BIOLOGY 202
FALL 2018

Genome Sci 200:
Tues/Thurs 12:30-1:45

genetics & molecular biology

Dr. Kelly Hogan & Dr. Gidi Shemer

Dr. Hogan: leek@email.unc.edu
Dr. Shemer: bishemer@email.unc.edu

Office hours: Check front page of Sakai for details about office hour times

http://bio.unc.edu/people/faculty/hogan/
http://bio.unc.edu/people/faculty/shemer/

IN THIS HIGHLY STRUCTURED, ACTIVE LEARNING COURSE, WE HAVE EVIDENCE THAT EVERY STUDENT CAN ACHIEVE IF THEY ARE MOTIVATED TO BE AN ACTIVE LEARNER!

How do you know you are learning? When you make mistakes and identify what you don't know. Making mistakes is KEY to learning.

RECITATIONS LED BY GRADUATE TAS:

ELLIE HOLMES
(ebholmes@live.unc.edu)

ABBY SHELTON
(abbyk93@email.unc.edu)

601 Th 10:00
602 Th 11:00
603 Th 4:00
604 Fri 9:05
605 Fri 11:15
606 Fri 12:20
607 Fri 1:25
608 Fri 2:30

we have three main additional resources to enhance your learning:

1. Supplemental Instruction ("S.I.")
2. Peer Mentoring Hours
3. Learning Center

check sakai for times and locations.

MAIN GOALS OF THE COURSE

GENETIC INFORMATION

STORAGE
How is genetic information stored? What is the basis for variation?

TRANSMISSION
How information copied from cell to cell or generation to generation?

FLOW
How does the information get used to make functional RNA and proteins?

1. You will learn the basic language and common themes within the field of genetics and molecular biology. For those of you continuing in biology, this is just the tip of the iceberg. Thoroughly learning the principles is about making connections between material learned at the beginning, middle, and end of the semester! Practice is key to building a foundation of knowledge, the course is designed around many times to practice.

The major theme of the course is "Information". We're explore how genetic information is stored, transmitted, and how information flows from DNA to RNA and proteins.

2. You will learn introductory skills necessary to become a scientist, including testing hypotheses, designing experiments, interpreting results, considering the impact of the science on society, and collaborating with peers. We'll practice these skills both inside and outside the classroom/recitation sections.

3.This course will prepare you to succeed in future science courses. You will be an active learner in the lecture hall, helping you learn how to actively study. Educational research has shown that students in this course who do reading/ homeworks before class, actively participate in class, and review notes regularly can and will succeed. Feeling underprepared? The course is designed to equalize your readiness before class—while you may take several hours reading and preparing, another student may need less time. Yet when you get to class, your effort will pay off as we practice these concepts together and you gain confidence in your ability!

REQUIRED TEXTBOOK

Klug et al.: Essentials of Genetics 9th edition
(ebook with Modified Mastering and Learning Catalytics access)

It is expected that you will spend several hours reading and working problems associated with each class. If you stay on top of your reading and homework, there will be no need to cram for an exam. Practice, practice, and practice more.

See UNC bookstore to purchase the correct material. If you purchase elsewhere, be sure to have ebook package. Modified Mastering allows you two free weeks-- so no excuses about why you are not prepared if you are enrolled in the course.
Why the ebook? This ebook comes with a web-based software package called Modified Mastering Genetics that will be the medium through which you will be quizzed and receive short pre-lecture and post-lecture assignments. Learning Catalytics, our classroom response software is included too.

what is the course code? hogan00555

REQUIRED ASSIGNMENTS

see detailed schedule for exact assignments and due dates.

Late assignments receive a 0%

BEFORE CLASS
Guided Reading Questions + Mastering Assignments

DURING CLASS
Learning Catalytics + other participation activities

AFTER CLASS
Mastering Quizzes + Open-Ended Homeworks + Peerwise

THIS IS NOT A CLASS FOR PASSIVE LEARNERS. You are expected to be actively engaged in this course through before and after class, during class discussions and activities and in recitation.

You are expected to stay on top of reviewing weekly. **SUCCESSFUL STUDENTS REVIEW AND PRACTICE ROUTINELY.** Really. Don't wait. Attend SI sessions to review material with your SI leaders, do one-on-one meetings with peer mentors from class or visit the Learning center learning specialists. Successful students ask questions and get help, ROUTINELY!

COURSE WEBSITE: on Sakai

This site will have postings from our lectures such as outlines, power point slides, supplemental material that we mention in lecture. We will also post announcements on this site. It is your responsibility to check it regularly and receive email announcements.

ENGAGE
PRACTICE
IMPROVE

HOW IS MY FINAL GRADE DETERMINED?

THREE MIDTERM EXAMS = (18% EACH)
ONE CUMULATIVE FINAL EXAM (18 %)
PRE-CLASS ASSIGNMENTS + QUIZZES 10%)
RECITATION (10%)
LEARNING CATALYTICS + PEERWISE (8%)

Final grades will be assigned on the total number of points for the entire semester:

A 93-100	C 73-76
A- 90-92	C- 70-72
B+ 87-89	D+ 66-69
B 83-86	D 60-65
B- 80-82	F <60
C+ 77-79	

EXAMS

Exam questions (multiple choice and open-ended) will be taken from class meetings and assigned readings. Exams must be taken on the dates indicated; no makeup exams except in special circumstances, i.e. medical or family emergency documented in writing. Students missing an exam are expected to have an excused absence note and notify the instructor prior to missing an exam. A make-up exam must be taken within one week of the exam, otherwise the final exam score will count for that portion of the grade missed. If you feel an error has been made in determining an exam score, you may submit the exam for a re-grade in a timely manner after the exam has been returned to the class. You must submit in writing your reasons for requesting a re-grade. All exams will be kept by TAs; see a TA to review.

PRE-CLASS ASSIGNMENTS + QUIZZES

Pre-class homeworks assignments will be due by 11AM on the day of class. (That is, they are done BEFORE class starts.) Most days this will be a Mastering Genetics assignment and submitting Guided Reading Questions (GRQS) through Sakai. Late homeworks will receive a zero. Pre-class assignments allow you to gauge what you are learning from the reading and what you do and don't know. Dishonesty on this work only hurts you later on exams. It's okay if you find these questions challenging, the idea is to figure out what you need more practice with. See detailed schedule for when specific assignments are due.

Quizzes via Mastering Genetics: The goal of these is to routinely review and prepare for exams. Unlike assignments, these are timed. You will not be able to go backwards on these questions or try each question again.

LEARNING CATALYTICS AND PEERWISE

Learning Catalytics is required for answering questions during class. You can submit your responses using a laptop or other mobile device with a UNC WiFi connection. You can log in through Mastering or go directly to learningcatalytics.com with your Mastering log in. Questions will be for participation, but you should always try for correctness. It behooves you to come prepared to class and to work collaboratively with peers in class when told to do so! Note - missing just a couple of classes can quickly affect your grade! Each student will get some freebie points to account for sickness, varsity travel, technology glitches, etc. Please do not email single class excuses. If you have extended absence or excused travel, hold onto all proof and submit it at the end of the semester.

**Learning Catalytics is to be done with students who are in the classroom participating. If you are found answering and you are not in the classroom, you may receive a zero for this part of the final grade for the semester. Additionally, this is an honor code violation and the matter will be send to the honor court.

Peerwise. A small part of your grade will be to create multiple choice questions that address the material we learn. Asking questions and evaluate your peers' questions has been shown to be an invaluable tool in developing deep learning. Posting and reviewing questions will be done through an interactive system called PeerWise. Instructions on how to register and how to use PeerWise will be given during the semester. You will post questions and answers prior to exams 2, 3, and the last day of class.

REQUIRED RECITATION

During recitations, TAs will lead you through activities or problem solving practices. This course is a 4 credit hour course, and the recitations are not simply "going over the material that was learned in class", but rather a core component of the course. There will be no make-up opportunities for in-class assignments if you do not attend a recitation in a given week. If you are unable to attend the recitation for which you are registered one week, you may attend another section with prior permission of the TAs if there is room in another section. There is a maximum capacity for each section so please do not assume that you can attend another section if you miss a recitation.

See Sakai for your TA's syllabus that shows what determines your final grade in recitation.

how do successful students seek out extra practice?

SUPPLEMENTAL INSTRUCTION (S.I)

We offer **GROUP REVIEW** S.I. sessions several times a week, led by undergraduate students who excelled in this class in a previous semester. The SI sessions will allow you to process and actively practice material that was taught in the previous week. Past students referred to SI sessions as one of the most significant tools that improved their learning. This is a great review, but peer mentoring or the learning center may be better for you if you are struggling and need more than a group review.

PEER MENTORING

We offer **ONE-ON-ONE** sessions with some our best students who excelled in this class in a previous semester. They will be happy to assist you both in the classroom during activities and outside the classroom. Each mentor will hold one hour a week, please check Sakai for this schedule. Come with your textbook, your specific questions, and a friend if you need one for moral support!

THE LEARNING CENTER

Still feel like you're not reaching your goals? We suggest seeing a biology specialist at the STEM Hub or an academic coach. Successful students seek help early and often!

PIAZZA

One more way to get everyone involved and getting personalized attention! Interesting research about a "confidence gap" and how this kind of technology ensures women and underrepresented minorities feel more comfortable asking and answering course-related questions. For example, research showed that men answer 37% more questions than women in STEM classes, but being able to ask/answer anonymously, may close this gap. So what are you waiting for? Get on Piazza and start asking and answering questions!

piazza.com/unc/fall2018/biol202

THE FINE PRINT

HONOR CODE: All work done in this class must be carried out within the letter and spirit of the UNC Honor Code. You must sign a pledge on all graded work certifying that no unauthorized assistance has been given or received. You are expected to maintain the confidentiality of examinations by divulging no information about any examination to a student who has not yet taken that exam. You are also responsible for consulting with your professors if you are unclear about the meaning of plagiarism or about whether any particular act on your part constitutes plagiarism. Please talk with us if you have any questions about how the Honor Code pertains to this course.

CHANGES: The professor reserves the right to make changes to the syllabus and schedule, including homework due dates. These changes will be announced as as early as possible. TEST DATES will NOT change unless there is a university closing/emergency coinciding with the scheduled exam).

COURSE LEARNING OUTCOMES

UPON COMPLETION OF THE 202 COURSE IN BIOLOGY, A STUDENT SHOULD BE ABLE TO:

skills:

•Build hypotheses to answer a specific scientific question, design an experiment using an appropriate technique/assay to answer the question, describe positive and negative controls, predict results of their experiment, and interpret data.
•Give examples of how advances in genetics and molecular biology, from the discovery of DNA's structure to sequencing individual genomes, have changed the world (examples include recombinant insulin, personalized medicine, transgenic crops)

concepts:

•Explain the term "allele" for a single gene at a population, organismal, cellular, and molecular level; explain how dominance and recessiveness are expressed at these levels.
•Explain how genetic variation comes from in a population (e.g. from meiosis, mutation, and epigenetic changes).
•Predict genotypic and phenotypic ratios of offspring in defined genetic crosses and work these problems in reverse (when given data about offspring, determine the genotypes and phenotypes of the parents).
•Deduce modes of inheritance (example: autosomal dominance, x-linked recessive) from genetic pedigrees and explain how incomplete penetrance and variable expressivity complicate these analyses.
•Distinguish single gene traits from polygenic traits and the influence of the environment on traits.
•Explain how DNA is replicated normally and abnormally and how these concepts are utilized in the polymerase chain reaction (PCR).
•Compare and contrast the consequences of germline errors during meiosis (such as non-disjunction, and translocations) and somatic errors during abnormal mitosis (such as non-disjunction and cancer)
•Explain the flow of genetic information, based on the central dogma- from DNA to proteins and how mutations are carried through this flow of information.
•Describe the nature of the genetic code
•Describe the general organization of prokaryotic and eukaryotic genomes, including the identification and significance of the different parts of a gene (e.g. regulatory/non-regulatory, exons/introns; transcription start site; translation start site; UTRs)
•Explain how a gene can be regulated transcriptionally and post-transcriptionally and how this leads to limited expression under different conditions (such as in different environments, during the course of development, or disease conditions)
•Predict the outcome of experimental manipulations in genes (e.g. GFP-tagging to investigate gene expression)
•Describe the basic steps in gene cloning (restriction, ligation, etc.)
•Design a transgenic animal/bacteria, where a protein of interest is specifically produced
•Explain the significance of research in genetic model organisms to understand fundamental biological phenomena.

Reach Dr. Hogan or Dr. Shemer through office hours, after class, or by email. We are nice people…nobody to be intimidated by!

See something. Say something. Worried about another student's wellbeing? Let us know.

WE BELIEVE STUDENTS THRIVE WHEN THEY:
- **TAKE FULL ADVANTAGE OF THE BREADTH AND DEPTH OF OUR CURRICULUM**
- **SET ACADEMIC AND PERSONAL GOALS**
- **TAKE RESPONSIBILITY FOR THEIR EDUCATION, CHOICES, & DECISIONS**

HOW WILL YOU thrive THIS SEMESTER?

@CAROLINA

Detailed schedules with homework assignments, quiz due dates, etc. can be found on Sakai under the "syllabus" tab.

Date				Class	Instructor
T	Aug	21	1	Introduction to BIOL202	Hogan
R	Aug	23	2	How genetic information is organized in the genome	Hogan
T	Aug	28	3	Variation in genetic information – from genotype to phenotype	Hogan
R	Aug	30	4	Process of Science: Discovery of DNA Replication	Hogan
T	Sep	4	5	How genetic information is copied	Hogan
R	Sep	6	6	How genetic variation arises by gene mutation	Hogan
T	Sep	11	7	How genetic variation arises by recombination during meiosis	Hogan
R	Sep	13	8	Errors in Meiosis and Dosage Compensation	Hogan
T	**Sep**	**18**	**-**	**EXAM I**	-
R	Sep	20	9	The flow of genetic information- Transcription I	Shemer
T	Sep	25	10	The flow of genetic information- Transcription II	Shemer
R	Sep	27	11	The flow of genetic information- Translation	Shemer
T	Oct	2	12	The nature of the genetic code	Shemer
R	Oct	4	13	Revisiting mutations and alleles	Shemer
T	Oct	9	14	Regulation of gene expression in prokaryotes I	Shemer
R	Oct	11	15	Regulation of gene expression in prokaryotes II	Shemer
T	**Oct**	**16**	**-**	**EXAM II**	-
R	***Oct***	***18***	***-***	***Fall Break***	
T	Oct	23	16	Regulation of gene expression in eukaryotes I	Shemer
R	Oct	25	17	Regulation of gene expression in eukaryotes II- The epigenome	Shemer
T	Oct	30	18	Alternative Splicing and miRNAs	Shemer
R	Nov	1	19	Recombinant DNA technology I	Shemer
T	Nov	6	20	Recombinant DNA technology- Growth Hormone project	Shemer
R	Nov	8	21	Recombinant DNA technology- CRISPR	Shemer
T	**Nov**	**13**	**-**	**EXAM III**	-
R	Nov	15	22	Transmission of independently assorting traits and linked traits	Hogan
T	Nov	20	23	Pedigrees and human disease	Hogan
R	***Nov***	***22***	***-***	***Thanksgiving Holiday***	-
T	Nov	27	24	Modifications of Mendelian ratios	Hogan
R	Nov	29	25	Gene interactions and complementation	Hogan
T	Dec	4	26	Cancer Genetics	Shemer
F	**Dec**	**7**	**-**	**FINAL EXAM (Cumulative)- noon**	