

**DEPARTMENT OF SCIENCE**

**COURSE OUTLINE – FALL 2022**

**BI2070 A2 – MOLECULAR GENETICS AND HEREDITY (3-1-3)**

**105 HOURS FOR 15 WEEKS**

Northwestern Polytechnic acknowledges that our campuses are located on Treaty 8 territory, the ancestral and present-day home to many diverse First Nations, Metis, and Inuit people. We are grateful to work, live and learn on the traditional territory of Duncan's First Nation, Horse Lake First Nation and Sturgeon Lake Cree Nation, who are the original caretakers of this land.

We acknowledge the history of this land and we are thankful for the opportunity to walk together in friendship, where we will encourage and promote positive change for present and future generations.

**INSTRUCTOR:** Dr. Shauna Henley, **PHONE:** 539-2439  
PhD

**OFFICE:** J215 **E-MAIL:** SHenley@nwpolytech.ca

**OFFICE HOURS:** Monday 12:30 – 2:00; Tuesday 1:00 – 2:00; Wednesday 1:30 – 2:30;  
Thursday 1:30 – 2:30

**CALENDAR DESCRIPTION:** The course covers chromosomal and molecular basis for the transmission and function of genes. The construction of genetic and physical maps of genes and genomes. Strategies for the isolation of specific genes. Examples of regulatory mechanisms for the expression of the genetic material in both prokaryotes and eukaryotes.

**PREREQUISITE(S)/COREQUISITE:** BI1070

## **REQUIRED TEXT/RESOURCE MATERIALS:**

“Principles of Genetics” by Snustad & Simmons, 7<sup>th</sup> edition, John Wiley & Sons Inc., 2016.

University of Alberta, Biology 2070 Laboratory Manual 2022/2023. The latest version of the lab manual must be purchased. It will be available in the NWP bookstore.

## **DELIVERY MODE(S):**

Lectures – Monday and Wednesday, 10:00 – 11:20

Seminars – Friday, 1:00 – 1:50

Labs – Wednesday, 2:30 – 5:20

## **COURSE OBJECTIVES:**

Upon completion of the course, students should be able to:

1. Apply knowledge of the structure of molecules and cells to explain how genetic information is passed between generations.
2. Demonstrate an understanding of molecular biology through the study of genetic analysis.
3. Apply knowledge of laboratory skills and techniques to generate data and conduct analyses of that data.

## **LEARNING OUTCOMES:**

1. To gain an understanding of the basic principles of inheritance at the molecular, cellular and organismal levels.
2. To understand the molecular basis for mutation and how it applies to changes in genotype/phenotype.
3. To comprehend how gene expression is regulated in prokaryotes and eukaryotes and apply this knowledge to examples in molecular biology.
4. To develop the ability to design, analyze and report the findings of scientific experiments.
5. To foster critical thinking skills.

## **TRANSFERABILITY:**

Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at the Alberta Transfer Guide main page

<http://www.transferralberta.ca>.

**\*\* Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability**

**EVALUATIONS:** Midterm Exam – 25%

Laboratory – 30%

Seminar – 10%

Final exam – 35%

The midterm exam will be held on **Monday, October 24<sup>th</sup>**. The final exam will be cumulative and will take place during the exam period. Failure to write the midterm or exam will result in a grade of zero unless appropriate documentation is provided.

**GRADING CRITERIA:** Please note that most universities will not accept your course for transfer credit **IF** your grade is **less than C-**.

Alpha Grade	4-point Equivalent	Percentage Guidelines	Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	90-100	C+	2.3	67-69
A	4.0	85-89	C	2.0	63-66
A-	3.7	80-84	C-	1.7	60-62
B+	3.3	77-79	D+	1.3	55-59
B	3.0	73-76	D	1.0	50-54
B-	2.7	70-72	F	0.0	00-49

**COURSE SCHEDULE:**

	Topics	Required Text Readings (pages)	
		6 <sup>th</sup> ed.	7 <sup>th</sup> ed.
1.	Introduction to BI 2070	1-15	1-15
2.	DNA and Chromosomes	192-214	189-213
3.	Genes and Proteins	286-292, 310-313	281-288, 303-308
4.	Cellular Reproduction	18-36	18-36
5.	Mendelian Genetics	40-52	40-52
6.	Extensions of Mendelian Genetics	62-76	62-75
7.	Chromosomal basis of Mendelism	89-105	88-104
8.	Pedigree Analysis	53-56, 77	53-56, 76
9.	Variation in Chromosome Number	110-123	111-121
10.	Variation in Chromosome Structure	124-129	122-131
11.	Linkage	135-140	133-138
12.	Mapping Genes on Chromosomes	141-153	139-151
13.	Population Genetics	634-641, 644 – 651	541-548, 551-558
14.	Replication of DNA & Chromosomes	220-227, 231-250	217-224, 228-239, 241-246
15.	Mutation	320-339	313-326

16.	Techniques of Molecular Genetics	366-391	350-372
17.	Genomics	397-412, 415-424	379-393, 397-401
18.	Applications of Molecular Genetics	439-464	417-440
19.	Regulation of Prokaryotic Genes	504-523	459-478
20.	Regulation of Eukaryotic Genes	531-550	484-504
21.	Genetics of Cancer	581-603	*WC51-70

\*this chapter can be found online

**STUDENT RESPONSIBILITIES:** Students are expected to attend **all** classes, seminars and laboratory sessions. All assignments must be completed in full and handed in by the date specified.

**STATEMENT ON PLAGIARISM AND CHEATING:**

Cheating and plagiarism will not be tolerated and there will be penalties. For a more precise definition of plagiarism and its consequences, refer to the Student Conduct section of the Northwestern Polytechnic Calendar at <https://www.nwpolytech.ca/programs/calendar/> or the Student Rights and Responsibilities policy which can be found at <https://www.nwpolytech.ca/about/administration/policies/index.html>

\*\*Note: all Academic and Administrative policies are available on the same page.