

HONORS GENETICS

BIOL 310, [REMOVED], SPRING 2019

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Office Hours: [Removed]

Lecture Times: [Removed]

Course Description

This course examines the basic principles of genetics in eukaryotes and prokaryotes at the level of molecules, cells, and multicellular organisms, including humans. Topics include Mendelian and non-Mendelian inheritance, structure and function of chromosomes and genomes, biological variation resulting from recombination, mutation, and selection, and population genetics.

Prerequisites

BIOL 152, BIOZ 152 or LFSC/BNFO 252, CHEM 101, and CHEZ 101, each with a minimum grade of C; BIOL 200, MATH 200, MATH 201, STAT 210, STAT 212, STAT 314 or a 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. Pre- or co-requisites: CHEM 102 and CHEZ 102.

Course Goals

Students will gain knowledge of how to apply concepts of modern transmission, molecular, and population genetics; sharpen their critical thinking and leadership skills through group work, quantitatively analyze data and predict outcomes using common biology and genetics techniques, and hone their written and/or oral presentation skills.

Learning Outcomes

At the conclusion of this course you will have the knowledge, skill, and ability to:

- Correlate meiosis and mitosis with Mendel's principles.
- Make predictions of results for genetic crosses using Mendel's principles and probability concepts.
- Use Mendelian principles to explain different forms of inheritance: codominance, epistasis, and quantitative traits.
- Describe the structure and function of nucleic acids.
- Understand control of gene expression and its role in different biological processes.
- Explain the inheritance of traits using classical and molecular genetic concepts.
- Describe the role of genes in the evolution of organisms.
- Understand the importance of genetics in today's society.
- Discuss case study problems and formulate answers that apply the course content in a collaborative group.

Required Course Materials

Text: Genetic Analysis: An Integrated Approach, by Mark F. Sanders and John L. Bowman with Mastering Genetics, 2nd edition (ISBN-13: 978-0321948908). We will *not* be using MasteringGenetics, so there is no need to buy the text + Mastering package.

Top Hat is a classroom and student response system used to increase your engagement during lectures using your electronic device (iPad, cell phone, tablet etc.). Subscription options are: 1) one semester (4 months) = \$24, 2) one year = \$36, and 3) lifetime = \$72. Check your email for the invite to purchase your subscription.

Blackboard will have announcements, course documents, grades, Frequently Asked Questions (FAQs), and a discussion forum intended for posting questions and discussing course-related material.

Note: for exams, students will need either a four-function or a scientific calculator. Graphing/programmable calculators and calculators with internet access will not be permitted.

Important: The discussion forum should be the first place for posting questions relating to course material, *before* emailing the instructor or a preceptor. The forum will contain folders for each chapter, as well as a general discussion section. Please post any questions in the relevant folder. Preceptors and instructors will check the forum and reply on a regular basis, but students are also welcome and encouraged to reply to posts. Questions can be

posted and replied to anonymously by students, but common courtesy is expected. Any rude/inappropriate posts or language will result in a loss of the anonymous posting option for the remainder of the semester.

The purpose of this forum is to give all students equal access to the same information. If an individual student emails a question to an instructor, the answer may give them information that other students will not have access to, which could inadvertently translate to an unfair advantage on quizzes, exams, etc. Having an online forum where everyone has equal access to all information keeps everyone on the same page!

Please note E-mail Etiquette

Always identify yourself by full name and include your class in the subject area, and send emails only from your VCU account. Because I cannot verify the identity of the owner of a non-VCU email account, I can't discuss any course-related items with that account. Basic consideration and politeness is expected. Please no 'text messaging' style messages.

Note: I make every effort to reply to emails and discussion forum posts within one day of receipt during work hours (8:00AM – 6:00PM); emails sent later than this time or on weekends may not receive a reply until the following day. Please note that I will not reply to exam/content-related emails and forum posts within 24 hours of the beginning of an exam.

Course Structure

This class meets twice a week and requires that you take an active part in the learning process. It is my goal to bring critical thinking, rigor, creativity and a spirit of excitement about biology to this class. Therefore, your time in class will be spent in a mix of traditional lectures, discussions, and group work to add to and clarify readings and concepts.

- **Attendance Policy:** Students are expected to attend all class sessions. Attendance will not count toward your final grade, but in-class participation will. To successfully master the material and receive the desired grade in the course, students are strongly encouraged to participate in all class meetings, including taking notes, writing answers to questions presented in class and working with classmates. *You are responsible for all course materials and content you miss due to an absence from class.*
 - a) **Reminder:** Students who stop attending class must withdraw officially. I will not withdraw students. A grade of "F" will be assigned for students who stop attending class but do not withdraw.
 - b) **Inclement Weather:** Lecture will meet unless officially canceled by VCU officials. Call the VCU "inclement weather hotline", 828-OPEN (828-6736), or go to www.vcu.edu/alert/. In the event of a class cancellation, the course schedule will adjust accordingly. Please check course announcements and emails for up-to-date information.
- **Electronic devices:** Students may use laptops, iPads, tablets, and recording devices for *class purposes only*. **You are required to have an electronic device to use Top Hat.** Students caught checking e-mail or Facebook, sending text messages, surfing the Internet, etc., will be asked to leave the classroom. Cell phones and pagers must be *turned to silence* during lecture and may not be on you during exams (see Exam Policy).

Assessments

1. **Weekly quizzes (10% of final grade):** at the end of each lecture, I will include recommended textbook problems relevant to the material covered in class. In the final 10-15 minutes of most Thursday lectures (see schedule), there will be a *closed-book* quiz consisting of one or two questions from the previous week's problems.
 - There will be a total of 12 quizzes. From these, your best 10 scores will count toward the final grade (1% each), with each quiz being weighted equally.
 - The remaining two quizzes will count as extra credit (1% of final grade each, maximum of 2%). If you miss a quiz without an excused absence, it will count as one of the "extra credit" scores (max. of two missed quizzes). For excused absences, a make-up quiz can be completed during the next office hour or by appointment.
2. **Participation (5% of final grade):** Although attendance will be taken using Top Hat for all class sessions, attendance itself will not be graded. Instead, participation will be graded in the form of answers to Top Hat questions during class sessions. The participation grade will be calculated based on the number of questions answered, not on whether you answered questions correctly. However, it is worth the effort to try to answer questions correctly! Students who answer at least 75% of questions correctly throughout the semester will receive 0.5% extra credit toward their final grade.
3. **Journal Club (5% of final grade):** At the end of the semester, we will have two journal club-style discussions of published research articles. Students will work in pairs to present and discuss the significance of a portion of one paper to their peers. All students will also submit a one-page summary of the two papers and submit answers to a few brief questions prior to the presentation sessions. Further details will be provided during the semester.

4. **Midterm exams (50% of final grade):** There will be *three midterm exams* during the semester. Midterm exams will be weighted such that the lowest-scoring exam will be worth 10% of the final grade, and the other two will be worth 20% each. Midterm exams will be comprehensive; however, problem-solving/calculation approaches from previous exams may be required if they are relevant to the material on later exams. Be careful not to “pigeonhole” your learning, as simply memorizing isolated concepts and examples will not ensure a good grade. You will need to integrate concepts you saw in prior chapters. Exams will use a combination of multiple-choice, matching, and short answer/problem-solving questions, and will be based on material covered in class and in the relevant sections of the textbook.
5. **Final exam (30% of final grade):** There will be a *cumulative* final exam at the end of the semester. Please consult the academic calendar for information on exam dates/times.

Midterm and Final Exam Policy

- a) Unless otherwise stated, you must bring a *scientific* or *four-function* calculator for all quizzes and exams. Programmable calculators, graphing calculators, and devices with internet access are not permitted. There will be no borrowing or sharing of calculators once the exam has begun. If you do not bring a calculator, you will be expected to perform all calculations by hand. Alternatively, you may sign one out from the library before beginning; however, no time extensions will be granted.
- b) Please bring your VCU student ID (or a government-issued photo ID) to all exams. You will be asked to show your student ID and initial a copy of the class roster when handing in your exam. Failure to bring your ID will result in a 2.5% deduction from your grade on that exam.
- c) Place all personal items (food, drink, notes/books/laptop, pack/purses, phones, coats, hats, watches, etc.) except writing tools, calculator, and student ID at the front of the classroom prior to taking a seat. Because of the prevalence of Apple Watches and similar smart devices, all watches (electronic or not), Fitbits, etc. must be removed and kept with other personal items at the front of the room.
- d) Phones must be turned off/silent and left with other personal items. *Having a phone in your possession during an exam is against course policy and will result in a “0” on the exam, even if it is turned off and not being used.* Using a phone or similar device during an exam, and other forms of cheating on an exam, will result in the filing of an honor code complaint. The instructor reserves the right to record possible instances of academic misconduct during exams to include as evidence in honor complaints.
- e) If you arrive late, you may begin an exam as long as no student has handed in their test and left the room. No time extensions will be granted for late arrivals unless specifically authorized by the instructor.
- f) **Missed exams: Permission from the instructor is required (in writing) in order to miss a midterm exam with an approved excuse.** Permission for missing an exam requires a physician’s note for illness of the student or family member or other official notice for more serious family events. All documentation must be in English. NOTE: A physician’s note must clearly state that the student cannot attend the class/exam session due to illness. A note that simply states that the student is/was not feeling well *will not* be accepted. Failure to provide official notice will result in a “0” on the exam.
- g) Makeup exams may be granted at the instructor’s sole discretion, and must be completed within three school days of the student being cleared to return to class. Makeup exams will only be granted for approved absences as described above. Missing a scheduled makeup exam will result in a “0” on the exam. NOTE: A makeup exam will use different questions than the original exam, and may thus be more difficult!
- h) Following the release of your grade on Bb, you have **one week** to view your exam, and to consult with the instructor regarding any scoring issues or re-grade requests.

Grade Calculation

The final grade scale is based on a possible total of 100%. This grade reflects what you have earned in the class, not what I have given you. Please be aware that *I do not curve, round or drop any grades*. Only changes due to mathematical error will be granted. A grade of Incomplete (I) will be given only if an excused absence is granted for the final exam.

Final Grade Scale

90.0-100% = A
80.00-89.99% = B
70.00-79.99% = C
60.00-69.99% = D
Below 60.00% = F

Category	Percent
Mid-term exams	50%
Final exam	30%
Weekly quizzes	10%
Participation (Top Hat)	5%
Journal club	5%
Total	100%

Extra credit opportunities: Maximum of 2.5% added to final grade

1. Weekly quizzes: The top 10 quiz grades will count toward the final grade, while the remaining 2 quizzes will count as extra credit (1% each, maximum of 2%)
2. Top Hat questions: Students who answer at least 75% of all Top Hat questions correctly will receive 0.5% extra credit.

Important Information from the Provost Office

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.

Letters of Recommendation

Due to the high level of demand for letters of recommendation, this is my policy:

*You must provide at least **three weeks notice**, preferably more, before your letter is due. I will not consider writing a letter that is due in less than three weeks.*

Letter of recommendation to professional school (medical, dental, vet, nursing, pharmacy, etc.) and to the VCU Pre-Health Track Committees (or any other pre-professional school committee):

- I only write letters for students who have served as a preceptor in my class, have completed two courses with me, or that I have worked with closely in some other manner.
- A successful letter of recommendation to a professional school must have detailed information about a student's personality, work ethic, scholastic performance, reliability, interpersonal relationships, etc.
- I only get to know a student well enough to write this letter by working with them personally, as I do with preceptors.

Letter of recommendation to undergraduate programs (travel abroad, summer research, etc.):

- You must complete a course with me. Furthermore, you must be someone with whom I am familiar and meet with on a regular basis (office hours, before/after class, etc.).
- If I agree to write a letter for you, please *email a CV or resume*, and all the necessary paperwork to accompany the letter. Provide a list of all the classes you have taken with your letter writer, including the semester. Make sure to tell your letter writer when the letter is due, where to send the letter, and provide information about the program you are applying for and why you want to be in it.
- Also make sure you have filled out your section of the form and signed where needed, if applicable. Please make sure that the document file format is a type that can be edited (for example, .docx format).

Please be advised that the better your letter writer knows you, the better (and longer) your letter will be. If I have agreed to write a letter for you, but have not spent a lot of time with you, the letter will be short. *If this letter of recommendation is for something very competitive or important to you, your application may suffer considerably from a short letter.* You may want to ask someone who knows you better and can write more confidently about you.

Lastly, please note that letter of recommendation writing is completely voluntary; I reserve the right to decline to provide a letter to anyone for any reason.

Tentative Schedule
(May change to accommodate pace)

<u>Date</u>	<u>Topic</u>
[Removed]	Introduction to Course
[Removed]	Chapter 3 (3.1-3.2): Review of Cell Division – Mitosis and Meiosis
[Removed]	End of add/drop and late registration period
[Removed]	Chapter 2 (2.1-2.3): Mendelian Genetics, Part I
[Removed]	Chapter 2 (2.4-2.6): Mendelian Genetics, Part II
[Removed]	Deadline to provide advance written notification of intent to observe religious holidays
[Removed]	Chapter 3 (3.3-3.6): Chromosome Heredity
[Removed]	Chapter 4 (4.1-4.2): Gene Interaction, Part I
[Removed]	Chapter 4 (4.3): Gene Interaction, Part II – Epistasis
[Removed]	Catch-Up Day, Genetics of Human Disease, Part I
[Removed]	Exam #1: Chapters 2, 3, and 4
[Removed]	Chapter 5 (5.1-5.2): Genetic Linkage, Part I
[Removed]	Chapter 5 (5.3): Genetic Linkage, Part II – 3 Point Test Cross
[Removed]	Chapter 7 (7.1-7.3): DNA Structure and Replication, Part I
[Removed]	Chapter 7 (7.4-7.5): DNA Structure and Replication, Part II
[Removed]	Chapter 8 (8.1-8.4): Molecular Biology of Transcription and RNA Processing
[Removed]	NO CLASS (Spring Break)
[Removed]	NO CLASS (Spring Break)
[Removed]	Chapter 9: Molecular Biology of Translation
[Removed]	Catch-Up Day, Genetics of Human Disease, Part II
[Removed]	Exam #2: Chapters 5, 7, 8, 9, and 11
[Removed]	Chapter 11 (11.1-11.4): Chromosome Structure
[Removed]	Deadline to withdraw from a course with a mark of “W”
[Removed]	Chapter 13 (13.1-13.4): Chromosome Aberrations
[Removed]	Chapter 12 (12.1-12.3): DNA Mutations and Repair, Part I
[Removed]	Chapter 12 (12.4-12.6): DNA Mutations and Repair, Part II
[Removed]	Chapter 15: Regulation of Gene Expression in Eukaryotes
[Removed]	Chapter 17: Recombinant DNA Technologies
[Removed]	Chapter 22 (22.1-22.3): Population Genetics, Part I
[Removed]	Chapter 22 (22.1-22.3): Population Genetics, Part II
[Removed]	Catch-Up Day, Genetics of Human Disease, Part III
[Removed]	Exam #3: Chapters 12, 13, 15, 17, 22
[Removed]	Journal Club
[Removed]	Journal Club
[Removed]	FINAL EXAM [REMOVED]