Acadia Biology Department

Organisms & Their Environment 2

BIOL1123, BIOL1120L

Part 1: Course Information

Instructor Information

Instructor: Dr. Don Stewart
Office: Bio 434
Office Hours: Tuesdays or Thursdays 2:30-3:30 - **appointment required** (on-line or in person)
E-mail: don.stewart@acadiau.ca
Lab Instructors: Kendra Sampson
Office: BIO 224
Student Hours: Student Hours: Tuesday 8:30am-11:30am, 1pm-4pm; Thursday 8:30am-11:30am, 1pm-4pm

E-mail: kendra.sampson@acadiau.ca

Course Description

Continuing from first term, our first objective will be to explore the molecular basis of heredity. Topics will include the structure and replication of DNA, transcription and translation, and the role that genes play in development. We will also explore some genetic techniques such as cloning. (~4 weeks) The second objective for the term is to explore the concept of evolution and the diversity of life (~8 weeks). For a biologist to understand an organism fully, they must understand its evolutionary history. We will discuss the evidence that species have changed over time as well as the evidence that natural selection is the mechanism by which adaptive change occurs. To tie together the concepts of genetics and evolution, we will explore how population genetics models can be used to study changes in allele frequencies over time. We will explore some of the major evolutionary transitions over time and discuss how biologists use phylogenetic methods to reconstruct evolutionary relationships on the tree of life.

Prerequisite: Successful completion of BIOL1113 lectures and labs with a minimum grade of C-

Textbook & Course Materials

Biology 6th edition by Robert J. Brooker and colleagues.

Course Requirements

- Access to course page

  Section 8:30
  https://moodle.acadiau.ca/course/view.php?id=34113

  Section 9:30
  https://moodle.acadiau.ca/course/view.php?id=34047

- Laptop

Course Structure

Section W01 will meet in **BAC 132 (830-920am);**
Section W02 will meet in **BAC 132 (930-1020am).**

****Labs will begin the week of 13 January 2024****

Part 2: Student Learning Outcomes

- Understand the events leading to the discovery of DNA as the hereditary material
- Understand the structure of DNA and RNA, as well as DNA replication, transcription and translation
- Understand fundamental molecular biology and cladistic techniques
- Understand the history of evolutionary thought
- Become familiar with the basics of population genetic theory
- Become familiar with the major taxa of life on earth

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

- Attend lectures and lab sessions on a regular basis, take notes, and ask for clarification when something is unclear
- Complete weekly quizzes to assess understanding of lectures
- Completing a group presentation on an assigned taxon
- Completing laboratory exercises (assignments, reports and quizzes)

[!]See Program-level outcomes for this course at the end of the syllabus.

Part 3: Topic Outline/Schedule (Lecture)

Tentative week by week schedule. The timing of lectures may be revised from time to time.

Week	Week of: (Approx.)	Topics	Relevant Chapters in Biology (Brooker et al.)
1	6 Jan	Overview and Intro to Nucleic Acids, DNA structure **Fri - Quiz 1**	11
2	13 Jan	Gene expression – Transcription, RNA processing **Fri – Quiz 2**	12
3	20 Jan	Codons, Translation **Fri – Quiz 3**	12
4	27 Jan	Genetic Technology – Cloning, PCR, Molecular Techniques **Fri – Quiz 4**	21
5	3 Feb	Intro to Protein electrophoresis; Intro to Hardy-Weinberg equilibrium **Fri – Quiz 5**	22 23
6	10 Feb	Violations of Hardy-Weinberg Fact and Theory of Evolution **Test 1 – Friday – 16 February**	23 24
7	*17-21 Feb*	*Reading week – no lectures or labs*	
8	24 Feb	Species and Speciation Development (Possible Guest Lecture) **Fri – Quiz 6**	25 20
9	3 Mar	Taxonomy and Classification; Cladistic Method; History of Life **Fri – Quiz 7**	25 26
10	10 Mar	History of Life continued; Human Evolution **Fri – Quiz 8**	26
11	17 Mar	**Test 2 - Monday - 18 March** Student Presentations	Unit 5
12	24 Mar	Student Presentations **Fri – Quiz 9**	Unit 5
13	31 Mar	Student Presentations **Fri – Quiz 10**	Unit 5

***Note: There is NO FINAL EXAM. See Grading Scheme below**

NOTE: In consultation with the class, the instructor reserves the right to amend the above course plan with reasonable notice to you.

Part 4: Grading Policy

Graded Course Activities

Points*	Description
Test 1 (20%)	Friday, Feb 14
Test 2 (25%)	Monday, March 17
Group Presentation (10%)	Powerpoint presentation, done in groups on an assigned taxon
Quizzes (15%)	Weekly review and Weekly quizzes held in class on Fridays during lecture timeslot (but not during weeks when we have tests or during "reading week").
Final exam (none)	There is no final exam for Biol 1123.
Lab mark (30%)	See below for more information on labs
100	**Total Points Possible**

University policies on missing classes, etc. can be found here:

https://registrar.acadiau.ca/RecordsandOtherRequests.html

Part 5: Course Policies

Attend Class

Students are expected to attend all class sessions.

Lab Description

Lab Instructor: Kendra Sampson

Office: Biology Building, Room 224

E-mail: kendra.sampson@acadiau.ca

Student Hours: Tuesday 8:30am-11:30am, 1pm-4pm; Thursday 8:30am-11:30am, 1pm-4pm

BIOL 1120L is the laboratory component of Biology 1123 where we will examine topics related with how DNA works (molecular genetics), the mechanisms by which adaptive change occurs and the evolutionary relationships between organisms. Through hands on activities and observation we will study the diversity of life and how life has changed over evolutionary time.

By the end of the semester learners will be able to:

- Understand DNA transcription, replication and translation

- Understand the consequences of changes in allele frequencies in populations
- Recognize the role of natural selection in the adaptation of organisms to their environment
- Discuss the connection between development and evolution
- Describe diversity of life and phylogenetic relationships among organisms

Please check your schedule to confirm your section:

Section	Day and Time	Room
WI01	Tuesday, 8:30AM-11:20PM	BIO 220/230
WI02	Tuesday, 1:00PM-3:50PM	BIO 220/230
WI03	Wednesday, 1:00PM-3:50PM	BIO 220/230
WI04	Thursday, 8:30AM-11:20PM	BIO 230
WI05	Thursday, 1:00PM-3:50PM	BIO 220/230

All laboratory exercises will be available on Moodle. **You are responsible for printing and reading the lab exercises before coming to class.**

Materials for the scheduled labs will be posted on Moodle by Friday on the week before the lab is scheduled to take place.

Other handouts and links of interest will be posted on the Moodle page.

Attendance in labs

Labs will be delivered in-person, only in the event of a campus closure (due to weather) the labs will be cancelled for that day. You will be notified via e-mail and Moodle in the event of a change.

Lab attendance is mandatory. As per our policy in Biology, you must pass the lab to pass the entire course. Failing the lab will result in failing the entire course. Makeup labs will only be considered after presentation of suitable documentation of illness or serious extenuating circumstances, and only if you contact the *lab coordinator* - kendra.sampson@acadiau.ca - before the absence. Please notify the lab coordinator as soon as you miss or know that you will miss a particular lab.

Makeup labs are only possible if arranged ahead of time. Once the last section (FA05: Thursday 1:00-3:55pm) is completed, it is not possible to make-up that week's lab. In the case of justified absences in which the student is not able to make up the lab, the weight from the missed lab will be calculated based on the average of attended lab grades. A grade of zero will be assigned for unjustified missed work. In the case of unjustified absence, the student will also receive a zero on the hand-in assignment for the respective missed lab/tutorial.

Graded Lab Activities

This is a *general* description of how the learner's performance in the lab will be assessed, the number of activities and final weight in each category may change but the general activities will be maintained:

Activity	Grade	Due Date
Hand-in assignments	40%	At the end of each lab
Pre-lab quizzes	15%	Before each lab
Quiz 1 (Labs 1-4)	10%	Feb 11 – 13
Quiz 2 (Labs 5-8)	10%	Mar 18 – 20
Lab report (Full lab report)	25%	Apr 1 – 3

** The lab mark will account for 30% of the total marks for BIOL 1123*

1) The *hand-in assignments* are part of each lab exercise and *must* be completed during the lab session. Make sure to hand it in to your TA before you leave the lab.

2) The *pre-lab quizzes* are to be completed on Moodle before the start of your designated lab time.

3) Q*uiz 1* will be completed at the beginning of lab.

4) Quiz 2 will be completed at the beginning of lab.

5) Lab report will contain an abstract, introduction, materials and methods, results, discussion and references.

Lab schedule

This is a *tentative* list of the lab exercises for the semester, the order and title of some of the labs may change in the event of school cancellations, but the general topics covered will be maintained:

Dates	Topic
Jan 6-10	**NO LABS THIS WEEK**
Jan 14-16	**Lab 1**: DNA structure, transcription and translation
Jan 21-23	**Lab 2**: Mutations & micropipetting
Jan 28-30	**Lab 3**: Allele frequencies
Feb 4-6	**Lab 4**: PCR & gel electrophoresis
Feb 11-13	**Lab 5**: Scientific Writing **QUIZ 1 (material from labs 1-4)**
Feb 18-20	**No labs: Winter study days**
Feb 25-27	**Lab 6**: Natural Selection
Mar 4-6	**Lab 7**: Development
Mar 11-13	**Lab 8**: Diversity of life
Mar 18-20	**Lab 9**: Phylogeny **QUIZ 2 (material from labs 5-8)**
Mar 25-27	**NO LABS**

Apr 1-3	**NO LABS** **REPORT 2 (Abstract/Intro/M&M/Res/Discussion)** due

Part 6: University Policies

University policies are available in the Acadia University Academic Calendar or through the Registrar's website:

https://registrar.acadiau.ca/welcometotheregistrarsoffice.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

If you are a student with a documented disability who anticipates needing supports or accommodations, please contact Marissa McIsaac, Manager, at *902-585-1520*, Accessible.learning@acadiau.ca. Accessible Learning Services is in Rhodes Hall.

https://www2.acadiau.ca/student-life/accessiblelearning.html

Commitment to Integrity

Cheating in the lecture 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

If caught cheating you will automatically receive a grade of zero on the quiz/assignment, and your name will be submitted to the registrar. If this is not the first occurrence you will either receive a mark of zero for the course (2nd occurrence), or be expelled from the University (3rd occurrence).

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, and tests) 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. Students with disabilities who wish to request accommodation should contact Accessible Learning.

Acadia is a Scent-Free Campus

In consideration of the difficulties that exposure to scented products causes individuals with sensitivities and allergies, all students, faculty, staff, employees of any companies working on university property, visitors, and guests of Acadia University, or of members of the University community are asked to refrain from wearing scented personal care products such as perfumes / aftershave, lotions, hair spray and deodorant. In addition, users of tobacco and cannabis are asked to be aware that odours associated with product use may impact individuals with sensitivities and allergies. Acadia University in consultation with its contracted cleaning staff, have agreed to use products that do not leave residual odors that may cause difficulties for individuals with sensitivities and allergies.

[i]Program-level learning outcomes for Organisms & Their Environment 2, Biol 1123.

Program Level Outcomes	**Sub-outcomes**	BIOL 1123	BIOL 1120L
		Lecture	Lab
Discipline Knowledge		1=Introduced	1=Introduced
Scientific Method & Inquiry	**Hypothesis Testing**	1	
	Scientific Method	1	
	Historical Concepts	1	
	Contributions by Historical Figures	1	1
	Discovery-based	1	1
	Observational Science	1	
	Applied Science	1	

Biodiversity, Ecology & Evolution	**Ecology**	1	1
	Biodiversity	1	
	Minas Basin and SW Nova ecosystems	1	
	Taxonomy	1	1
Cells, Tissues & Evolution	**Metabolism**	1	
	Form and Function	1	
	Cellular Communication		
	Development	1	1
Molecules, Genetics & Evolution	**DNA sequence and expression**	1	1
	Phenotype and Environment	1	1
	Mutations	1	1
Human & Environmental Health	**Climate Change (local/national/global)**	1	
	Environmental/Social Awareness		1
	Human Health and Disease	1	
	Environmental Health		1
Ethics & Interdisciplinary Perspectives	**Traditional/Local (Indigenous) Ecology Knowledge**	1	1
	Integrative Skills (connect with other units)	1	
	Discuss Ethics in Science (CCAC & Research Ethics)	1	1
	Interdisciplinary Perspectives/synthesis	1	
	Cultural Awareness		1
Lab/Field Skills			
Laboratory Skills	**Microscopy**		1
	Pipetting		1

	Museum/Herbarium		1
	Observation		1
Equipment Proficiency	**Molecular (gel electrophoresis)**		1
Experimental Design	**Running an Experiment**		1
Data Acquisition and Management	**Measurement**		1
Data Analysis	**Graphing and Visualizations**		1
	Dataand Statistical Analysis (significance, etc.)		1
	Data Interpretation		1
Transferable Skills			
Professionalism	**Respect/professionalism**	1	1
	Equity, Diversity & Inclusion	1	1
	Ethics and Professionalism		1
Academic Integrity	**Academic Integrity and Accountability**	1	1
Problem Solving	**Problem solving**	1	1
	Critical Thinking	1	1
Resilience	**Adaptability/resilience**		1
	Constructive Criticism	1	
Time Management	**Remote Learning**	1	
	Time Management	1	1
Group Work	**Collaboration/group work**	1	1

	Engage in classroom discussion	1	1
Scientific Communication	**Scientific Writing/Referencing**		1
	Technical Communication (lab reports)		1
	Seminars/Presentations	1	
	Interpretation of "Biology in the News"	1	