Algonquin College

SCI2200
DyNAmic DNA: You are not alone

Course Outline

2022-2023

Pre-requisite(s)	N/A
Co-requisite(s)	N/A
Prepared by	Ryan Porter
Approved by	Natalie Gamble, Chair, Police and Public Safety Institute
Normative hours	42.00
Grading system	A+ Through F
Experiential Learning	No

Applicable Program(s)	Level	Core/Elective
Multiple Programs	Multiple Levels	Multiple Core/Elective

Course Description

DNA is the recipe book for all living things. This small molecule can tell us about our past, present, and future. It is what makes us all unique and what ties us together. DNA can answer some of life's biggest questions: Where do we come from? How are we made? Can we cure disease? Can we predict the future or change the outcome? In this course, we will examine the spectacular DNA molecule and how it works. Through contemporary articles, research, images, and videos, we will investigate ways in which DNA can be used to predict traits, detect disease, discover ancestry and engineer babies. We will look at DNA's involvement in our evolution, and how we can harness its powers to create superfoods, change a wolf into a pug or clone extinct species. Through a combination of discussion boards, quizzes and assignments, students will discuss DNA history, technology and social attitudes, providing them with a greater understanding of their genetic make-up, both on a personal and global level.

General Education Theme Area(s)

This is a General Education course that supports learning in the following theme area(s): Civic Life, Personal Understanding, Science and Technology, Social and Cultural Understanding

Essential Employability Skills

This course contributes to your program by helping you achieve the following Essential Employability Skills:

EES 1	Communicate clearly, concisely and correctly in the written, spoken and visual form that fulfills the purpose and meets the needs of the audience. (T, A)
EES 6	Locate, select, organize and document information using appropriate technology and information systems. (T, A)
EES 7	Analyze, evaluate and apply relevant information from a variety of sources. (T, A)
EES 8	Show respect for diverse opinions, values, belief systems and contributions of others. (T, A)
EES 9	Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals. (T, A)
EES 11	Take responsibility for one's own actions, decisions and consequences. (T, A)

Assessment Levels —T: Taught **A**: Assessed **CP**: Culminating Performance

Course Learning Requirements / Embedded Knowledge and Skills

When you have earned credit for this course, you will have demonstrated the ability to:

1. Describe how building blocks of the living cell, such as DNA, RNA, proteins, and chromosomes, relate to the study of genetics.

- Identify the components of an animal cell.
- Describe the structure, location and purpose of DNA and RNA.
- Explain DNA replication, RNA transcription, protein synthesis and the structure of chromosomes.
- Interpret DNA sequences as they relate to the genetic code.
- Describe reproduction on the cellular level including trait inheritance and genetic variation.

2. Differentiate between the effects of genetic and environmental factors on various physical and behavioural traits.

- Identify differences in allele expression and how they are represented by physical characteristics.
- Discuss gene expression and trait inheritance as it relates to physical traits such as eye colour, blood type, and disease.
- Discuss gene expression and trait inheritance as it relates to behavioural traits such as intelligence, mood disorders and schizophrenia.
- Identify environmental and lifestyle factors that affect gene expression.

3. Summarize chromosome trends and abnormalities relating to physical traits and health conditions, and the methods that allow us to identify those abnormalities.

- Differentiate between different types of gene inheritance.
- Identify single-gene inheritance disorders such as cystic fibrosis and sickle cell anemia.
- Identify chromosomal abnormalities such as Down Syndrome.
- Investigate other hereditary conditions including colour blindness, muscular dystrophy, and hemophilia.
- List the various methods used to detect chromosome trends and abnormalities.

4. Discuss how biotechnology and the study of genetics lead to medical breakthroughs.

- Summarize the field of biotechnology and genetic engineering using tools such as CRISPR.
- Define cancer on a broad level and at the cellular level.
- Identify new gene technologies helping to fight genetic diseases.
- Summarize the Human Genome Project and how the project assists the medical field.

5. Identify theories of evolution, natural selection, and selective breeding.

- Identify Darwin's theory of evolution, natural selection, and species fitness.
- Describe the origin of our species and our position on the Primate Family Tree relative to other ancient human species.
- Explain ancient humans and modern humans using DNA analysis and physiology.
- Explain how different hominins populated the planet.
- Recognize selective breeding and how it relates to agricultural crops and animal breeding.

6. Explain population genetics and how it affects everything from humans, to herds of animals and even bacteria.

- Describe the field of population genetics.
- Define the Hardy-Weinberg Equilibrium and its conditions.
- Identify various population movements and human interactions which affect allele frequency.
- Explain how at-home DNA kits tell us about our ancestry.
- Connect population genetics with species extinction and resistance.

7. Address the field of bioethics as it relates to genetic testing, reproductive technologies, genetically modified organisms, and cloning.

- Explore the field of bioethics.
- Identify different types of assisted reproductive technologies (ARTs).
- Identify genetically modified organisms and investigate pros and cons of GM Foods.
- Trace the process of cloning and how cloning can be used to bring back extinct species.
- Discuss bioethics and privacy of information as it relates to DNA testing kits.

Pre-defined Evaluation / Earning Credit

The following list provides evidence of this course's learning achievements and the outcomes they validate:

Quiz(zes) (30%)

Validates Outcomes: CLR 1, CLR 2, CLR 3, CLR 4, CLR 5, CLR 6, EES 1, EES 6, EES 7

Discussion(s) (30%)

Validates Outcomes: CLR 1, CLR 2, CLR 3, CLR 4, CLR 5, CLR 6, CLR 7, EES 1, EES 6, EES 7, EES 8, EES 9, EES 11

Assignment(s) (30%)

Validates Outcomes: CLR 1, CLR 2, CLR 3, CLR 4, CLR 5, CLR 6, CLR 7, EES 1, EES 6, EES 7, EES 8, EES 9, EES 11

Final Exam (10%)

Validates Outcomes: CLR 1, CLR 2, CLR 3, CLR 4, CLR 5, CLR 6, CLR 7, EES 1, EES 6, EES 7

Learning Resources

Required Resources:

- There is no textbook for this course.
- Course notes are available via Brightspace.
- Required web-based readings and resources (including video and audio clips) will be provided by the professor via Brightspace.
- Students must ensure they have successfully logged in to the Algonquin College Library for certain resource links.

Hardware and Software:

- This course is entirely online. Students are required to have access to a computer and to the internet. They should also ensure they can log in to the Algonquin College Library.

Learning Activities

- Reading, listening and/or viewing online course content
- Completing individual work assignments and projects
- Discovering, retrieving and applying research from the Internet
- Undertaking quizzes, discussions and other forms of assessment

Prior Learning Assessment and Recognition

Students who wish to apply for Prior Learning Assessment and Recognition (PLAR) need to demonstrate competency at a post-secondary level in all outlined course learning requirements. Evidence of learning achievement for PLAR candidates includes:

- Portfolio

Other Information

Students are required to respect the confidentiality of employer, client and/or patient information, interactions, and practices that occur either on Algonquin College premises, or at an affiliated clinical/field/co-op placement site. Concerns regarding clients, patients, and/or employer practices are to be brought to the attention of the program coordinator, or designated field/clinical/co-op placement supervisor so that they may be resolved collaboratively. Such concerns are not to be raised publically either verbally, in writing, or in electronic forums. These matters are to be addressed through established program communication pathways.

Grade Scheme

Final Grade	Mark Equivalent	Numeric Value	Final Grade	Mark Equivalent	Numeric Value
A+	90% - 100%	4.0	A	85% - 89%	3.8
A-	80% - 84%	3.6	B+	77% - 79%	3.3
B	73% - 76%	3.0	B-	70% - 72%	2.7
C+	67% - 69%	2.3	C	63% - 66%	2.0
C-	60% - 62%	1.7	D+	57% - 59%	1.4
D	53% - 56%	1.2	D-	50% - 52%	1.0
F	0% - 49%	0	FSP	0	0

Course Related Information

Please refer to the Course Section Information (CSI) / weekly schedule for specific course-related information as provided by your professor.

College Related Information

Algonquin College's policies have been developed to ensure the health, safety and security of all students, faculty and staff, and the proper and fair operation of the College as an academic institution and employer. Please refer to the Algonquin College Policies website for the most current policy information available at http://www.algonquincollege.com/policies/.

Students are especially encouraged to be aware of the following College expectations

Academic Integrity

Algonquin College is committed to the highest standards of academic integrity, and students are expected to uphold these standards as part of the learning process. Any academic work submitted by a student is expected to be their own work, unless designated otherwise and all sources must be attributed. All students should be familiar with the Algonquin College policy AA48: Academic Integrity which outlines student's roles and responsibilities and what represents academic dishonesty. In some courses, online proctoring may be used to prevent academic dishonesty. Additional information can be found at Academic Integrity - Student Survival Guide - Subject Guides at Algonquin College (libguides.com) and via Academic Integrity Student Resources. Students with any questions about the course expectations regarding academic integrity are encouraged to speak to their professor and the College's academic integrity team at acaio@algonquincollege.com

Centre for Accessible Learning

Students with visible and/or non-visible disabilities are encouraged to register with the Centre for Accessible Learning (CAL) in order to be eligible for appropriate learning supports and/or accommodations. Students are strongly encouraged to make an appointment with the Centre for Accessible Learning as early as possible when starting a program. Once your needs are identified, a Letter of Accommodation (LOA) will be issued which you can share with your professors. If you are a returning student, please ensure that professors are given a copy of your LOA each semester.

College Email

Students at Algonquin College are provided with a college email account. This is the address that will be used when the College, your professors, or your fellow students communicate important information about your program or course activities. Your network credentials can be found in the?ACSIS portal and you are expected to check your Algonquin email regularly and to use it to send and receive college-related email. Support is available through the college Information Technology Service (ITS) at: https://www.algonquincollege.com/its/

Retroactive Accommodations

Students are expected to meet evaluation and completion deadlines as stated in course outline and course section information documents. In circumstances where evaluation and/or completion deadlines are missed or student performance has been affected by a temporary or permanent disability (including mental health), interim or retroactive accommodations may be considered. In such instances, please consult your course faculty member. For other situations where deferral of evaluations may be warranted, please?consult Algonquin College?Policy?AA21: Deferred Evaluation.

Student Course Feedback

Algonquin College's invites students to share their course experience by completing a student course feedback survey for each course they take. For further details consult Algonquin College Policy AA25: Student Course Feedback.

Use of Mobile Devices in Class

With the proliferation of small, personal mobile devices used for communications and data storage, Algonquin College believes there is a need to address their use during classes and examinations. During classes, the use of such devices unless authorized by your professor can be disruptive and disrespectful to others. During examinations, the use of such devices is generally prohibited unless authorized by your professor.

Otherwise use is considered academic dishonesty in the form of cheating. For further details consult Algonquin CollegePolicy AA32: Use of Mobile Devices in Class

Technology Requirements

Students are required to have access to a computer and to the internet. There may also be additional technology-related resources required to participate in a course that are not included in the course materials fee, such as headphones, webcams, specialized software, etc. Details on these requirements can be found in the Course Section Information of the course outline for each course available on Brightspace.

Transfer of Credit

It is the student's responsibility to retain course outlines for possible future use to support applications for transfer of credit to other educational institutions.

Safe Harbour

In the event of an unexpected major event (pandemic, etc.), your course may have changes that are not reflected in the Course Outline. Should this happen, the Course Section Information document will have updated information about your course.