

EVOLUTION (BIOL 318-[Removed])

Class Meeting: [Removed]

Location: [Removed]

Professor:

Andrew J. Eckert, Ph.D.

[Removed]

aeckert2+evolution@apps.vcu.edu

Office hours: [Removed]

Pre-requisites:

BIOL and BIOZ 151 and BIOL and BIOZ 152, each with a minimum grade of C; and BIOL 200, MATH 200, MATH 201, STAT 210, STAT 212, STAT 314 or satisfactory score on the VCU Mathematics Placement Test within the one-year period immediately preceding the beginning of the course. Biology majors must have completed BIOL 200.

Course web site:

All information will be available through VCU Blackboard.

Text:

Bergstrom & Dugatkin (2016) "Evolution" Second Edition. (Norton Publishers).

Course Description & Objectives:

Evolution is a fundamental scientific concept underlying all aspects of modern biological, environmental, and health-related research. The study of processes and mechanisms at every level of organismal biology through the lens of change over historical time helps us understand why these processes occur today and how we may better understand evolutionary responses to future environmental change. The specific course objectives are:

- Evaluate the historical scientific contributions of people to our understanding of evolutionary biology.
- Compare and contrast, using biological examples, the requirements for evolutionary mechanisms, such as natural selection and genetic drift, to operate within and among populations.
- Apply phylogenetic reasoning to interpret the process by which speciation occurs.
- Provide theoretical and empirical evidence for evolutionary change.
- Generate hypotheses in applying evolutionary approaches to the interaction and coevolution of organisms, populations, species, and communities.

Grading & Assessment:

I will provide *learning objectives* for each class meeting. These will specifically include the content and knowledge base that is expected, as well as how this content will be evaluated throughout the semester. The evaluations will be based on and mirror these learning objectives. ***The last day to withdraw from this course is [Removed].*** Evaluations are as follows and are based on a total of **750** points:

1. **Three multiple-choice exams (total 450 points: 60% of overall grade).** These evaluations will be composed of thought-provoking questions that enable you to demonstrate and apply your

knowledge base. The first two exams are worth **175 points** each. The final (**100 points**) will be a mixture of new information (**50 points**) and cumulative information (**50 points**). It is scheduled for [Removed] and will occur in the normal classroom assigned to this course (see above). I will provide scantrons on exam days. See **Exams Policy** below for more information.

2. Online homework assignments and quizzes (total 300 points: 40.0% of overall grade). These assignments are composed of weekly quizzes based on the assigned reading (14 quizzes at 10 points each) and homework assignments (4 assignments at 40 points each). All quizzes and homework assignments are offered through Blackboard. Please carefully read the **Blackboard policy** found after the course schedule.

At the end of the semester, the percentage grade achieved will be rounded to the closest whole percentage following normal rounding conventions (i.e. 0.50 and up are rounded upwards, while less than 0.50 is rounded downwards). This course is not curved. To determine your grade, simply add up your scores on each exam, assignment, and quiz and compare them to the ranges below. To determine your grade prior to completion of the final, please note that the point totals are percentage grades as follows: 90-100%: A, 80-89%: B, 70-79%: C, 60-69%: D, <60%: F. This means that you would add up the points achieved, divide by the points available by the date on which you are calculating your grade, and multiply by 100% (see Lecture 1). You would then compare this number to the percentage ranges to see what your grade would be at any given time throughout the semester (see also **Grades policy** below).

672-750 points (90-100%): A
 597-671 points (80-89%): B
 522-596 points (70-79%): C
 447-521 points (60-69%): D
 ≤ 446 points (< 60%): F

Schedule of topics and assignments:

The following table gives the tentative schedule of topics for the entire course. All reading assignments should be completed by the date on which they are listed. In the table below, when a chapter is listed it means the entire chapter. The book is required for this course, so please read it. It is your responsibility as a student to obtain the book in a timely manner. It is an excellent text and written at an appropriate level for an undergraduate course about evolutionary biology at VCU.

<u>Date</u>	<u>Day</u>	<u>Week</u>	<u>Module</u>	<u>Topic</u>	<u>Reading</u>	<u>Assignment</u>
[Removed]	T	1	1	Evolution as Science	Syllabus	None
[Removed]	R	1	1	Biological Evolution	Chapter 1	None
[Removed]	T	2	1	History of Evolution	Chapter 2	Quizzes 1 and 2*
[Removed]	R	2	1	Nature of Variation	Chapter 6	None
[Removed]	T	3	1	Thinking About Evolutionary Forces	Chapter 3	Quiz 3
[Removed]	R	3	1	Hardy-Weinberg Model	Chapter 7	None
[Removed]	T	4	1	Nonrandom Mating	Chapter 7	Quiz 4, HW1
[Removed]	R	4	1	Natural Selection & Mutation	Chapter 7	None
[Removed]	T	5	1	Genetic Drift & Population Structure	Chapters 7 & 8	Quiz 5

[Removed]	R	5	1	Neutral Theory	Chapter 8	None
[Removed]	T	6	1	Quantitative Genetics 1	Chapter 9	Quiz 6
[Removed]	R	6	1	Quantitative Genetics 2	Chapter 9	None
[Removed]	T	7	1	Exam 1	Chapters 1, 2, 3, 6-9	HW 2
[Removed]	R	7	2	Species Concepts & Speciation	Chapter 14	None
[Removed]	T	8	2	Spring Break	None	None
[Removed]	R	8	2	Spring Break	None	None
[Removed]	T	9	2	Extinction	Chapter 15	Quiz 7
[Removed]	R	9	2	Evolutionary Trends	Chapter 15	None
[Removed]	T	10	2	Tree Thinking	Chapter 4	Quiz 8
[Removed]	R	10	2	Inference of Phylogenies 1	Chapter 5	None
[Removed]	T	11	2	Inference of Phylogenies 2	Chapter 5	Quiz 9
[Removed]	R	11	2	RNA World & Major Transitions	Chapters 11 & 12	None
[Removed]	T	12	2	Genome Evolution	Chapter 10	Quiz 10
[Removed]	R	12	2	Evolution & Development	Chapter 13	None
[Removed]	T	13	2	Exam 2	Chapters 4, 5, 10-15	Quiz 11, HW 3
[Removed]	R	13	3	Sexual Reproduction	Chapter 16	None
[Removed]	T	14	3	Costs & Benefits of Sex	Chapter 16	Quiz 12
[Removed]	R	14	3	Sexual Selection	Chapter 16	None
[Removed]	T	15	3	Inclusive Fitness Theory	Chapter 17	Quiz 13
[Removed]	R	15	3	Models of Cooperation & Conflict	Chapter 17	None
[Removed]	T	16	3	Coevolution	Chapter 18	Quiz 14, HW 4
[Removed]	R	17	3, Cumulative	Exam 3 & Final	Chapters 16 - 18, Cumulative	None

*Both Quiz 1 and Quiz 2 can be turned in later than the date listed, but not later than the due date and time for Quiz 3. Starting with Quiz 3, there are *no* late assignments allowed (even for partial credit).

COURSE POLICIES, PROCEDURES, AND EXPECTATIONS

This section of the syllabus outlines policies, procedures, and expectations that are specific to this course. The goal of these policies is to set clearly defined rules and expectations, so that all of us can best utilize our time together to learn about evolutionary biology.

(1). E-mail policies:

- i) I will only respond to e-mails sent to the addresses listed at the beginning of the syllabus.
- ii) E-mails about course material or to set up an appointment outside of office hours will be responded to within 48-72 hours. Please note that questions about course mechanics (e.g. When is the test?) and policies (e.g. Can I wear a hat to the exam?) are not course materials, so e-mails of this form will be ignored (see also point iii). All

pertinent information is contained within this syllabus, so questions can be answered by reading it.

- iii) E-mails about problems with your schedule, excuses for missing class, issues with Blackboard, feelings about your grade, problems with your grade (please see **Grades policy**), course policies, or the structure of exams will be ignored.
- iv) If you do e-mail, please remember to politely address your professor, state your question clearly, and to use an informative statement in the subject line.

(2). Blackboard policies:

- i) It is the responsibility of the student to maintain access to Blackboard. This means you are responsible for using Blackboard correctly, obtaining a suitable wireless or Internet connection using a reliable device, and to begin assignments prior to the due dates listed on the syllabus. If you experience issues with Blackboard, contact the VCU IT Support Center (itsc@vcu.edu).
- ii) All Blackboard assignments will close on the listed due dates and times. Beginning on [Removed], late work is not permitted for any reason, not even for partial credit. Prior to [Removed], Blackboard quizzes can be turned in late for full credit, but must be turned in by the due date for Quiz 3. As for the time listed as the due date, it is exact. This means that when 11:55 PM is listed, you must submit your assignment by 11:55 PM exactly and not at 11:55 PM and 1 second. **No matter how close to a due date and time (e.g. 1 second late), submission of a late assignment will not qualify for any amount of credit.**
- iii) Please do not use a smartphone to access Blackboard. If you do and there is a problem then you will have to suffer the consequences of your choice to use technology prone to creating issues with Blackboard assignments (see point i). The consequence in these cases is to accept whatever grade was achieved on the assignment prior to the issue created due to use of a smartphone. **There will be no exceptions to this rule.**
- iv) If you encounter a problem with Blackboard, it is your responsibility to contact the VCU IT Support Center (itsc@vcu.edu) and/or the Blackboard help desk to remedy your situation.
- v) No exceptions will be made to individual students unable to complete an assignment on Blackboard. **You have approximately one to two or more weeks of time to complete a given assignment, so please plan accordingly.**
- vi) The only exception to missing a Blackboard assignment is if Blackboard experiences a system-wide problem for more than 12 hours during the last 24 hours prior to a due date for an assignment. If such an event does occur, I will provide details on the new due date via e-mail.
- vii) Blackboard assignments will be of three types: (1) homework assignments, (2) reading comprehension quizzes, and (3) extra credit assignments. All types of assignments are open book.
 - (1) **Homework assignments** are practice problems on which you are allowed unlimited attempts. Each homework assignment, of which there are four, is worth 40 points. The grades for homework assignments will be the maximum score

achieved on all attempts. Please also see the table given on Blackboard where the exact material for each homework assignment is listed. Homework assignments will open at 11:56 PM on the closing date of the previous assignment and remain open until 11:55 PM on the closing date. The only exception is homework assignment 1, which opens on [Removed].

- (2) **Reading comprehension quizzes** are sets of 10 questions taken directly from the reading materials. **After studying the chapter on your own time**, you should be able to answer these questions. There will be 14 reading comprehension quizzes, each worth 10 points. All reading comprehension quizzes will be due at 11:55 PM on Tuesday nights. The material covered in these quizzes is detailed on Blackboard. **You get exactly one attempt on these quizzes. There is also no backtracking allowed and questions will be presented one at a time.** To accommodate usage and/or access issues encountered with Blackboard, each quiz will have a 7-hour time limit. This means once you start the quiz, you will have 7 hours to complete it. If you experience a technical problem with Blackboard and need to logout, your answers will be saved. The timer, however, will continue to run, so at your earliest convenience (but within 7 hours), please log back into Blackboard to complete the quiz. **Remember, there is no backtracking.** The only exception to the timer being of length 7 hours is when you begin the quiz within 7 hours of the deadline. In this case, you will have the number of hours and minutes in the timer equal to the difference between your start time and the due date and time. **There are no other exceptions to these rules.** Quizzes will open at 11:56 PM on the closing date of the previous quiz and remain open until 11:55 PM on the closing date. The only exceptions are quizzes 1 and 2, which open on [Removed] and remain open until the due date of Quiz 3 ([Removed]).
- (3) **Extra credit assignments** will be available from time to time. They will be simple exercises, surveys, or extra questions on reading comprehension quizzes. Each extra credit assignment will be worth 0.5 to 1.0 point. If the extra credit assignment is a survey or set of problems distinct from a reading comprehension quiz, you will receive full credit for completing the assignment. In these cases, a check mark will appear in your grade book. **At the end of the semester, you will have extra credit points from surveys added to your total class score equal to the number of check marks in your grade book multiplied by 0.5. Extra credit points available on tests, homework, and quizzes will be reported with the grade for that particular assignment.** Remember that some of these will be extra questions on the reading comprehension quizzes. Announcements will be made via Blackboard about these assignments when not part of a quiz. Extra credit cannot be made-up for any reason, including missing class or adding the class late into the semester.

(3). Grades policies:

- i) The determination of grades will be made following the descriptions provided above under **Grades & Assessment**. There will be no exceptions to this plan (i.e. no

- curve). Grades are also not determined through bargaining. There are ample opportunities, including extra credit, in this course to achieve your desired grade.
- ii) Grades for all assignments will be reported via Blackboard Center. It is your responsibility to understand how to access your grades on Blackboard (e.g. through the link labeled “My Grades” is one way, but if you cannot find your grades please contact the VCU IT Support Center or Blackboard IT). Please also note that the total points available may often be misreported by Blackboard. In these cases, it stems from a missed assignment (i.e. Blackboard does not automatically assign a grade of 0 for missed assignments). Please use the syllabus to calculate the total points available for the best accuracy.
 - iii) Grades are easily calculated in this course (see **Grades and Assessment** above). Please do not ask your professor to do this for you or to calculate how many assignments you can miss and still get a certain grade.
 - iv) Problems with grades will only be discussed in person during office hours. If you discover an error in grading on either a Blackboard assignment or an exam, please bring a description of the error to office hours. If it is indeed an error, the error will be fixed immediately and the extra points will be added to the assignment or exam via the Blackboard Grade Center. Grades will not be discussed before or after lecture or through e-mail.

(4) Lecture policies:

- i) You will not get points for coming to lecture. Other than exams, there will not be graded in-class assignments. ***Students who come to lecture, however, consistently perform better in this course.*** We will also spend large amounts of time learning how to solve problems that commonly occur on exams and homework assignments during lecture.
- ii) ***The time before and after lecture is not for questions.*** This is time for me to prepare materials for lecture and to leave the classroom, so the next class can begin. Please attend office hours, read the syllabus, and/or follow the e-mail policy to receive an answer to your question.
- iii) ***I will not schedule meetings or discuss grades before or after lecture.*** Please follow the rules of e-mail correspondence and attendance at office hours to address these concerns.
- iv) Please be respectful of other students and your professor during the lecture. If I have to ask you to stop talking more than once, you will be ***required*** to leave the lecture.
- v) Questions are always welcomed, but please raise your hand and wait to be called upon prior to asking your question.
- vi) You are permitted to record lectures if that helps you to learn the material.
- vii) Lecture material will be provided via Blackboard in the form of PowerPoint slides and/or PDFs. Typically, these materials will be available prior to lecture.

(5) Exam policies:

- i) Exams in this course are in-class events. It is your responsibility to bring to lecture on exam day, a #2 pencil for the Gradelts answer sheet and, if needed, a calculator. ***Smartphones and smart watches cannot be used as calculators for exams.***

- ii) Exams have multiple versions, so please avoid cheating. It is extremely easy for me to spot cheaters and all students caught cheating will be subjected to the full weight of the University's policy (see VCU Honor System below) on ethical behavior.
- iii) **Hats cannot be worn in class on exam day.** If you refuse to remove your hat then you cannot take the exam and will receive a score of 0. Turning your hat around is not the same as not wearing it.
- iv) All bags and items brought to class on exam day must remain closed.
- v) If you experience an emergency that makes you miss an exam, please stay calm and refrain from sending urgent e-mails to your professor. Your priority should be dealing with your emergency. Once you have dealt with your emergency, please calmly attend office hours or, if that is not possible, please calmly e-mail me to set up an appointment to discuss your emergency. **I will not discuss or schedule meetings to discuss emergencies before or after lectures. Emergencies are defined as unavoidable events that are unable to be predicted.** Clear examples of emergencies are deaths in your family, **severe and sudden illnesses**, unexpected deployments for military personnel, and serious car accidents. I may ask for appropriate documentation so as to verify that the emergency described actually happened. This is in no way a reflection on my belief about you as a person, but is my way to ensure that all grades in this course are determined fairly and accurately. Documentation includes notes from health facilities, police, or superiors. **Make up exams will not be scheduled via e-mail.**
- vi) Exams 1 and 2 are not cumulative and each is worth 175 points. Exam 3, given as the final, will be composed of a part with material that is new since Exam 2 ($n = 50$ points) and a part that is cumulative ($n = 50$ points). Please consult the schedule of lectures above to determine the material on the non-cumulative portions of exams (i.e. Exams 1 and 2, as well as the first 50 points of Exam 3). In the event that we are behind in the coverage of material during lecture, the material appearing on the exam will be that which was covered through the end of the last lecture prior to the exam date. If possible, the material not covered will be moved to the next exam.
- vii) Exam questions will come from the reading and lecture materials, with approximately 65% from material covered in lecture and 35% from material in the textbook.
- viii) All mathematical equations will be provided on the front of each exam. It is your responsibility to be able to recognize and correctly use an equation to achieve an answer.
- ix) Exams will not be returned to you. They are, however, available for viewing during office hours for **2 weeks** after the exam date. Please plan accordingly.

(6) Preparedness policies:

- i) This is a 300-level course about evolutionary biology at a four-year, research-level university in a department of general biology. There are several pre-requisite courses that are required (please see above). **I expect that you have either mastered or at least have a working knowledge of the material presented in these pre-requisite courses.**
- ii) The information presented in this course **will not be unique to the technical aspects of human health.** VCU has wonderful programs in the applied human

- health fields if this is your passion. In general, a degree in Biology is not needed if your plans include one of these professions (e.g. medical school, nursing school, pharmacy school, etc.). Degrees from one of the human health oriented programs are just as, or even more than, sufficient. Of course, it does not hurt to obtain a degree in Biology either.
- iii) There are many resources on this campus to help you if you find that the material from pre-requisite courses is unfamiliar. I strive to provide as much review material as possible to help you succeed, but success is ultimately up to you and your ability to master concepts in this course, including those concepts relying on information from pre-requisite courses.

(7) Textbook policies:

- i) The textbook is required for this course. You are responsible for obtaining access to this resource by the first day of lecture, which is set for [Removed].
- ii) No extensions will be provided for any reason related to the inability to obtain the textbook prior to the first lecture. ***This includes reasons related to travel during winter break and money.***
- iii) Copies of the textbook will be placed on reserve at the library and will be available by [Removed]. This book also has numerous online versions available for purchase through either VCU bookstore or the publisher's website.

(8) Letter of recommendation policies:

- i) Many of you plan on attending further technical and professional programs (e.g. medical school, nursing school, pharmacy school, etc.) after graduating from VCU. Congratulations on your drive and vision. With that said, almost all technical and professional programs require letters of recommendation from ***mentors***. Key components to these letters are statements from mentors who personally know you and your work ethic (per the definition of a mentor-mentee relationship). ***Please note that taking a core curriculum course composed of hundreds of students taught by one professor does not establish a mentor-mentee relationship. Thus, detailed letters of recommendation cannot be written for students who take this course and achieve a good grade (but see (8).ii) below). Evaluation committees for your desired technical or professional program will receive your transcripts, so letters of recommendation speaking to your abilities to achieve letter grades could be viewed poorly.*** You should instead plan well ahead of your application to your desired program and get to know a mentor in your field of interest. This could be through volunteering in their lab, attending their lab meetings, or interacting with them in some other way. I would be more than happy to provide guidance on how best to find these types of opportunities during office hours.
- ii) With that said, technical and professional programs often require up to five different letters of recommendation during the application process. If you need to fulfill this requirement and would like to use your performance in this course to meet this requirement (**but see (8).i) above**), I can provide a letter with the following content:

“ _____ was enrolled in my Biology 318 – Evolution course at VCU during the _____ semester. This course is a large, survey style course addressing major aspects of evolutionary biology. Grades in this course are not curved. During this semester, _____ achieved an overall grade of _____, which placed them in the _____ percentile of performance out of _____ students during this semester.”

(9) Other policies:

- i) For students that are parents or those that need to care for family members in general, please feel free to contact me early in the semester if these needs place excessive demands on your abilities to perform in this class. There are ways in which I can help you to perform better in this course. In general, I have no problem with students that need to bring children to class during childcare emergencies. I only ask that they not interrupt the lecture. The same goes for office hours.
- ii) For students that are in the military, employed as various types of first responders with extreme schedules (e.g. night shifts), or have a job with an extreme work schedule (e.g., night shift for nurses, machine mechanics, etc.), please feel free to contact me early in the semester, so that we can work out a way for you to be able to perform at your desired level in this course. This also applies to students who have significant others in this situation. Of course, this is not required, but I am happy to help. In all cases, thank you for your service to our society.
- iii) There are resources for students with English as a second language and those who have various disabilities. If needed, please utilize them. More information can be found at: <https://saeo.vcu.edu/>

TIPS AND RECOMMENDATIONS TO SUCCEED IN THIS COURSE

- (1) Read the textbook by the dates assigned. Often students equate reading with skimming, but reading is used here to denote reading and comprehension, not just scanning of words on a page. This will enable you to better ask questions during lecture.
- (2) Attend and participate in lecture.
- (3) Take notes during lecture. Notes represent a powerful way to refresh your memory about the topics covered, so that you can study after lecture (see point 5 below). Notes can take any form, ranging from simple bullet point lists to full transcripts of what was stated.
- (4) Begin the course by putting all due dates for homework assignments, quizzes, and exams into your personal calendar. Using alarms to remind you of when an assignment is due within 24-48 hours of its due date is also helpful.
- (5) Attempt the homework assignments multiple times, especially those on which you struggled on the first attempt.
- (6) Use your own time to study. A good rule of thumb to use is to multiply the number of hours spent in class per week (2.5 hours for this course) by three and use the resulting number (7.5 hours) as the amount of time needed to study for this course outside of class. This time should be above and beyond that which is spent on Blackboard assignments and quizzes.
- (7) Good study habits often include but are not limited to the following: reading the assigned materials multiple times prior to attending lecture, taking notes while you read the textbook, construction of flash cards, formation of weekly study groups, answering the questions at

the end of the assigned chapters, beginning Blackboard assignments prior to an hour before the due date, and use of additional materials (e.g. dictionaries, suggested readings from lecture or the textbook) to study.

VCU POLICIES AND PROCEDURES

The required syllabus statements originally included here are maintained by the Office of the Provost and are regularly updated. To prevent the dissemination of information which may no longer be accurate or complete, the full text of the required syllabus statements have been removed from this document.

Students should visit <http://go.vcu.edu/syllabus> and review all syllabus statement information. The full university syllabus statement includes information on safety, registration, the VCU Honor Code, student conduct, withdrawal and more.