



# UNIVERSITY OF CALGARY

## FACULTY OF SCIENCE DEPARTMENT OF BIOLOGICAL SCIENCES COURSE OUTLINE

### 1. Course: BIOLOGY 243: DNA, INHERITANCE AND EVOLUTION

Lecture Section(s): L01: MWF 11:00-11:50 ST 140 WINTER 2020  
L02: MWF 13:00-13:50 ST 140

**Laboratories:** All labs are in **EEEL 309, 315, 319, 353, 357 and 363**. Labs begin the week of **January 13, 2020**

**Course Coordinator:** W. Huddleston EEEL 235B 403-220-7739 [wrhuddle@ucalgary.ca](mailto:wrhuddle@ucalgary.ca)

**Laboratory Coordinator:** C. Yip EEEL 301A 403-220-6129 [cyip@ucalgary.ca](mailto:cyip@ucalgary.ca)

**Instructors:** G. Chua BI 560 403-220-7769 [gchua@ucalgary.ca](mailto:gchua@ucalgary.ca)  
L. Powell BI 379B 403-220-7638 [lpowell@ucalgary.ca](mailto:lpowell@ucalgary.ca)

A Desire2Learn (D2L) site will be maintained throughout the term to provide study material, assignments, background information, readings, biology-related features, and course information. The course code for the site is: W2020BIOL243L01

Biological Sciences Department BI 186 403-220-3140 [biosci@ucalgary.ca](mailto:biosci@ucalgary.ca)

NOTE: Students must use their UofC account for all course correspondence.

### 2. Prerequisites: BIOLOGY 241 See section 3.5.C in the Faculty of Science section of the online Calendar

- **Students must earn a minimum of C- in Biology 241 to continue on to Biology 243.**
- **Students are responsible for ensuring that their annual course selections are in accord with all Calendar requirements. Students who do not meet these requirements will be removed from the course.**
- **Credit for more than two of Biology 231, 233, 241, 243 will not be allowed.**
- **Completion of two of Biology 231, 233, 241, 243 does not guarantee access to Biological Sciences Degree Programmes.**
- This course is **NOT** recommended for those students seeking a general interest overview of the biological sciences.

### 3. Grading: The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

In-Class Assignments (details provided in lecture)	5%
On-line quizzes (details provided in lecture)	5%
Midterm Examination (lecture material covered through February 28)	30%
Final Examination (scheduled by the Registrar's Office)	30%
Laboratory component (details provided on D2L)	30%

Each piece of work (reports, assignments, quizzes, lecture exams) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows:

Minimum % Required	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
	95	85	82	79	76	72	68	64	60	55	50

A maximum course letter grade of D+ will result if the student does not earn >50% on the:

1. Lab Exam
2. Laboratory component of the course
3. Weighted average of the Lecture Midterm and Final exams.

Students must attend all laboratory classes; lab assignments will not be accepted from students who were absent without a valid excuse from the lab in which data were collected/distributed. Students who have a substantial number of unexcused lab absences will not be permitted to write the Laboratory Exam.

This course has a non-cumulative, registrar-scheduled Lecture Final Exam.

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in [Section 3.6](#). It is the student's responsibility to familiarize himself/herself with these regulations. See also [Section E.3](#) of the University Calendar.
5. **Scheduled out-of-class activities:** Dates and times of approved class activities held outside of class hours.

Activity	Location	Date and Time
Lecture Midterm Exam	TBA	Saturday, March 7, 1000-1230

**REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY.** If you have a clash with this out-of-class-time-activity, please inform the BIOL 243 course administrator as soon as possible so that alternative arrangements may be made for you.

6. **Course Materials:** Russell *et al.* 2019. **Biology: Exploring the Diversity of Life, 4<sup>th</sup> Canadian edition.** Nelson. Huddleston *et al.* 2020. **Biology 243 Laboratory Manual, 2020 edition.** Hayden-McNeil.
7. **Examination Policy:** No electronic or written aids (e.g. cell phones, tablets, computers, PDAs, notes, textbooks) will be allowed during writing of any exams. Communication with others during quizzes and examinations is not allowed. Students should also read the Calendar, [Section G](#), on Examinations.
8. **Approved Mandatory and Optional Course Supplemental Fees:** Not applicable.
9. **Writing across the curriculum:** In this course, the quality of the student's writing in laboratory reports will be a factor in the evaluation of those reports. See also [Section E.2](#) of the University Calendar.
10. **HUMAN & LIVING ORGANISM STUDIES STATEMENTS:**

Students will not participate as subjects or researchers in human studies.

See also Section E.5 of the University Calendar.

Studies in the Biological Sciences involve the use of living and dead organisms. Students taking laboratory- and field-based courses in these disciplines can expect involvement with and experimentation on such materials. Students perform dissections on dead or preserved organisms in some courses. In particular courses, students experiment on living organisms, their tissues, cells, or molecules. Sometimes field work requires students to collect a variety of living materials by many methods, including humane trapping.

All work on humans and other animals conforms to the Helsinki Declaration and to the regulations of the Canadian Council on Animal Care. The Department strives for the highest ethical standards consistent with stewardship of the environment for organisms whose use is not governed by statutory authority. Individuals contemplating taking courses or majoring in one of the fields of study offered by the Department of Biological Sciences should ensure that they have fully considered these issues before enrolling. Students are advised to discuss any concern they might have with the Undergraduate Program Director of the Department.

11. Students are expected to be familiar with Section SC.4.1 of the University Calendar.

### Reappraisal of Grades:

A student wishing a reappraisal, should first attempt to review the graded work with the Lab TA, Lab or Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See Section I.3 of the University Calendar.

- a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **ten business days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work form to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections [I.1](#) and [I.2](#) of the University Calendar
- b. **Final Exam:** The student shall submit the request to Enrolment Services. See Section I.3 of the University Calendar.

### 12. Other Important Information for Students:

- a. **Mental Health:** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, Mental Health Services Website) and the Campus Mental Health Strategy website (Mental Health).
- b. **SU Wellness Center:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see [www.ucalgary.ca/wellnesscentre](http://www.ucalgary.ca/wellnesscentre) or call 403-210-9355.
- c. **Sexual Violence:** The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>) is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email ([svsa@ucalgary.ca](mailto:svsa@ucalgary.ca)) or phone at 403-220-2208 .
- d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K. Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. **These are only examples.**
- e. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.
- f. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#). Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head, Undergraduate of the Department of Biological Sciences, Heather Addy by email [addy@ucalgary.ca](mailto:addy@ucalgary.ca) or phone 403 220-6979. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See Section E.4 of the University Calendar.
- g. **Safewalk:** Campus Security will escort individuals day or night (See the Campus Safewalk website). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

- h. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see Legal Services website.
- i. **Student Union Information:** VP Academic, Phone: 403-220-3911 Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: 403-220-3913 Email: sciencerep@su.ucalgary.ca. Student Ombudsman, Email: suvpaca@ucalgary.ca.
- j. **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.
- k. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction (USRI) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.
- l. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or non-academic misconduct, in addition to any other remedies available at law.

Department Approval \_\_\_\_\_ ORIGINAL SIGNED \_\_\_\_\_ Date \_\_\_\_\_

Associate Dean's Approval for  
out of regular class-time activity: \_\_\_\_\_ ORIGINAL SIGNED \_\_\_\_\_ Date: \_\_\_\_\_  
B243 W20; 12/11/2019 9:10 AM

**UNIVERSITY OF CALGARY - DEPARTMENT OF BIOLOGICAL SCIENCES  
BIOLOGY 243 – DNA, INHERITANCE AND EVOLUTION  
COURSE INFORMATION SHEET – WINTER SESSION 2020**

**TEXTS:**           **Required:**   Russell *et al.* 2019. **Biology: Exploring the Diversity of Life, 4<sup>th</sup> Canadian edition.** Nelson.  
Huddleston *et al.* 2020. **Biology 243 Laboratory Manual, 2020 edition.** Hayden-McNeil.

**PREREQUISITES:**

Biology 241 is a pre-requisite for this course and, therefore, we assume that you have a **working understanding** of topics covered in Biology 241.

**LEARNING OUTCOMES** – After completion of this course, the student will be expected to:

1. Explain why DNA is the genetic material in organisms and describe how DNA information is expressed in cells
2. Explain how and why mutations occur and the relationship between mutations and evolution by natural selection
3. Differentiate among the theories of evolution, the cell theory, and inheritance as unifying principles in biology and compare their historical contexts and evidence
4. Analyze the implications, influences and major ways scientists study the theory of evolution
5. Contrast single-gene dominant and recessive inheritance and recognize that phenotypes are not all single-gene phenomena
6. Evaluate the relationship between environmental/climate changes and evolutionary changes over time
7. Analyze phylogenetic trees and explain how they are made
8. Collaborate with peers to describe, design and carry out scientific experiments
9. Analyze scientific data collected from scientific experiments (student-conducted experiments and experiments described in the primary literature)
10. Produce oral and written reports that communicate scientific information effectively

**CLASSROOM PERFORMANCE SYSTEM:**

Students may be asked to use the classroom performance system, *Top Hat*, in lecture. We will **not** use Top Hat in the calculation of students' course grade. Additional information will be provided in lecture.

**COURSE POLICY ON MEDICAL DOCUMENTATION:**

If you miss a graded lab or lecture component for excusable reasons, you must provide supporting documentation e.g. a completed **Physician/Counsellor Statement Form** (can be downloaded from the University Wellness Centre web site) or a Statutory Declaration (available at [www.ucalgary.ca/registrars](http://www.ucalgary.ca/registrars)).

Submit the documentation to Mr. Huddleston in EEEL 235 for Lecture component items or Dr. Yip in EEEL 301A for Laboratory component items. You have **48 hours** from the due date to submit the completed form.

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LECTURE SCHEDULE

<u>Week of:</u>	<u>Lecture Topic*</u>
January 13	DNA as an Information Molecule
January 20	DNA and Genome Structure
January 27	DNA Replication and Repair
February 3	The Central Dogma
February 10	Transcription/Translation
February 17	Winter Break (no lectures)
February 24	Mutations and Cell Division
March 7	Midterm Examination
March 2	Evolution
March 9	Mendelian Inheritance
March 16	Population Genetics
March 23	Selection, Species and Speciation
March 30	Phylogeny
April 6	Macroevolution and the History of Life
April 18 – 29	Final Examination period (scheduled by Registrar's Office)

\* Dates for each lecture topic are approximate; a more detailed outline of each lecture topic and assigned readings will be provided on Desire2Learn

LABORATORY SCHEDULE

<u>Week of:</u>	<u>Lab Topic</u>
January 13	Lab 1: What are my genes made of?
January 20	Lab 2: Genetic engineering and UV radiation
January 27	Lab 3: Mutations
February 3	Lab 4: Mitosis and the chi-square test
February 10	Lab 5: Evolution and meiosis
February 17	No BIOL 243 Lab
February 24	Lab 6: Evolution and mendelian genetics
March 2	Lab 7: Evolution and statistics/hypothesis testing
March 9	Lab 8: Evolution and Genetic Drift
March 16	Lab 9: Evolution and Domesticating Dogs
March 23	Lab 10: Presentations
March 30	Lab Exam
April 6	No BIOL 243 Lab