Biol 305-01 Syllabus: Genetics. Spring 2019

Instructor

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classroom: RITA 101
class meeting time 11-11:50am MWF

   A comment on appointments: I realize that you have busy schedules. I will gladly meet with you at my office at Grice and I will make every effort to come downtown if you contact me and arrange such a meeting. I really mean it!
   Contacting me: The best way is via email. I check it regularly. Please include **BIOL305** in the subject line. I receive many emails a day and this will ensure that I see and can respond to yours as quickly as possible.

Overview

This course is intended to provide you with a foundation in genetics for the rest of your curriculum in biology. It will build on material you have covered in BIOL111, BIOL112, and BIOL211.
   I see this course as essential for understanding biology. In short, studying genetics helps one to understand the relationship between the information stored as genetic material and the actual organisms that this information produces.
   This course is also important for critical thinking skills. This may be the first biology

course in which you will be expected to frequently fit alternative quantitative models to empirical data. This is a centerpiece of genetics, but more important, it's central to science.

The two overarching goals for this course are to help you develop the ability to take data and fit it to alternative genetic models and develop an understanding of the epistemology of genetics[1].

There are several subcategories of learning goals that track the topics provided in the lecture schedule.

At the end of the semester, you should have reviewed Mendelian genetics and learned about transmission genetics more broadly. You should also have expanded your understanding of the molecular machinery underpinning the transmission and expression of genes. Finally you will be familiar with both the history of the field and current-day applications.

Text and Web

The text will be **?**. This is the latest edition of the Pierce genetics textbook. Textbooks are ridiculously expensive: I encourage you to look around for a copy of this book you can scrounge for free. I see no problem with you using earlier editions of the text; I will try to make sure that problems assigned in edition 5 have equivalents in earlier editions[2]

Fairly detailed class notes should also be available on the web at `http://linum.cofc.edu/bio305`. This web-site is password protected.[3] In addition to lecture notes, other course material will be available here, including problem sets.

I will be happy to work with students who have a version of Pierce's book that is older than the most recent, 5th, edition. If you can find an old book on the cheap, I'd encourage you to go that route.

Poll Everywhere

To encourage participation in class, I will periodically ask 'clicker questions'. Rather than use a dedicated classroom device (and paying for it) we are going to use (www.polleverywhere.com). With this service, you can respond to questions I ask in (and out of) class using your computer, tablet, or phone. The phone may be particularly useful. Anybody who has a texting plan can respond to questions in class.

There is a Poll Everywhere registration link on the course homepage. You should register as soon as you are able. I also sent a link to you in an introductory email.

My classroom polls will be located at: `http://PollEv.com/stranda` you can go there on your browser, log in, and respond to questions I ask. If you log in and, in your account settings, add your mobile number (don't forget to add the country code [1 for US] and area code along with the number).

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[1]The theory or science of the method or grounds of knowledge. (Webster, 1913)

[2]Here's a link to the Amazon page for older editions. `https://www.amazon.com/Genetics-Conceptual-Approach-Benjamin-Pierce/dp/1429232501/ref=mt_hardcover?_encoding=UTF8&me=`

[3]The username is: bio305 and the password is: sewell

Assignments

Problem sets

Coming to class is an essential part of success, but because many elements of genetics are quantitative in nature, it is essential that you practice problems outside of class.

There will be three problem sets assigned this semester. They will require you to take the concepts in class and apply them in a relatively low-pressure, relaxed(!?!) environment. I will provide a series of questions, usually associated with data. Expect these problem sets to be challenging and to require independent thought. They will not consist of regurgitation-type questions. At the same time, I fully intend to provide you with the tools and skills needed to solve these problems. You will be allowed to discuss these problems with other members of the class and use text and online references, but you will be required to write up the document that you hand in alone. ***If multiple people hand in identical papers, I will consider this to be academic dishonesty and will treat the people involved accordingly (see below also)***

Exams

There will be three cumulative in-class exams and a cumulative final. These exams will have both objective questions that require mastery of facts and synthetic sections that require that you have mastery of the processes we discuss in class.

There are no makeup exams. If you miss an exam, I will weight the final more in that case. Yes, this implies that you could skip all of the in-class exams and let the entire exam grade ride on the final. That would be a terrible idea, but it is up to you.

Participation

I will be assessing participation in class through the use of clicker questions. You don't have to answer questions correctly, but you need to give each question a try. Participation will be calculated as a proportion of questions asked that you attempted to answer.

Grading

The final grade for the semester will be determined by scores on problem sets and exams. The weight given to each type of assignment is

Assignment	Weight
Problem sets (total)	35
Exams	35
Final	20
Participation	10

Outside help

As I mention above, I'll be available for outside help via office hours or appointments. In addition, this course has a Teaching Assistant (Megan Sporre) who will run an open help session each week to address questions. We will schedule this meeting in the first week of class. These sessions are not lecture rehashes, please arrive with questions–your time will be much better spent. Also the TA is not there to tell you the answers to your problem set questions. They *are* there to help you understand the concepts underlying these questions.

Attendance

It is rather ridiculous that the following statement has to be included in the syllabus of a college class: the difficulty of this course will increase exponentially as you miss classes. Furthermore, if you miss lectures please do not expect me to re-teach lectures just for you. You will be responsible for the material that you missed. Finally, this class also will be much easier if you do the assigned readings, not to mention practice problems.

I will have an idea about your attendance in the course through the use of in class polls. Though I will not formally award or dock points based on attendance, I will refer to this information when helping students outside of class.

Academic honesty

Academic honesty is critical to your career as a college student and beyond. One of your most important possessions is your integrity. When people do not trust you, it will be very difficult to truly succeed in whatever endeavor you choose to pursue. Because some students don't understand the real negative consequences of dishonesty, colleges have implemented penalties for dishonest behavior. The details of these penalties are provided in the College of Charleston's Student Handbook (`http://www.cofc.edu/about/handbook.pdf`)

Plagiarism, copying, cheating, or use of inappropriate technology (recordings on PDAs, calculators, cell phones, etc) will all be considered academic dishonesty.

Speaking of tech

My policy is to let you use whatever technology you want in class. Indeed, to respond to my poll everywhere questions you kind of need it. That openness to technology ends abruptly, however, if you impinge on the learning experience of others in the class. That rules out devices that produce sound, including the use of earphones[4]. If you are looking at distracting sites, calling your neighbors attention to something you think is funny or newsworthy, or offending people with content on your device, I will ask you to stop.

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[4]I get that earphones reduce disturbance towards neighbors, but why bother coming to class if you are stuffing things in your ears to block out the lecture as well as the give and take that happens in class?

Most of these rules and admonishments are irrelevant if you are engaged in the class. Resist the temptation to check sports scores, stocks, facebook, texts, etc. While these activities seem important at the moment, why add more obstacles between you and a deeper understanding of your declared field of interest?

Calculators

Calculators bear special mention, probably also in the section above on Academic Honesty. Working genetics problems requires calculators, and while I understand that most phones have them (or calculator apps), **I will require that you have a stand-alone calculator for all exams.** Luckily, the functions required for this course are pretty modest: addition, subtraction, multiplication, division, square-root and logarithm should do it. *If you arrive the day of the test with no calculator, I will not allow you to use a phone, nor will I go and find a calculator for you. I will ask that you either take the test with no calculator or leave, find a calculator, return and finish the test in the allotted time without disrupting other students.*

Stuff I am required by the College of Charleston to include in a syllabus, but that I think is a waste of your time

If I don't include them, however, I can be fired:
https://www.insidehighered.com/news/2016/08/08/should-professor-lose-his-job-over-ref

Pre- and Co- requisites

Students must have taken and passed BIOL 211, BIOL 112, and BIOL 111 (or their equivalents, or had permission of instructor). BIOL 211 can be a co-requisite as well.

However, you have completed these requirements or you would have been barred from registering; this is probably not information that you really need on your syllabus. For those of you who have enrolled based on instructor permission, you have also demonstrated knowledge conferred by the pre and co-requisites. After all, you convinced the instructor to override you in to the class. So really this requirement provides completely redundant, though harmless, information.

Learning Outcomes

By the end of the semester students will be able to

- Calculate a χ^2 statistic on genetic data

- Estimate the recombination rate between two loci

- Estimate a narrow-sense heritability from parent-offspring phenotypic data

- Determine if a natural population is at Hardy-Weinburg Equilibrium for a single locus

- Describe the central dogma, its exceptions, and mechanisms that control each step

It is not clear to me that if you do these things that you will actually understand genetics, but you will have committed facts to memory for a while. At the same time, a bureaucrat somewhere will be somehow relieved. And feeding bureaucracy is an essential skill that we *all* need to master.

In my opinion, it would be a pedagogical disaster if we all believe that the outcomes of any meaningful course can be boiled down to a short list of bullet points.

The most important point (one unfortunately, *not* required by the College of Charleston)

I hope that over the semester, you will develop a less task-oriented and more nuanced view of genetics than emphasized in the previous section. That's when you start to really love the topic. Lots of students have done this in the past, you can do it too. I'm looking forward to the semester and helping you along that path.

Schedule

I reserve the right to deviate from the lecture topic schedule. If there's one guarantee in this course, it's that this schedule is flexible.

Date.Mon	Topic	Readings_Pierce
01/09/19	Introduction; Blueprints for life; Begin transmission genetics	Chap 1; Chap 2
01/14/19	Mendelian genetics cont	Chap 3
01/21/19	More complex Mendelian genetics	Chap 4; Chap 5
01/28/19	Chromosomal rearrangements	Chap 8
02/04/19	Linkage	Chap 7
02/11/19	PS I due (Mon); Exam I (Fri); Linkage; Pedigrees	Chap 6
02/18/19	Population genetics	Chap 25
02/25/19	Population Genetics; QTL analysis; Quantitative genetics	Chap 24
03/04/19	Quantitative genetics	Chap 24
03/11/19	PS II Due (Mon); Exam II (Fri); Molecular basis of heredity	Chap 10; Chap 11.1-11.3; Chap 12
03/18/19	Spring Break	
03/25/19	Mutation and DNA repair	Chap 18
04/01/19	Central Dogma	Chap 13; Chap 14; Chap 15
04/08/19	Gene regulation; Epigenetics	Chap 16; Chap 17
04/15/19	PS III Due (Wed); How do genomes evolve; Transposable elements; Forensics	Chap 20
04/22/19	Exam III (Mon)	Chap 26
04/23/19	help day on Tues	
04/26/19	Final Exam 8-11am	