Course Name
BIOL 3613

Instructor: Dr. Russell Easy
Hear my name
Office: Biology 432
Office hours: T, Th 11:00am-2:00pm
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Lecture: M/W/F BAC 236, 9:30-10:20am
Lab: BIOL 3610, M 1-3:50pm, Rm 220

Evaluation	Percentage	Date
Midterm Exam 1	15	October 11th
Midterm Exam 2	20	November 15th
Final Exam	30	Tbd
Laboratory reports	20	Due at end of each lab session
Lab quizzes	10	2 at beginning of lab GMO and Fish labs
Court Case	5	

Part 1: Course Information

Course Description

BIOL 3613 serves as an advanced course in genetics. The course will provide an overview of the fundamental principles of genetics with a focus on modern genetic theories and techniques. This will include exploring mutations, transmission genetics, gene expression and modern methods of genomic analysis. We will also explore the role of genetic analyses in the forensic sciences. The goal is to focus on the scientific process as applied to research in genetics and to further develop critical thinking skills by emphasizing the analysis of experimental data and problems.

Prerequisite(s):

BIOL 2013. The BIOL course(s) used as a prerequisite must be completed with a minimum grade of C-.

Course Materials & Requirements

None. However, Principles of Genetics, 6th ed., Snustad & Simmons, Wiley publishers can be used as a guide.

Course Structure

Lecture time will be used for activities, discussion, and instruction. In-person attendance is strongly encouraged.

Student Learning Outcomes

How to Meet the Learning Outcomes At the end of the course students will be able to:

- Possess a vocabulary within the context of classical and modern genetics.
- Describe the connection between genotype, phenotype, and environment and the effects of changes through evolution by natural selection.
- Better understanding of modern analytical methods for genetic studies

- Understand the details of gene transmission and function and genome structure, function, expression and analysis.
- Understand how genetic analyses are necessary for a better understanding of human health and wellness.
- Understand the role of genetic analyses in forensics
- Understand the essential nature of genetic counselling and its role in providing a better understanding of health issues for the general public.

You will meet the objectives listed above through a combination of the following activities in this course:

- Attend lectures on a regular basis, take notes, and ask for clarification when something is unclear

Study on a regular basis, rather than cram…Part 2: Course Plan

The instructor reserves the right to amend the course plan with reasonable notice, and in consultation with the class.

Lecture:

Tentative Lecture Schedule

(Subject to change based on students' interests)

Section 1: Milestones in genetics
- Mendel
- Franklin, Wilkins, Crick, Watson, McClintock, Stevens
- HUGO

Section 2: Topics in molecular genetics
- DNA mutation and repair
- Regulation of gene expression
- Operons
- Genetics of Animal Development

Section 3: Modern genetics
- Genetics in the real world (e.g., immunotherapies, vaccine development, gene therapy)
- Gene editing (e.g., CRISPR)
- Nucleic acid sequencing technologies (e.g., Sanger, next generation sequencing)

Section 4: Forensics
- Crime scene investigations and data collection
- Applying genetic data to solve crimes
- Genetic methods in forensics

Lab:
Labs will consist of two groups – A and B

Date	Topic
September 9th All	PCR/Primer design/Bioinformatics
September 16th All	Pipetting workshop
September 23rd (Group A)/October 7th (Group B)	Identifying GMOs using molecular techniques Part 1
October 21st All	Identifying GMOs using molecular techniques Part 2
October 28th (Group A)/November 4th (Group B)	Fish DNA Barcoding Part 1
November 18th All	Fish DNA barcoding Part 2
November 25th /December 2nd	Crime Scene investigation/Court Cases

Part 3: Assessment and Grading

The assessment schedule is listed at the beginning of the syllabus. Each test will be delivered in class in person during lecture time. Appropriate accommodations will be made for any student who might require them; please contact Accessibility Services to make sure you are getting the supports set up that you need.

If you are sick, or have other valid reasons for missing a test, the weight from the missed test will automatically be distributed among the completed unit tests.

You are required to pass the lab in order to pass the course.

Part 4: Course Policies

Lab activities are designed to reinforce class content. If you are sick or otherwise unable to come to the lab, please contact me as soon as possible so that we can make alternate arrangements.

Part 5: University Policies

University policies are available in the Acadia University Academic Calendar or through the Registrar's website: https://registrar.acadiau.ca/welcometotheregistrarsoffice.html

Equity, Diversity and Inclusion

Acadia University is committed to becoming a culturally safe and anti-oppressive community. This can only be achieved where there are simultaneous efforts to eliminate all forms of discrimination and harassment from our campus community, including the elimination of all discrimination, harassment and violence based on one's identity, including but not limited to, gender, race, class, ethnicity, sexual orientation, disability, gender identity, gender expression, and Indigeneity. The policy against harassment and discrimination, and resources for students who believe they may have experienced, or witnessed, discrimination or harassment, are available here: https://www2.acadiau.ca/student-life/equity-judicial/equity.html

Last Drop Day

Last day to drop a course and receive a "W". Please check the Acadia University calendar dates, which are available here: https://registrar.acadiau.ca/AcademicCalendars.html

Inform Your Instructor of Accommodations

Acadia University is dedicated to improving access to campus life for all students with disabilities. While we attempt to ensure that all courses are accessible, we recognize that there are barriers that need to be addressed on an individual basis. Students who require accommodations to complete coursework or otherwise fully participate in class should contact Accessible Learning Services directly as soon as possible. https://www2.acadiau.ca/student-life/accessiblelearning.html

The Use of Animals in Teaching and Research

The use of animals in teaching and research at Acadia University is done in accordance with guidelines on the care and use of animals published by the Canadian Council on Animal Care (CCAC). For more information on the CCAC, please visit their website at http://www.ccac.ca

Commitment to Integrity

It is standard practice in Biology to check exams and assignments for cheating and plagiarism. Cheating in the class and/or lab, including plagiarism, will not be tolerated. Please read the appropriate sections of the current Acadia University Academic Calendar: https://registrar.acadiau.ca/AcademicCalendars.html

Information on copy-write and course content from Acadia University is available through the Vaughan Memorial Library: http://libguides.acadiau.ca/c.php?g=433650&p=5027078

The spoken and written course content (including the syllabus, handouts, lectures, presentations, labs, assignments, quizzes, tests, and exams) are the intellectual property of the instructor and may only be copied for personal use. Sharing these materials or uploading them where they may be accessed by others is a violation of copyright. If you wish to make audio, video, or photographic recordings in class, you must first obtain the consent of the instructor and of any other persons (e.g., guest speakers, other students) who may be captured in such recordings. In the case of personal use by students with disabilities, the instructor's consent shall not be unreasonably withheld.

Part 6: Program Learning Outcomes

Foundations of knowledge		**Course specific examples**	**Proficiency** 1-Introduction 2-Reinforcement 3-Proficient
Scientific method, inquiry and hypothesis testing	Find, understand and apply information from the literature; understand how to use the scientific method to examine problems from different perspectives	Process of exploring the flow of genetic information (The Central Dogma of Molecular Biology) in the cell, and biological processes that lead to an identifiable phenotype. Interpretation and discussion of data from literature.	2
Historical concepts and contributions by important figures	Explain foundational concepts in biology, and ethical implications of scientific discoveries	Key discoveries in genetics, Nobel prize awards, ethics of genetic engineering.	2
Biodiversity and ecology	Understand the genetic, taxonomic and ecosystem levels of biodiversity; focus on SW Nova including the Acadian Forest and Bay of Fundy ecosystems	Investigate the role of mutations, gene expression and genetic drift. Genetic adaptations in response to environmental conditions.	2
Genetics and evolution	Understand the chemical basis of heredity, genetics and genomics; integrate concepts across disciplines to understand evolution	Roles of vertical and horizontal gene transfer in organisms. The Central Dogma of Molecular biology	2

Human and environmental health	Understand form and function in health and disease within a One Health framework, integrating human and environmental health	Exploring the genetics of disease and how modern genetic analyses can answer key questions in human pathologies.	1
Lab and field skills			
Experimental design	Gain experience in applying the scientific method	Controls, conducting an experiment, data collection	2
Safety	Work safely and productively in lab and field settings	Basic lab safety protocols	2
Lab skills	Gain experience with basic and advanced lab techniques and understand their application in research, health science and industry	Design, set up and perform polymerase chain reactions (PCR). Pipetting, nucleic acid quantification and integrity determination using agarose gel electrophoresis.	2
Field skills	Gain experience in basic and advanced field skills and understand their application in ecology, conservation biology and environmental change	NA	
Data acquisition, analysis and interpretations	Collect data, present results both qualitatively and quantitatively, and interpret outcomes in light of the literature	Analysis of figures and data from genetic analyses.	2
Statistical analysis	Use R and or other programs to analyze biological data		
Professional skills			
Ethical practices	Demonstrate ethical conduct, apply principles of academic integrity, and understand the principles of EDI in science	Respectful participation in class and lab, proper citation, professional email and other communication	2
Collaboration and group work	Work effectively in groups within and across disciplines	Group collaboration in class and lab activities such as small group discussions, case studies, lab partners and review work	2
Critical thinking	Analyze and evaluate information to make science-based decisions	Question response, discussions, experiment reflection questions, lab observation reflection questions	2
Computer proficiency	Use common and discipline- specific software	Basic bioinformatics tools.	1
Scientific communication	Communicate science effectively to both scientific and general audiences	Lab discussions, lab reports, in-class written responses.	2