



UNIVERSITY OF CALGARY

FACULTY OF SCIENCE DEPARTMENT OF BIOLOGICAL SCIENCES COURSE OUTLINE

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

Lecture: TWR 09:30-11:30 AM ST 141

Laboratories: All labs are in **EEEL 309, 315 and 319. Labs begin on Thursday July 7, 2016.**

Course Instructor: Dr. Cynthia Yip cyip@ucalgary.ca

Lab Coordinator: Dr. Heather Addy EEEL 235C 220-8963 addy@ucalgary.ca

D2L course website: BIOL 243 L01 – (Summer 2016) – DNA, Inheritance and Evolution (S2016BIOL243L01)

Biological Sciences Department BI 186 403-220-3140 biosci@ucalgary.ca

2. **Prerequisites:** BIOLOGY 241

See section [3.5.C](#) in the Faculty of Science section of the online Calendar

- **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%
Midterm Examination (Thursday July 28, in class)	30%
Final Examination (cumulative ; scheduled by the Registrar's Office)	35%
Laboratory component (details provided on D2L)	30%

REQUIRED COURSE COMPONENTS

Each piece of work (assignment, laboratory report, midterm test or final examination) submitted by the student will be assigned a percentage score. The student's average percentage score for the various components 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 using the conversion scale provided below, bearing in mind that a maximum grade of D⁺ will result if the student does not write and pass (> 50%) the final lab exam, pass (>50%) the laboratory component of the course, or if the weighted average of the midterm and final lecture exam is not a passing grade (> 50%). 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 final laboratory exam.

RE-APPRAISAL OF GRADED TERM WORK

A student who feels that a piece of graded term work (term paper, essay, test, etc.) has been inaccurately graded may have the paper re-evaluated. The student shall discuss the work with the instructor **within fifteen days** of being notified about the mark or of the item's return to the class. The result of that reevaluation will be given to the student in writing.

Any reappraisal of term work may cause the grade to be raised, lowered or to remain the same.

CONVERSION BETWEEN COURSE PERCENTAGE AND LETTER GRADE FOR BIOL 243

Letter Grade	Course Percentage
A+	Reserved for outstanding performance
A	85%
A-	82%
B+	79%
B	76%
B-	72%
C+	68%
C	64%
C-	60%
D+	55%
D	50%
F	<50%

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:** N/A

REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY.

6. **Course Materials:** Morris *et al.* 2013. **Biology: How Life Works, 1st edition.** WH Freeman and Company.
Addy *et al.* 2016. **Biology 243 Laboratory Manual, 2016 edition.** Hayden-McNeil.

Online Course Components: BIOL 243 will **not** use online tools outside of those provided by the University course Management system.

7. **Examination Policy:** No electronic or written aids (e.g. cell phones, tablets, computers, PDAs, calculators, notes, textbooks) will be allowed during writing of any exams. 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 studies statement:** If you consent, your course work may be used for research purposes once the course is over. Your responses will remain anonymous and confidential. Grouped data (no individual responses) may be used in academic presentations and publications. Participation in such research is voluntary and will not influence grades in this course. Students' signed consent forms will be withheld from instructors until after final grades are submitted. More information will be provided at the time student participation is requested. See also [Section E.5](#) of the University Calendar.

ETHICS IN THE BIOLOGICAL SCIENCES

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 fieldwork 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. OTHER IMPORTANT INFORMATION FOR STUDENTS:

(a) **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.

(b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).

(c) **Student Accommodations:** 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 http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf.

Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Biological Sciences, Dr. H. Addy, by email addy@ucalgary.ca or phone 403 220-3140.

(d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

(e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOI/PPA). As one consequence, 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 also <http://www.ucalgary.ca/secretariat/privacy>.

(f) **Student Union Information:** VP Academic Phone: 220-3911 Email: suvpaca@ucalgary.ca.
SU Faculty Rep. Phone: 220-3913; Email: sciencerep@su.ucalgary.ca; [Student Ombudsman](#)

(g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

(h) At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference - please participate in USRI Surveys.

Department Approval _____ Original Signed _____

Date July 4/16

**UNIVERSITY OF CALGARY - DEPARTMENT OF BIOLOGICAL SCIENCES
BIOLOGY 243 – DNA, INHERITANCE AND EVOLUTION
COURSE INFORMATION SHEET – SUMMER SESSION 2016**

TEXTS: Required: Morris *et al.* 2013. **Biology: How Life Works, 1st edition.** WH Freeman and Company.
Addy *et al.* 2016. **Biology 243 Laboratory Manual, 2016 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 this course.

LEARNING GOALS/ OBJECTIVES – After completion of this course, the student will be expected to:

1. Explain the theory of evolution (and the cell theory and inheritance) as a unifying principle in biology, its historical contexts and evidence, its implications and influences, and the major ways scientists study evolution;
2. Explain the link between evolution and heredity
3. Explain DNA as the genetic material in organisms, encoding information for synthesis of RNA and proteins (central dogma; transcription and translation);
4. Explain how/why mutations occur and the relationship between mutations and evolution by natural selection;
5. Explain single-gene dominant vs. recessive inheritance and appreciate that phenotypes are not all single-gene phenomena
6. Explain the relationship between environmental/climate changes and evolutionary changes over time;
7. Interpret phylogenetic trees and explain how they are made
8. Collaborate with peers to design, carry out and analyze scientific experiments
9. Draw and interpret various kinds of graphs
10. Present scientific findings in written and oral formats

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 lab/lab exam or the lecture midterm exam for medical reasons, the only documentation that will be accepted in BIOL 243 is a completed [Physician/Counsellor Statement Form](#), which can be downloaded from the University Wellness Centre web site.

Have your physician fill out this form and bring it to Dr. Yip (for the midterm exam) or Dr. Addy (for a lab/lab exam) within **48 hours** from the date of the lab or midterm exam.

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COURSE INFORMATION SHEET – SUMMER SESSION 2016

LECTURE SCHEDULE

<u>Date</u>	<u>Lecture Topic*</u>
July 5	Introduction to Biology 243 Theme 1. The molecular basis of inheritance
July 6–12	Theme 1. The molecular basis of inheritance
July 13–26	Theme 2: Decoding genetic information
July 27	Theme 3: What is evolution?
July 28	Midterm Exam (Themes 1 & 2)
August 2–10	Theme 4: Transmitting genes in individuals and populations
August 11–17	Theme 5: Phylogeny, macroevolution and evolutionary history
August 19–22, 2016	FINAL EXAMINATION PERIOD (exams to be scheduled by Registrar's Office)

* Dates for each lecture topic are approximate; a more detailed outline of each lecture topic and assigned readings is provided on D2L

RESERVE READING ROOM

Copies of biology texts and other supplements are available in the Reserve Reading Room of the Library. The list of these books will be provided on D2L.

STUDENT SUPPORT

The Student Success Centre's Writing Support Centre is available to assist students writing assignments and improve writing skills: <http://www.ucalgary.ca/writingsupport/>

The Students' Union Academic Commissioner for Science can be contacted at 403-220-6551, MSC 251.

Safewalk/Campus Security: **403-220-5333**

The University of Calgary calendar can be accessed online at: <http://www.ucalgary.ca/pubs/calendar/>

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BIOLOGY 243 – DNA, Inheritance and Evolution
COURSE INFORMATION SHEET – SUMMER SESSION 2016

LABS: Tuesdays & Thursdays 1300-1545 EEEL 309, 315, 319

LAB & ASSIGNMENT SCHEDULE			
DATE	TOPIC	QUIZZES	ASSIGNMENTS
Tues July 5	No labs		
Thurs July 7	Lab 1 What are genes made of?	Quiz 1 (1%)	Lab 1 Worksheet due at end of lab (1%)
Tues July 12	Lab 4 Glowing bacteria UV radiation effects	Quiz 2 (1%)	
Thurs July 14	Lab 5 Glowing bacteria UV radiation effects Note that pp. 48-55 from Lab 5 will be done in Lab 3)	Quiz 3 (1%)	Lit. Exploration Assignment due at start of lab (1%) pGLO worksheet due at end of lab (1%)
Tues July 19	Lab 2 DNA replication & mitosis Chi-square test (pp. 31-35 of Lab 3)	Quiz 4 (1%)	UV assignment due at start of lab (1%)
Thurs July 21	Lab 3 DNA replication & meiosis; Pages 48-55 from Lab 5 (start Bacterial Evolution Experiment & Mutation simulation)	Quiz 5 (1%)	Lab 3 Worksheet due at end of lab (1%) Mutation Assignment due at end of lab (1%)
Tues July 26	Lab 6 Bacterial Evolution Mendelian Genetics	Quiz 6 (1%)	Discussion Assignment due at start of lab (2%) Lab 6 Worksheet due at end of lab (1%)
Thurs July 28	Lab 7 Bacterial Evolution (pp. 71-73) Note: pp. 75-79 moved to Lab 10; pp. 80-84 moved to Lab 9)		
Tues Aug. 2	Lab 8 Bacterial Evolution; SimBio: Darwinian Snails		Lab 8 Worksheet due at end of lab (1%)
Thurs Aug. 4	Lab 9 Bacterial Evolution; Statistics/Hypothesis Testing Note: SimBio virtual lab moved to Lab 10	Quiz 7 (1%)	t-test Worksheet due at end of lab (1%)
Tues Aug. 9	No lab		
Thurs Aug. 11	Lab 10 SimBio: Flowers & Trees Population Genetics (review)		Results & Discussion Assignment due at start of lab (3%)
Tues Aug. 16	Lab Exam		Lab Exam (9%)