to the Indigenous knowledges held by the Mi'kmaq People, and to the wisdom of their Elders past and present. The Mi'kmaq People signed Peace and Friendship Treaties with the Crown, and section 35 of the Constitution Act, 1982 recognizes and affirms Aboriginal and Treaty rights. We are all Treaty people.

Dalhousie University also acknowledges the histories, contributions, and legacies of African Nova Scotians, who have been here for over 400 years.

Instructors	E-mail	LSC Office	Student Hours (in-person)*
Debra Grantham (Coordinator) she/her	grantham@dal.ca	6089	Mon & Wed 11:35-12:25 PM
Dr. Andrew Schofield (Unit 1&2) he/him	a.schofield@dal.ca	3075	Tues 9:30 – 10:30 AM or appt
Dr. Paul Bentzen (Unit 3) he/him	paul.bentzen@dal.ca	6052	Wed 1:35-2:35 PM or appt

*Student hours are times we can meet with you to answer questions or discuss any aspect of the course

Student Resources

Technology

BIOL 2030 will use Dalhousie-supported programs, mainly **Brightspace** and Microsoft **Teams**, and share files through Teams and Microsoft 365. All students have [free access](#) to Microsoft Office products and our assignment templates are all MS **Word**. A laptop or device with Teams, Word, Outlook and Chrome installed will give you the best class experience! Bring them to every class, tutorial and lab if possible. Talk to Debra if you need to borrow a laptop.

What if I feel sick? As Dalhousie members, we all have to respect our classmates. Please **stay home** if you are sick. If you are well enough to work from home, you are expected to join class (labs or tutorials) through Teams. You have **one [Student Declaration of Absence \(SDA\)](#)** to use for any **missed academic requirement throughout term** (for a three day extension or opportunity to makeup) so please file the SDA using the form and link on our homepage in Brightspace (lower right corner :). Request lecture recordings if you missed class from Debra.

How will I be able to answer questions? Helpful resources are plentiful- the textbook, our recorded mini-lectures, animations, self-quizzes, and tutorial questions and solutions are all excellent sources of trusted information. You can earn credit by participating in tutorials,

completing the **Achieve homework** every week and completing the laboratory exercises within a reasonable time. Problem-solving takes a lot of practice, so we have found problems in the text, tutorials and Achieve that allow you to struggle with important concepts and practice solving them while earning points for trying. This is called *formative learning*.

What are the Lecture times in the Timetable? Chez Genetics meets Monday, Wednesdays and Fridays from 12:35 – 1:25 pm in the charming and comfortable Ondaatje Auditorium (Auditorium 2) in the [Marion McCain Social Sciences Building](#). Lectures are the principal way to learn and practice genetics, so you are expected to attend each one. There may sometimes be pre-recorded short videos to view before you come (especially if we are doing an activity!) or questions to complete after lecture. There are also animations and learning activities in the accompanying modules to help you practice the concepts. **Checklists** will help you keep on track. If you are ill, contact Debra and you can view those recorded lectures you've missed. Please join us for a wonderful meal of hearty problem solving and friendly company, with some spice thrown in!

Our first meeting is Monday Jan 6, 2025 at 12:35PM in Ondaatje Auditorium.

What are the Tutorial times? A helpful and expert guide will host group work sessions in person solving those difficult tutorial questions in the Achieve assignments. They will not lecture at you, but you can discuss any tricky concepts, interpretations, or extensions of the ideas you have or need to solve problems. If you **participate**, you will receive course credit for doing so (9 weekly tutorials, Achieve Tutorial assignments worth 9%, participation worth 3%). Your first Tutorial is the week of Sep 9-13.

What are the Laboratory times? Laboratories are two-hour wet-lab sessions that allow us to tackle weightier problems, perform some experiments and collect data, and learn approaches to interpret that data. The week after your wet lab you will meet for a one hour dry lab in a classroom with your pod and TA to continue the report work. You can chat with your pod of 4 and all contribute to the group in-lab assignments but show your unique and original work in your epistasis report, drafts and final scientific paper which are all **individual**. Please see the **Lab info** in Brightspace for details (9 weekly labs total, worth 23%).

Your first lab is the week of Jan 13-17 or Jan 20-24 (see **Laboratory Format**).

What if I need extra help? You are encouraged to reach out to your TAs through Teams if you find you're not sure of what you need to do on ANY assignments. Your profs love for you to come see them at student hours to ask about lectures or labs or just to say hello! You can also attend the **DABS concept room** help sessions where previous students can help you!

Communication

Questions related to content? Post in the Brightspace Discussion forum '[Any questions?](#)' and your post will be answered in 24 hours. If you know the answer, please help out a classmate!

Tutorial questions? Ask during your weekly **tutorial** session meetings.

Need to talk to one of the lecturers about specific problems? Drop into their student hours at their office (posted above) or make an appointment for a meeting. You can also drop into Debra's student hours and ask about any aspect of the course.

Personal questions or problems affecting your success in this course? I'm here to help you succeed in the class. We know you can improve and do well in genetics! Contact [Debra Grantham](#).

Email responses may take up to 2 days and are not answered outside working hours – 9-5 Monday to Friday.

Autonomy and independent learning

One of the most important outcomes of a university education and a skill that you can use forever is your ability to learn independently. We will guide you and give you opportunities and choice over what you do to learn as much as we can, but you are ultimately responsible for your learning in this, and any course. **We believe that you have the capacity to be successful at Genetics!** Please reach out to us if you're struggling and we'll do what we can to help.

CLASS CODE OF CONDUCT

In this course, because your voice will be heard when we discuss societal issues based on genetics, please give this courtesy to everyone in the class. We are all learning and mistakes will be made and understand you can communicate your discomfort or opposition (an example would be a microaggression, an example that made you uncomfortable, or gender stereotype) anonymously through the [Diverse Perspectives survey](#) open all term in Brightspace. I would appreciate suggestions on how to make BIOL 2030 more inclusive and diverse. We all have different stories and experiences, and we want to make our class a safe space to share them and learn together.

Course Description (from the Calendar)

The power and prominence of modern genetics are emphasized through a blend of classical and molecular approaches. Topics include: Mendelian, population and quantitative genetics; chromosome structure and variation; structure and function of nucleic acids; DNA replication, transcription and translation; gene expression; gene mutations; and genetic engineering.

Course-based research experience in lab.

Course Prerequisites

-Courses:

A grade of C or higher in BIOL 1010.03 or (BIOL 1020.03, BIOL 1030.03, BIOA 1002.03, SCIE 1507.09). RECOMMENDED: CHEM 1011.03 and CHEM 1012.03

EXCLUSIONS: GENE 2000.03

-Knowledge/skills:

You will draw on these skills you have developed in previous courses:

- Compare and contrast the fundamental characteristics of eukaryotic, prokaryotic, diploid and haploid organisms
- Describe the stages of mitosis and meiosis and the cell cycle.
- Recall the basic concept of heredity, and that genetic information is encoded in DNA.
- Define genotype, phenotype, chromosome, gene, allele, recessive and dominant.
- Contrast the basic differences between DNA and RNA and describe how information flows from DNA to RNA to protein.
- Identify the minimal regulatory elements and how they function in the control of gene expression of inducible operons in prokaryotes.
- Define the principal classes of physical and chemical mutagens, the changes mutation introduces to the amino acid sequence of a polypeptide, and the resulting effect on phenotype.
- Describe the basic methodology of gene cloning and DNA technology/biotechnology, some applications, and their ethical and societal implications.
- Interpret the concepts of evolution as changes in allele frequencies and the Hardy-Weinberg principle. Calculate expected genotype and allele frequencies in simple cases.
- Describe the components of a scientific paper.
- Collect scientific literature using library resources, incorporate information from them into a scientific paper, and properly cite these sources.
- Explain the importance of academic integrity

If you feel that you need to review any of these topics before term, please see the resources on the “**Recall your past knowledge of genetics**” page in Brightspace

Course Materials

If you'd like to learn well you'll need:

1. **Achieve Access (for grades from the tutorials) and a version of the text, through the [Dal Bookstore](#) :**
 - **Option 1 (a good deal):** Achieve access + Pierce, Benjamin A. Genetics: A Conceptual Approach (7th Update edition) 2024. (E-book) ~\$70.00

OR

 - **Option 2:** Pierce, Benjamin A. Genetics, A Conceptual Approach (Update 7th ed). 2020. NY: W.H. Freeman (Hardcover) + Achieve access for ~\$140
 - If the cost is a barrier, please contact me at grantham@dal.ca
2. **BIOL2030 Course website:** Connect through my.dal.ca (Brightspace). Weekly modules to organize content, provide lecture slides, pre-lab, lab and tutorial activities. What is going on this week? What is due? What should I be working on?
3. **Microsoft Teams:** Install the desktop app early [from Office 365](#) for interacting with your lab team members and the genetics faculty.
4. **Lab coat:** Can be purchased through the [Dal Bookstore](#) for approx. \$25 or you can borrow one of our used ones during lab.

Recommended:

5. Knisely, Karin. 2017. *A Student Handbook for Writing in Biology*. 5th ed.
If you don't have a copy, follow the miRNA paper guidelines provided in the Lab Brightspace pages, and the Writing for Biology video series links there. Individual examples will be posted.

For blended course delivery:

BIOL 2030 will use **Brightspace** and **Microsoft Teams**. You will also need to share files through Teams in labs. **Achieve** tutorial assignments are through Macmillan Learning's link from our Brightspace. All students have [free access](#) to Microsoft Office products and our assignment templates are all **MS Word**. A laptop or device with Teams, Word, Outlook and Chrome installed will give you the best class experience! Bring them to **every** class, lab and tutorial if possible. Talk to [Killam Library](#) about borrowing laptops.

Course Assessment

Course assessments are designed to align with learning outcomes:

Formative(Form.): Designed to give you immediate feedback on what you are learning- no or low marks but important for you to be aware of what you do know and do not know. This is called [Metacognition](#). If you've struggled in first year with getting the marks you wanted, now it the time to click on the Metacognition link and watch (and try!) Dr. Chew's recommendations. I've read many books and articles and his advice is still accurate and one of the best resources I've found for improving success! (Debra)

Summative(Summ.): Designed to assess whether you have mastered all the learning outcomes, or which outcomes you have mastered. More weight for marks, to encourage you to prepare for them by practicing problems and testing yourself before the assessment.

Both types of assessments are better for your learning if first attempted without looking at notes.

Component	Weight (% of final grade)*	Date
<i>Achieve tutorial assignments (Form.) (best 9/10)</i>	9	Weekly, start at in-person Tutorial and complete by 5 days after your tutorial by 11:59 pm (<i>none in Midterm weeks</i>)
<i>Participation (Form.)</i>	3	Participate in group work in tutorials; attend and ask questions, help others solve tutorial questions.
<i>Midterms (Summ.) 3 midterms, 1 for each Unit (20% each) Not cumulative, IN-PERSON</i>	60	MT1: Tue Feb 25, 6:30-8:30 PM (Rowe 1028) MT2: Tue Mar 25, 6:30-8:30 PM (Rowe 1028) MT3: TBA, final exam period, sched. by Registrar
<i>Conversation with a TA (Individual) (Summ.) IN-PERSON</i>	5	Sign up for a session (3 weeks through middle of semester, Feb 26-Mar 21)

Laboratory Assignments:

Individual:

<i>Pre-lab quizzes/Epistasis report (5) (Form.)</i>	4	Due by lab start time
<i>Drafts of scientific paper (Form.)</i>	4	Due by lab start time, week after lab when peer reviewed
<i>Final version scientific paper (Summ.)</i>	10	Due by 11:30pm AST 5 days after your extra help drop in at the end of term, the week of Mar. 31-Apr 4 . See lab schedule.
Group:		
<i>In-lab Pod assignments (Form.)</i>	5	Due by noon (12:30 PM) the day after your lab session.

Lab total: 23

COURSE TOTAL: 100

- There is no requirement to pass any specific part of BIOL 2030. All parts are added together for your final grade :)

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100) A (85-89) A- (80-84)	Excellent	Considerable evidence of original thinking; demonstrated outstanding capacity to analyze and synthesize; outstanding grasp of subject matter; evidence of extensive knowledge base.
B+ (77-79) B (73-76) B- (70-72)	Good	Evidence of grasp of subject matter, some evidence of critical capacity and analytical ability; reasonable understanding of relevant issues; evidence of familiarity with the literature.
C+ (65-69) C (60-64) C- (55-59)	Satisfactory	Evidence of some understanding of the subject matter; ability to develop solutions to simple problems; benefitting from his/her university experience.
D (50-54)	Marginal Pass	Evidence of minimally acceptable familiarity with subject matter, critical and analytical skills.
F (0-49)	Inadequate	Insufficient evidence of understanding of the subject matter; weakness in critical and analytical skills; limited or irrelevant use of the literature.

Course Structure

Course Delivery

In-person lectures, tutorials and laboratories. All students are expected to attend **all** lectures, tutorials, and labs. **If you are ill**, you are not expected to attend, but will be given access to the recorded live lectures that you missed due to illness to help you catch up. If you are well enough to complete work through Teams (in-lab assignments or tutorial sessions) you are encouraged to do so or make up the work later. If you have an extended illness and makeups are impossible, you will be excused from those assignments.

Blended aspects: Additional pre-lecture videos/animations, tutorial question solution videos, pre-lab videos and online pre-lab quizzes. Group assignments completed through Teams Files in breakout rooms (channels).

LECTURE FORMAT: In-person lectures will be the primary way to learn the content and is supplemented by assigned videos/animations/exercises in the module for that week. Lecture schedule with topics and readings is provided at the end of this syllabus. **Checklists** at the beginning of each module will guide you how to prepare to participate fully in all lecture activities. It would be useful to bring your laptop to our lecture meetings and open Teams in the Scotiabank Auditorium.

Conversation with a TA(teaching assistant): There is [one 5 min. presentation and 5 min. oral discussion \(in-person\)](#) following Unit 1 worth 5% of your total mark. It is an **individual conversation** with a teaching assistant on a topic that links lecture material to society. We hope you enjoy the opportunity to investigate a topic that is of concern to society, and you personally, and demonstrates your application of genetics theory to the world we live in. You choose the topic and you can potentially explore the answer to one of the big, important genetics questions you have always been intrigued by in the past. It is meant to mimic a conversation you may have with a friend when they hear you have taken genetics.

MIDTERM FORMAT: All midterms will be **in person and held outside of class time, during the evenings**. **Midterm 1** will cover Unit 1, **Midterm 2** will cover Unit 2, and **Midterm 3** will cover Unit 3.

Midterms are only on each Unit (not cumulative), so the weighting cannot be changed.

These tests are designed to assess you on the learning outcomes in the weekly modules, interactive lectures, the text readings and tutorials. You will not be tested on topics you've only learned about in the labs. The midterms consist entirely of questions requiring multiple choice answers and will be time-limited so you need to completely understand the concepts.

You are expected to uphold **academic integrity** standards and **rely on your knowledge and practice of problem solving**.

The final test, Midterm 3, will be held during the exam period:

https://www.dal.ca/academics/exam_schedule.html

Alternate writing times for tests will be offered to students who have another Dalhousie exam or class at the same time or who are ill. Students who have a timing conflict with another class should contact the [Coordinator](#) at least **three days** prior to the test date to arrange another time. Students who feel ill should see the "Missed or Late Academic Requirements" policy below.

MIDTERM VIEWING: There will be viewing sessions after marks are released to look at your test. Watch for Announcements in Brightspace for the date and times of the sessions. Contact the lecturer if you have any questions about the test.

TUTORIAL FORMAT: Tutorial questions are at the end of each weekly module. Videos of worked solutions of certain example questions appear Fridays after the last tutorial. There are specific tutorial TAs who understand the questions thoroughly and can help you if you become stuck.

- You have registered for a tutorial session (check Dal online) and you have the opportunity to work on the [Macmillan Achieve](#) tutorial assignments there in groups with your classmates. You will be assigned a group or pod of 6 others to work with in your tutorial. Group membership is based on declared major to produce **diverse groups of learners which have been shown by research to produce better problem solving**. Diverse perspectives, communicated with respect for each opinion, are welcome!
- The Achieve tutorial assignments open at your tutorial time. There is no embedded feedback in the module tutorial questions, so those are the ones to solve together in tutorial.
- Scrap paper or a notebook will allow you to work out problems.
- The Achieve tutorial assignments have half of their questions as the tutorial questions in the modules, and half are new Achieve questions on the same topics. There are no deductions for retrying questions or using hints up to 10 tries. If you give up and view the solution, you don't earn points for that question.

- The online Achieve tutorial assignment **opens at your tutorial time** and closes **five (5) days after your tutorial by 11:59 pm**.
- There are 10 assignments total, with your lowest mark dropped.
- There is one **bonus** survey (**Study Strategies Intro Survey**) worth one point open for the first weeks of term.
- **Participation:** The following criteria will be used: 1pt for coming 3 times or more, 2pts for coming to 4 times, and 3pts for 5 times or more and being actively being engaged during tutorials (discussing with classmates, helping others, asking questions, working on problems together).

IMP



To complete the Achieve tutorial assignments and to gain access to the Pierce e-textbook you will need to purchase access through a [course link](#) or the Dal Bookstore. DO NOT google Macmillan directly or purchase from another source (no used textbooks will include access!) or your work may not be visible to our teaching team. See the options for access above, under Course Materials. The schedule and location of tutorial sessions is listed on the [Tutorial Sessions](#) page in Brightspace.

LABORATORY FORMAT: Labs will begin as weekly wet labs in LSC 6009 or 6012 with collaborative work in pods of four students. Pods will be assigned in advance of the first lab based on declared major to produce diverse groups.

- **Sections B01, B02, B03, B04, B05 and B06 will have their first lab the week of Jan 12-18.**
- **Sections B07, B08, B09, B10, B11, B12, B13 and B14 will have no labs that week (Jan 12-18) but will have their first lab the week of Jan 19-25.**

In either case, labs are busy so you will want to come prepared by doing the pre-lab reading and quiz if there is one.

Check the [lab schedule](#) for the complete term schedule. DAL ONLINE shows in which lab section you have registered. **ALL Lab content** is in a separate LABS folder at the top of the Table of Contents.

- Online pre-lab quizzes must be completed up to 5 minutes before lab begins.
- In-lab assignments are due by noon or 12:30 PM AST of the day **after** your lab session.
- Although data is collected together, and group in-lab assignments will be collaborations of your pod, **all written work on your epistasis report, drafts and final scientific paper is individual.**
- Drafts of your scientific paper sections are due at the **start** of the lab session when they will be peer-reviewed by your pod mates. You will then have a week to make edits based on the

suggestions of your peers and submit for TA feedback to the assignment dropbox **before your next wet lab** (check the lab schedule for due dates).

- Drafts and the final version of your miRNA paper will be screened **by Turnitin** for plagiarism to ensure fairness to all. Please share your own ideas. If you use any outside sources or AI tools to assist your writing, good ethical practice means you need to describe the tool and where you have used it. See **Academic Integrity**.
- Late lab assignments may receive a 5% deduction for each day late, to a maximum of **5** days late.
- **Unfortunately we can't allow you to switch labs because of space limitations. If you are sick and need to attend a different lab please contact Debra about makeups and adjusting due dates.**

Missed or Late Academic Requirements

Requests for an alternative quiz time due to extenuating circumstances: If you have another Dalhousie class or exam scheduled at the same time as our Unit midterms or have another type of unavoidable conflict with the test, please should contact the [Coordinator](#) at least three days prior to the quiz date to arrange another time.

Missed Midterms, tests, tutorial assignments, labs or lab reports due to illness or other exceptional circumstances: We understand that you may feel ill and should not come to Dalhousie campus. We support this! If you are slightly ill and can still do some coursework, you should do so and join the class work via Teams if possible. In any case, contact the coordinator to arrange accommodations.

If you must miss a due date because of illness or other reasons:

1. **Notify the coordinator (grantham@dal.ca)** by e-mail **before** the academic requirement deadline or scheduled time to arrange a makeup or extension. Accommodations will depend on your situation and will be decided with the Coordinator, Debra.
2. **Submit a Student Declaration of Absence Form through Brightspace** within three (3) days following the last day of absence. Can be used **once** per term for absences of **3 days or less** to avoid academic penalty or loss of marks. For more [info](#)
3. For absences of **longer than 3 days**, current regulations established by the University state students can still submit a Student Declaration of Absence Form. If you've already used yours, please contact the [Coordinator](#).

There will be times during your term when you will have deadlines in several different courses at the same time. **PLAN AHEAD. WORK CONSISTENTLY. TEST YOUR RECALL.** Your time at university should, among other things, teach you to develop effective time management skills and study habits. On the other hand, unforeseen events such as personal/family crises or illness can occur during the term. These occurrences are unavoidable, and the teaching staff of 2030 will be most understanding and willing to make alternate arrangements. This can include no late deductions. **Please speak to one of the teaching staff as soon as you think you're falling behind.**

Academic Integrity

In BIOL 2030, group work in lecture, tutorial and lab is encouraged. You will be placed in pods of 6 people for tutorials and pods of 4 for labs.

- In tutorials, you are encouraged to discuss the questions as you complete the Achieve questions together and help your podmate's understanding (think like a tutor or TA :).
- In labs, you can discuss questions with your pod of 4 and all can contribute to a single group in-lab assignment.
- You should show your unique and original work in the epistasis report, your drafts and final scientific paper, which are all **individual, your own ideas and synthesis and in your own voice** (no direct quotes from other sources- we want to know what you think!).

The epistasis report and drafts and the final version of your scientific paper will be screened for plagiarism by **Turnitin** to ensure fairness to all.

Use of any online “homework” sites like Chegg or CourseHero to answer questions defeats the purpose of doing practice questions and labs and may lead to an academic integrity investigation.

Restricted use of Artificial intelligence

- You may use AI-driven tools to assist your learning, but you may not use them to produce work to be submitted for evaluations.
- Due to the nature of this course, it would be impractical and more difficult to assess students properly if AI-driven tools were allowed. For this reason, and even if these tools will be valuable tools in your career, their use is restricted.
- Using AI-driven tools when producing submitted work constitutes an academic offence.

Midterms are individual, in-person only, and not collaborative. Even though you work together to learn and prepare for the midterms, know that you will need to rely on your own **knowledge, recall and problem-solving abilities** when assessed in your midterms, so **practice these skills throughout term if you want to do well.**

Learning Outcomes

If you've built skills through this course you can:

- Manipulate the theories and topics covered in lecture and readings by solving problems in lecture, tutorials and labs.

Unit 1:

- Defend the importance of genetics to society and the study of biology and explain this to non-specialists.
- Manipulate Mendelian principles of heredity for both autosomal and sex-linked inheritance.
- Apply rules of heredity to the eukaryotic cell cycle. Relate meiotic crossing over and genetic linkage.
- Show how complex genetic systems lead to modifications of the basic principles of Mendelian inheritance.
- Summarize the basic principles of population and quantitative genetics and apply these principles to real biological systems.

Unit 2:

- Diagram the structure of DNA, DNA replication, how DNA is transcribed to RNA, and how RNA is translated into proteins.
- Diagram the structure of RNA and how post-transcriptional processing modifies it prior to translation.
- Interpret genetic and protein variability using detailed knowledge of the genetic code and the processes of transcription and translation.
- Compare and contrast the regulation of gene expression in prokaryotic and eukaryotic cells
- Relate chromosome structure, the types of rearrangements that occur, and the consequences of variations in chromosomal number.

Unit 3:

- Explain and illustrate the fundamental biochemistry required in the application of modern techniques of molecular biology: (i) gel electrophoresis; (ii) contemporary methods used for determination of DNA sequences, and the key similarities and differences among them; (iii) amplification of DNA via the polymerase chain reaction (PCR); (iv) evaluation of gene expression via quantitative PCR; (v) determination of epigenetic methylation of DNA sequences.
- Classify physical and chemical mutagens, identify chemical mutagens by the Ames test, and predict the effect of different types of mutation on phenotype.
- Describe recombinant DNA technology and different approaches to the genetic modification of multicellular organisms.
- Explain approaches to the study of genetic variation at the molecular level and some of the key applications of these approaches.

In labs:

- Develop a testable scientific hypothesis and design a research approach with appropriate controls.
- Apply techniques used in genetic and molecular biology laboratories.
- Generate, organize, interpret, and critique data collected from experiments in the laboratory and communicate results by an original and individually written scientific paper.
- Summarize, cite and reference scientific literature to avoid plagiarism.

Course Content

BIOL 2030.03 TENTATIVE Lecture Outline Unit 1 (Winter 2025)

(Changes to these readings may occur and will be announced in modules; lectures may overlap modules)

Module	Dates	TOPIC	Pierce 7th edition (pages)	Tests and Assignments
1	5-Jan 11-Jan	M1: Genes, chromosomes, and the copying genetic information & review of basic heredity (M2)	Ch 1.1 & 1.3 (p5, 12-13) Ch 2 Intro & 2.1 (p17-21) Ch 2.2 (p20-25) Ch 2.3 up to Fig. 2.18 (p27-35)	
2	12-Jan 18-Jan	M2: Heredity - Basics and Extensions & Modifications	Ch 3.1 & 3.2 (p48-67) Ch 3.3 (p56-67) Ch 5 Intro to 5.2, not dog coat colour (p110-127)	Tutorials begin (T01 to T11) Achieve Tutorial 1 assignment Labs begin (B01-B06)
3	19-Jan 25-Jan	M3: Binomial Expansion, Sex Determination, Sex-Linkage	Ch 3.2 (p58-60) Ch 4 Intro to 4.3 (p81-99)	Achieve Tutorial 2 assignment Labs begin (B07-B14)
4	26-Jan 1-Feb	M4: Linkage Mapping in Eukaryotes, Mendelian Basis of Quantitative Genetics	Ch 7.1 & 7.2 (p180-190 & p193-195) Ch 7.3 Effects of Multiple Crossovers (p203-204)	Achieve Tutorial 3 assignment
5	1-Feb 8-Feb	M5: Quantitative Genetics and Population Genetics M5: Capstone: preparation for "Conversations with a TA"	Ch 24.1 (p732-737) Ch 24.2 & 24.3 (743-752) [self review p737-743] Ch 25.1 to 25.3 (p766-774)	Achieve Tutorial 4 assignment
Unit I - Midterm 1: Tuesday Feb 25 (M1, M2, M3, M4 and M5), Rowe 1028 (Potter), 6:30-8:30 PM				

BIOL 2030.03 TENTATIVE Lecture Outline Unit 2 (Winter 2025)
 (Changes to these readings may occur and will be announced in modules)

Module	Dates		TOPIC	Pierce 7th edition (pages)	Tests and Assignments
6	9-Feb	15-Feb	M6: DNA, RNA, & Replication & Transcription	Ch 10 Intro to 10.3 (p293-308) Ch 12 Intro to 12.4 (p345-366) Review Ch 2.1 to 2.3 (p23-35) Ch 13.1 to 13.4 (p379-396) Ch 17.3 (p507-508)	No tutorial assignment; review for Midterm 1
Study Break	16-Feb	22-Feb			
7	23-Feb	1-Mar	M7: RNA Interference and RNA Processing	Ch 14.5 (p424-427) Ch 17.5 (p515-517) Ch 19.2 & 19.6 (p574-578, 601-602) Ch 14.1 to 14.4 (p405-424) Ch 17.4 (512-514)	Achieve Tutorial 5 assignment Midterm 1- Tuesday Feb 25, 6:30-8:30 PM in Rowe 1028 Conversation with a TA (begins)
8	2-Mar	8-Mar	M8: The Genetic Code and Translation	Ch 15 Intro to 15.2 (p435-446) Ch 18.1 (p528-530) Ch 15.3 & 15.4 (p446-458)	Achieve Tutorial 6 assignment
9	9-Mar	12-Mar	M9: Regulation of gene expression	Ch 16.1 & 16.2 (p470-484) Ch 13.2 & 13.3 (p383-392) Ch 11.1 (p320-325) Ch 17.1 to 17.3 (p502-05, 510, 517-18) Ch 21.1 & 21.2 (651-653; 656-658) [Self-review: Ch 13.4 (p392-396) and Ch 14.2 (p416-418)]	Achieve Tutorial 7 assignment

Unit 2 - Midterm 2: Tuesday Mar 25 (M6, M7, M8, and M9), Rowe 1028 (Potter), 6:30-8:30 PM

BIOL 2030.03 TENTATIVE Lecture Outline Unit 3 (Winter 2025)
(Changes to these readings may occur and will be announced in modules)

Module	Dates	TOPIC	Pierce 7th edition (pages)	Tests and Assignments
10	14-Mar 22-Mar	M10: Variations in chromosomes and consequences; Ames test, REs and gel electrophoresis	Ch 8.1 to 8.4 (p224-228) Ch 18.1 to 18.3 (p525-545) Ch 19.1, 19.2 (p569-575)	No tutorial assignment; review for Midterm 2
11	23-Mar 29-Mar	M11: Tools of the Geneticist-PCR, qPCR, sequencing	Ch 19.3 (p590-594) Ch 11.1 (p318-319) Ch 20.1 (p618-623, 625-628)	Midterm 2: Tue Mar 25, 6:30-8:30 PM in Rowe 1028 (Potter) Achieve Tutorial 8 assignment
12	30-Mar 5-Apr	M12: CRISPR, Recombinant DNA tech, cloning, GMOs	Ch 11.3 (p327-328) Ch 19.3 (p582-587) Ch 14.5 (p426-427) Ch 19.2 & 19.7 (p574-578; 604-605)	Achieve Tutorial 9 assignment
13	6-Apr 7-Apr	M13: Wrap up		Achieve Tutorial 10 assignment due Apr 8 by 11:30 PM
Unit 3 - Midterm 3: During Final exam period (M10, M11 and M12), Dalplex				

University Policies and Statements

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit or e-mail the Indigenous Student Centre at 1321 Edward St or elders@dal.ca. Additional information regarding the Indigenous Student Centre can be found at: https://www.dal.ca/campus_life/communities/indigenous.html

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At Dalhousie, 'thinking and acting globally' enhances the quality and impact of education, supporting learning that is "interdisciplinary, cross-cultural, global in reach, and orientated toward solving problems that extend across national borders." Additional internationalization information can be found at: <https://www.dal.ca/about-dal/internationalization.html>

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Accessibility

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Conduct in the Classroom – Culture of Respect

Substantial and constructive dialogue on challenging issues is an important part of academic inquiry and exchange. It requires willingness to listen and tolerance of opposing points of view. Consideration of individual differences and alternative viewpoints is required of all class members, towards each other, towards instructors, and towards guest speakers. While expressions of differing perspectives are welcome and encouraged, the words and language used should remain within acceptable bounds of civility and respect.

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2). Additional diversity and inclusion information can be found at: <http://www.dal.ca/cultureofrespect.html>

Student Code of Conduct

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https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

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