UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. Course: BIOL 401, Evolutionary Biology – Winter 2020

Lecture 01: MWF 10:00-10:50 in ST 139

Tutorials: T01 – T in MS 571
T02 – T in BI 190
T03 – T in MS 571
T04 – T in BI 190

Instructors	**Email**	**Phone**	**Office**	**Hours**
Dr. Samuel Yeaman	samuel.yeaman@ucalgary.ca	220-6126	BI 394	Fri 1-3
Dr. Mindi Summers	mindi.summers@ucalgary.ca	220-8761	BI 041	Fri 1-3

Course Site: D2L: BIOL 401 L01-(Winter 2020) – Evolutionary Biology

Note: Students must use their U of C account for all course correspondence.

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

2. **Requisites:**

See section 3.5.c in the Faculty of Science section of the online Calendar.

Prerequisite(s): Biology 313 and 315

3. **Grading:**

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

Components	Weighting %	Date
Part 1: Quizzes (3)	3%	In-Class
Part 1: Midterm Exam (1)	30%	Thursday, March 5
Part 2: Reading Assignments (3)	9%	On D2L - March 13, March 27, April 8
Part 2: Final Exam (1)	24%	TBD
Parts 1 & 2: Tutorial Assignments (8) & Presentation (1)	33%	In-Tutorial
Surveys (2)	1%	On D2L – Jan 15; April 15

This course has a registrar scheduled final exam.

Online course components: In the lecture component of the course, we will use the Top Hat classroom performance system, where you will be asked to use a cell phone to text answers to questions during class. The use of the Top Hat system is optional, but highly recommended to enhance learning in the classroom. If you answer 85% or more of the in-class questions, five points will be added to your total score for Part Two Assignments. If you answer less than 85% of the in-class questions, a grade of 0 will be assigned for this course component, and the

grade for your Part Two Assignments will not be replaced. It is your responsibility to ensure that your participation is being properly recorded by the Top Hat system. In the event of any discrepancy, you must contact the administrators of the Top Hat Monocle system to have them corrected. Correction of any discrepancies must be done prior to 5pm on April 15, 2020. If a student is unable to use the Top Hat system, please contact Dr. Mindi Summers within the first week of class to make alternate arrangements.

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) 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.

Letter Grade	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Min. Percent Required	96%	90%	85%	80%	75%	70%	65%	60%	55%	53%	50%

4. **Missed Components Of Term Work:**

   In the event that a student misses the midterm or any course work due to illness, supporting documentation, such as a medical note or a statutory declaration will be required (see Section M.1; for more information regarding the use of statuary declaration/medical notes, see FAQ). Absences must be reported within 48 hours.

   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 themselves with these regulations. See also Section E.3 of the University Calendar.

5. **Scheduled Out-of-Class Activities:**

   The midterm exam will take on **Thursday, March 5 in EDC 179**.

   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 your instructor as soon as possible so that alternative arrangements may be made for you.

6. **Course Materials:**

   There are no additional course materials required for this course.

7. **Examination Policy:**

   No aids are allowed on tests or examinations.

   Students should also read the Calendar, Section G, on Examinations.

8. **Approved Mandatory And Optional Course Supplemental Fees:**

   There are no mandatory or optional course supplemental fees for this course.

9. **Writing Across the Curriculum Statement:**

   For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. 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 the 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 concerns they might have with the Undergraduate Program Director of the Department.

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

11. **Reappraisal Of Grades:**

A student wishing a reappraisal, should first attempt to review the graded work with the 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 Exams:** 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 resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 30, 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 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 ttps://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) 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 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.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: ombuds@ucalgary.ca.

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: ombuds@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: 9 January 2020

Associate Dean Approval
For Out-of-Class-Activity: ORIGINAL SIGNED Date: _____

BIOLOGY 401 - EVOLUTION
COURSE OUTLINE

COURSE OVERVIEW

Instructors

Dr. Yeaman	Office: BI 394	Phone: 403-220-6126	Email: samuel.yeaman@ucalgary.ca
Dr. Mindi Summers	Office: BI 041	Phone: 403-220-8761	Email: mindi.summers@ucalgary.ca

Graduate Teaching Assistants (GTAs)

Alejandra Santa maria.santa@ucalgary.ca

Amber Whitebone stephanie.whitebone@ucalgary.ca

Email policy

Email is the preferred method of communication for questions and ideas. We will do our best to read and respond to emails within 24 hours Monday-Friday. We will try to respond to emails received during the weekend by the following Tuesday. To ensure targeted and timely response, please include the following components in all emails: a) appropriate salutation (e.g., "Dear Dr. Yeaman/Summers"); b) description of the problem/question; c) description of the steps you have taken to solve the problem/answer the question; and d) specific feedback that you are requesting.

Office hours

Students are invited to discuss the assignments, lecture, tutorial, and other evolution-related topics during office hours held from 1-3pm on Fridays in BI 394 (Dr. Yeaman)/BI 041 (Dr. Summers). We also welcome discussion immediately after lecture on Monday, Wednesday, and Friday, and by appointment.

Course D2L site

The D2L website will have the most updated schedule, assignments, readings, and slides and materials. You will also use D2L to complete and turn-in your assignments.

Required and recommended texts

Required reading:	*The beak of the finch: a story of evolution in our time;* Jonathan Weiner; ISBN: 9780679733379
Recommended:	*Evolution*; Bergstrom and Dugatkin

Class representatives

Please volunteer to be a class representative! Class reps are currently enrolled students in Biology 401 who volunteer to collect and share student feedback on Biology 401 – you can attend any meetings at any time (no commitment is required). Class reps meet with us on Mondays after class for approximately 30 minutes (we always bring snacks!). During our weekly meeting, class reps first share out ideas and comments from students and then we discuss ways to improve the course. Class reps will also lead collection and analysis of mid-semester feedback on the course. You will hear updates from the class reps weekly – please take the time to talk with them so that your experiences and ideas are heard!

Additional resources to learn about evolution

1) Web of Science and Google Scholar are excellent search engines to find primary articles in evolution.

2) *Understanding evolution* (http://evolution.berkeley.edu/evolibrary/article/evo_01)

3) *Evolution: the story of life on earth;* Jay Hosler*;* ISBN: 9780809043118

4) Other textbooks on evolution include:

   Evolution: Making sense of life. Zimmer and Emlen

   Evolution. Futuyma.

   Evolutionary analysis. Herron and Freeman.

LEARNING OUTCOMES & ASSESSMENT

Course themes

Microevolutionary change within populations and macroevolutionary change over vast periods of time have contributed to and shaped the diversity of life on our planet. To develop evolutionary thinking across timescales, this course will explore three key themes:

1) Mutation, recombination, natural selection, genetic drift, and gene flow generate, retain, and eliminate genetic diversity in populations over relatively short timeframes.

2) All organisms share common ancestry. Phylogenetic thinking allows investigation of the relationships among organisms.

3) The history of life on earth is dynamic and has played out over at least the past 3.5 billion years, with evolutionary innovations and rates of speciation and extinction varying through time.

Course learning outcomes

By the end of this course, you will be able to:

1) Demonstrate a thorough understanding of the process and pattern of evolutionary change.
2) Use an evolutionary framework and reasoning to applied and novel scenarios.
3) Interpret and use common qualitative and quantitative evolutionary models (e.g., phylogenetic trees).
4) Find, analyze, interpret, and discuss primary and popular literature on topics in evolutionary biology.
5) Communicate opinions on current topics in evolutionary biology orally in small discussions and presentations

Active-learning in lecture

In the lecture section of this course, you will be working with neighbors to discuss and solve problems. Typically, this will entail first solving problems as individuals, then the group will engage in peer-instruction and collaboration to answer questions, solve problems, and develop learning strategies – a technique that has been shown to increase learning compared to instructor lecture and explanation only (see Smith et al., 2011).

Please **register for TopHat before Monday, March 2** at https://tophat.com/

Course join code: 585050

In lecture quizzes

In Part 1 of the course, you will complete three in-class quizzes during lecture.

***Beak of the Finch* reading assignments**

In Part 2 of the course, we will read and discuss the *Beak of the Finch*, a nonfiction book that describes the groundbreaking research of Peter and Rosemary Grant. To accompany our reading of *Beak of the Finch,* we will also be reading a set of primary articles that resulted from the work described in the book. An overview of the *Beak of the Finch* assignments is posted on D2L. Assignments are due and discussions will take place on: **Friday, March 13; Friday, March 27; and Wednesday, April 8.**

Tutorial assignments

You will complete eight tutorial assignments during and following tutorial sessions. Assignments are due **at the beginning** of the next week's tutorial. You can only submit an assignment if you were at the tutorial it is based on.

Tutorial presentations

You will work with a partner to read, annotate, and present one paper on evolution. A list of papers to choose from will be provided, and you will need to choose your paper and partner during the tutorial session on February 25. Presentations will occur on during your tutorial on **March 31 and April 7.**

Surveys

There will be surveys announced throughout the course that will be available on D2L. These surveys will be marked for completion only, but you must complete ALL surveys to receive credit. These surveys are designed to improve instruction in this course and your effort on these surveys is important. You are asked to not use outside resources when completing these surveys. Since the timing of the surveys is important, there will not be opportunities for late submissions once each survey has closed.

BIOL 401 TENTATIVE LECTURE SCHEDULE

The most up-to-date class topics, readings, and assignment information can be found on D2L.

	DAY	TOPIC		Reading in Bergstrom and Dugatkin
			Part 1 – Dr. Yeaman	
Jan 13	M	1	Introduction to Course	N/A
Jan 15	W	2	History of evolutionary thought	Chapter 2
Jan 17	F	3	Evolutionary Genetics: Genetic diversity in the absence of evolution – 1 locus	Chapter 7.2
Jan 20 Jan 22	M/W	4 & 5	Evolutionary Genetics: Genetic diversity in the absence of evolution – 2 loci	Chapter 9.2
Jan 24	F	6	Mutation	Chapters 6.3, 6.4
Jan 27 Jan 29	M/W	7 & 8	Genetic drift	Chapter 8.1
Jan 31	F	9	Inbreeding and Population subdivision	Chapters 7.5, 8.1
Feb 3	M	10	Population subdivision	Chapter 8.1
Feb 5 Feb 7	W/F	11 & 12	Quantitative genetics	Chapter 9.4
Feb 10 Feb 12	M/W	13 & 14	Selection on the phenotype	Chapter 7.3
Feb 14	F	15	Single-locus models of selection	Chapter 7.3
Feb 16-22			**Winter Break**	
Feb 24	M	16	Single-locus models of selection	Chapter 7.3
Feb 26 Feb 28	W/F	17 & 18	Drift vs. selection Adaptation Review of the first half	Chapters 8.4, 8.5 Chapter 17 N/A
			PART 2 – Dr. Summers	
Mar 2	M	19	Evolutionary history & biodiversity	Chapter 15
Mar 4	W	20	Fossils & geologic evidence	
Mar 6	F	21	History of life on earth	Chapters 11 & 12
Mar 9	M	22	Naming nature & taxonomy	Chapter 14
Mar 11	W	23	Species & the species problem	
Mar 13	***F**	**24**	***Beak of the Finch Part 1***	***Beak of the Finch 1; primary lit.***
Mar 16	M	25	Evolutionary trees, tree-thinking, & phylogenetics I	Chapters 4 & 5
Mar 18	W	26	Evolutionary trees, tree-thinking, & phylogenetics II	
Mar 20	F	27	Evolutionary trees, tree-thinking, & phylogenetics III	
Mar 23	M	28	Macroevolution	Chapters 12 & 13
Mar 25	W	29	Symbiosis	
Mar 27	***F**	**30**	***Beak of the Finch Part II***	***Beak of the Finch II; primary lit.***
Mar 30	M	31	Coevolution	Chapter 18

Apr 1	W	32	Sex & sexual selection	Chapter 16
Apr 3	F	33	Human evolution	Chapter 19
Apr 6	M	34	Human population genetics	
Apr 8	***W**	**35**	***Beak of the Finch Part III***	***Beak of the Finch III; primary lit*.**
Apr 10	F		No class – university holiday	
Apr 13	M		No class – university holiday	
Apr 15	W	36	Synthesis	

*Reading assignments are due on D2L by 10am on March 13, March 27 and April 8 (**indicated with an asterisk and bold text**). Two surveys will be due on D2L by 10am on Wednesday, January 15 and Wednesday, April 15.

BIOL 401 TUTORIAL SCHEDULE

Part I – Dr. Yeaman

Week	Tutorial	Due in Tutorial
1 (Jan 14)	N/A	
2 (Jan 21)	Hardy-Weinberg	N/A
3 (Jan 28)	Genetic drift	Ass. 1: Hardy-Weinberg
4 (Feb 4)	Drift & gene flow	Ass. 2: Genetic drift
5 (Feb 11)	Selection	Ass. 3: Drift & Gene flow
Winter break		
6 (Feb 25)	*Paper Reading & Final Presentation Overview*	Ass. 4: Selection

Part II – Dr. Summers

Week	Tutorial	Due in Tutorial
7 (Mar 3)	Diversity	*Topic Selection*
8 (Mar 10)	Species	Ass. 5: Diversity
9 (Mar 17)	Phylogenetics I	Ass. 6: Species
10 (Mar 24)	Phylogenetics II	Ass. 7: Phylogenetics I
Tutorial presentations		
11 (Mar 31)	*Presentations*	Ass. 8: Phylogenetics II *Presentation*
12 (April 7)	*Presentations*	*Presentation*