BISC 336: Genetics, Fall 2018 – Drs. Hom & Bloomekatz | Lab: Dr. Mota
Sections 1-8: Lecture–Farley 202, MWF 9-9:50am
Sections 9-13: Lecture–Lamar 131, MWF 10-10:50am

Instructors:

- Dr. Erik Hom (lecturing: 8/20/18 to 10/5/18)
  Contact info: 401 Shoemaker Hall, 662-915-1731, hombisc336@gmail.com
  Office hours: Mon-Wed 2-3pm – book a 20-min slot: https://drhom.simplybook.me/
  or by appointment (use email above)

- Dr. Joshua Bloomekatz (lecturing: 10/8/18 to 11/30/18)
  Contact info: 208 Shoemaker Hall, 662-915-3072, josh@olemiss.edu
  Office hours: T.B.D.

- Dr. Linda Mota (Lab Instructor)
  Contact info: 525 Shoemaker Hall, 662-915-2002, lcmota@olemiss.edu
  Office hours: By Appointment

If you contact us via email, please include the following:
(1) BISC 336 in the subject line
(2) a description of what you need help with in the body of the email
(3) your first and last name at the end of the message.
You should receive a response from us within 24 hours (if not sooner)

Teaching Assistant (TA)	E-Mail	Office	Lab Sections
Isis Da Costa Arantes	idacost@go.olemiss.edu	Shoemaker	1 M (1:00-2:50) 2 M (3:00-4:50) 3 Tu (1:00- 2:50)
Sarah Russell	srussel3@go.olemiss.edu	Shoemaker	5 Th (11:00-12:50)
Victoria Monette	vmonette@go.olemiss.edu	Shoemaker	4 Tu (3:00- 4:50) 10 Tu (5:00-6:50) 13 Tu (11:00-12:50)
Chaz Hyseni	chyseni@go.olemiss.edu	Shoemaker 302	6 W (3:00-4:50) 9 M (5:00-6:50) 11 W (5:00-6:50)
Xia Li	xli13@go.olemiss.edu	Shoemaker 410	7 Th (1:00-2:50) 8 Th (3:00-4:50) 12 Th (5:00-6:50)

Course description: A study of current genetics, including form, function, regulation and utility. This course is designed to present an overview of genetics for Biology majors. Students are expected to become familiar with form and function of genetic material, modes of inheritance and change. Pre-requisites: Grade of C or better in BISC 160, 161, 162 and 163.

Course objectives: Why do children look like their parents? How is the information needed for living beings to survive, thrive and play soccer encoded in a cell? Where is the smart gene located? How can we identify individuals that might be susceptible to disease? How is it that all humans are 99.999% alike, yet very different? Why is cancer such a difficult disease to defeat? How do populations change based on different environmental pressures, and what underlies those changes? How can we use observation of patterns as well as planned or unplanned experiments to deduce the answers to these questions? This course is an introduction to such questions and to the fundamental concepts underpinning modern

genetics. Students should gain an understanding of inheritance, genetic variation, genetic methodologies, and some answers to the sort of questions posed above.

Required: (1) **A TopHat™ account and software on a smartphone, tablet, or laptop**. To register, go to: https://app.tophat.com/register/student/ and follow instructions there:
For 9am (Sec 1-8): use join code 335262 **For 10am (Sec 9-13)**: use join code 109443
(cost: $26/semester, $38/year, or $75/lifetime; *$16 discount will be applied upon checkout*)
We will be using this software for lecture activities, class polls, quizzes, etc. Many of the faculty in the School of Pharmacy also use TopHat for their classes, so for Pharmacy-track students, it may make sense to get a subscription beyond the semester (please check with your instructors if relevant). Please come to class prepared to participate (for course points).
We will start using TopHat on Wed 8/22 so please get all set up ASAP.
(2) Subscription to TopHat "Foundations of Genetics" (cost: $26). Readings and problem sets will be deployed through this subscription package. If you cannot afford these TopHat costs in a timely manner (nothing to be ashamed of!), please see Dr. Hom ASAP!!
(3) **Four Scantron forms F-289-PAR-L for exams**. These pink forms (http://bit.do/scantronF289) are available from the Ole Miss Bookstore. You will need one for each exam + the final.
(4) **Calculator and #2 pencil(s)** for exams.

Overview: This course will address classical and modern principles of biological inheritance, and genomic technologies relevant to contemporary research and practice in the life sciences and health professions. There are two components to this course: a rigorous lecture-based component, and a laboratory component that will constitute 25% of your course grade. Students will be expected to learn and remember facts, terminology, and concepts, but memorization *alone* will be insufficient for doing well in this course: critical thinking, the ability to formulate hypotheses and draw conclusions from quantitative data, problem-solving, and critically assessing scientific research findings (presented in figures or text) will be important for success. There will be periodic problem sets and quizzes, three exams, and a final.

Learning Objectives:
After this course, you will be expected to be able to:
- Explain how heritable information is organized, stored, expressed, and transmitted
- Explain the basic rules of inheritance, probability, and statistics
- Explain the processes that increase genetic and phenotypic diversity within a population
- Explain with examples how genes are functionally expressed and regulated by RNA and proteins
- Gain an excitement and appreciation for genetics as a foundation to understanding biology
- "Translate," quantitatively analyze, and solve written problems in genetics
- Explain the basis for key genomic technologies and how they are used today
- Appreciate the importance of genetics/genomics in society and the balancing role of ethics
- Explain the genetic basis for disease and other topics of human and societal relevance
- Manage and learn from large amounts of information and activities at a quick pace
- Design experiments and analyze results, using genetic techniques to answer biological questions
- Engage and question our understanding of genetics, determining what we know and don't know

— What are your learning goals? Why is genetics an important class for you to take? —

Attendance: *ALL students* at UM are required to bring IDs and register your attendance using the in-class Attendance Verification Interfaces; this will be strictly enforced the first 2 weeks of class. Additional details can be found here: https://common.olemiss.edu/docs/attendance.html. We will *not*

be responsible for correcting these records if you do not scan in properly in the first 2 weeks (thereafter, it may not matter). **We will also not use these specific verification records in grading you—that will be assessed via participation points (correct answers in class; see below)**. After the first 2 weeks, you will NOT need to scan in via the Attendance Verification Interfaces.

Grading:

Assessment	Points	Notes
Intake Survey	11	Survey (available 8/16) due by Mon 8/27, 11:59PM: Intake Survey: Bisc 336 Genetics Fall 2018: https://is.gd/fallgeneticsintake2018
Participation Questions	100	Correct answers earned during each class (~3 pts/class)
Daily Quizzes	100	Short in-class assessments based on readings (3-6 pts each)
Problem Sets (7)	96	Due @ 11:59PM of specified due date (12-16 pts/set)
Exam #1	111	Given on Fri 9/14 (no make ups without official note)
Exam #2	111	Given on Mon 10/8 (no make ups without official note)
Exam #3	111	Given on Fri 11/9 (no make ups without official note)
Course Improvement Survey	11	Survey (available 11/9) due by Tue 11/13, 11:59PM: Course Improvement Survey: Bisc 336 Genetics Fall 2018: https://is.gd/fallgeneticsimprovement2018
Exam #4 (cumulative Final)	210†	Given on Wed 12/5 (Sections 1-8) or Fri 12/7 (Sections 9-13) @ 8am-noon
Laboratory (Mota)	250	Performance in lab will comprise 25% of overall grade
Total POINTS (1000 will counted)	***1111***	(not counting any extra credit participation/quiz/problem set questions that might be offered throughout course)

† Final Exam will be broadly cumulative and consist of 2 parts: material covered in lectures *after* Exam #3 (111 points) and material covered in Exams #1, #2, and #3 (33 points each for a total of 99 points).

Conversion of points to letter grades for this course:
≥925 = A; 895–924 = A-; 875–894 = B+; 825–874 = B; 795–824 = B-; 775–794 = C+ ; 695–774 = C; 595–694 = D; ≤594 = F. *Note that a C or better is required for Biology majors and minors*.

Note that 11.1% extra credit is bundled into all assessments for this course: i.e., you have an *opportunity to earn 1111 points* but the grading scale is based only on 1000 points. This is a generous buffer to cover any unforeseen absences/quiz mishaps/participation question snafus, etc.; **please do not trouble us for "extra credit" or ask about missing points due to absences, etc. unless there is a persistent problem that needs addressing**. Experience has shown that this is sufficient to avoid curving final grades for the course, although students should NOT take this buffer for granted — this is not an easy course, and many students have underperformed by not working hard.

Laboratory Component: Lab sections provide an important hands-on application and illustration of the principles and techniques that you will be learning about in the "lecture" component of this course. They also provide a small group context in which to ask questions, teach each other, and engage in group-work. Students will be expected to come to lab having read the lab-related materials beforehand. Dr. Mota and your lab TAs will provide you with all further lab syllabus and lab guidelines when you first meet. Note that lab presentations and maintaining a good laboratory notebook will be a major component of your lab grade, which will comprise 25% of your overall course grade.

Exams: Exams will be multiple-choice and administered on paper with Scantron answer forms. Bring your **student ID, a #2 pencil(s), a calculator, and one Scantron form F-289-PAR-L**

(http://bit.do/scantronF289) to every exam. **Other than calculators, no electronic devices will be allowed during exams** (this includes cell phones—put them away). ***No make-up exams will be given so make sure that the exam dates are on your calendar.*** If you have an official university sanctioned absence, you must inform the instructor ASAP with official documentation, preferably at least 2 weeks before the exam. If you have a medical emergency the day of the exam, appropriate documentation or doctor's note sanctioning your absence must be provided ASAP. If no official documentation for either of these excusable types of absences is provided, expect to receive a zero for the missed exam. At the instructor's discretion, for exams missed due to an excusable absence, your grade will be determined by your performance on the corresponding section on the Final exam (your score on that section will count towards your final (33 points) but also determine the score of your missed exam (111 points)).

Electronic Devices: TopHat™ will be used to deploy class readings, problem sets, and for in-class polling (all for points). You will be expected to bring a smartphone, tablet, or laptop with WiFi internet connectivity to participate in every class. **Please refrain from sending/reading text messages, email, using social media, or engaging in any other online activities not directly related to coursework during class**. You may not realize the negative consequences it will have on your in-class focus and learning until you suffer them.

"Textbook:" Class readings and problem sets will be deployed via TopHat™ and/or Blackboard™. **You will be expected come to each class prepared, having read the required reading material for that day, *prior to class***. Staying on top of these readings in a disciplined and timely manner will enable you to get the most of lectures and the formative assessment exercises used in this course (see below). **There will be a quiz during each class during the first half of the course to ensure you have done the required reading**. In total, these quizzes amount to 100 points (roughly a whole letter grade) so please make sure to come to class on time and prepared, having worked through the readings.

In-Class Quizzes and Participation Questions: There will be in-class quizzes each day for the first part of the course to ensure you are keeping up with the required readings prior to class. These quizzes will be deployed using TopHat and are a low-stakes way (3-6 pts/quiz) to ensure you are prepared for what we will cover for that day. **We will start quizzing via TopHat on Wed 8/22; if you've done your reading for each day, you should have no problem**. Especially for the first half of the course, we will try and spend class time answering your questions, clarifying concepts that you might find confusing, and solving problems. There may be participation questions (~3 pts/class; also deployed using TopHat) sprinkled throughout class time to ensure you are tracking with the content we will be going over. **Working through the questions associated with each class reading will be a component of your Participation Points so please do them** (points may not be reflected in TopHat's grade book per se but will be assigned after-the-fact on Blackboard's grade center).

Problem Sets: There will be 7 graded problem sets (12-16pts/set) that are meant to help you learn the course material and keep you on track for preparing for exams. Much of Genetics is about solving problems. The sort of critical thinking expected of you to successfully complete problem sets will try to mimic what we expect you will need to perform well on exams. These problem sets will be administered through TopHat.

Lecture Slides, Note-Taking, and Recordings: In general, we will not be posting our lecture slides unless we deem some content relevant and not already covered in your reading. **We expect you to take your own notes in class**— (see "Advice and Study Tips" document for suggestions on this and other related matters). **Video recordings of lectures will not be permitted** (and there may be legal issues for doing so). Audio recordings of the lectures may be permitted in some cases, but you must

arrange and get prior permission for this from the instructor. But please note that audio transcripts may not be the best mode of note taking (see "Advice and Study Tips" at the end of Chapter 1 of the TopHat "Foundations of Genetics" book for the course).

Supplemental Instruction (SI): This will be the first year Genetics will have "Supplemental Instruction" (SI) — a peer-based tutorial clinic sponsored by the Center for Excellence in Teaching and Learning. In addition to working out problems and studying with your classmates, you are highly encouraged to make use of SI to supplement your efforts in this course. SI is run independently of the formal course and SI leaders are meant to facilitators (i.e., they strive to guide, not merely solve your problems in your assignments); nevertheless, as course instructors, we will liaise with SI leaders to ensure they can be a useful and productive resource for you. More details from the SI program:

- Supplemental Instruction (SI) is a set of weekly review sessions for **all** students enrolled in historically difficult courses.
- SI gives you the chance to get together with students in your class to organize your material, compare notes, discuss important concepts, practice problem-solving, develop study strategies, and be well prepared for taking your tests and exams.
- SI is for all students who want to improve their understanding of course material and improve their grades. Regular attendance of SI makes preparing and reviewing for a test much easier.
- SI sessions are organized by a trained SI leader who has taken and done well in this course.
- SI is a **FREE** service; it costs you nothing except your time. Come as often as you like. The weekly schedule is on Blackboard. By the way, the statistics show that the more you come, the better your grade.

We will have 2 SI leaders for Genetics this semester:

- **Lauren Byrd (ljbyrd@go.olemiss.edu)**
- **Rush Butler (rsbutle1@go.olemiss.edu)**

Evening SI review sessions will be held at the following times throughout the semester (please contact Lauren and Rush if you have any questions):

Review session #1: M 8-9 pm (Shoemaker 303, Rush Butler)
Review session #2: Tu 5:30-6:30 pm (Bishop 112, Lauren Byrd)
Review session #3: Tu 7-8pm (Lamar 132; Rush Butler)
Review session #4: W 5-6 pm (Lamar 327, Lauren Byrd)
Review session #5: Th 5-6 pm (Bishop 101, Rush Butler)
Review session #6: Th 7:30-8:30 pm (Bishop 103; Lauren Byrd)

Tips on how to do well: BISC 336 (like many other university courses) is complex enough to reward the student who gives some thought to how to take it. **The most important trick is to keep up: each lecture class builds on the one before**. You must master the previous material to understand the next set. Unlike other courses, genetics is largely about solving problems: working out problems, figuring out which experiments can be used to address different scientific problems, etc. The more problems you work through, the better you'll grasp the concepts. The following practices can help you succeed:

- Engage with the material! Ask questions, pull and push at the material, figure out why this or that is done that way, make connections between different parts of the material, figure out how different concepts can be used to answer other questions. Discuss with other students, and leverage SI leaders and SI sessions.
- Assess yourself frequently and accurately! Teach a topic to a friend or draw out an important figure from memory. Don't ask "do I understand this?" Ask "how would I explain this?"
- Be present and take good notes during lectures. Then take notes on those notes. Re-organizing them so it makes sense to you. Notes are useless unless you re-engage and work with them to learn what you need to.

- Don't fall behind, figure out if you don't understand something and then figure out why.
- Use the reading material and internet resources (see the Links Section of the course) as reference material to help you better understand lecture material. Make sure you understand what you read and that you do more than just "read." The true test is if you understand what you've read enough to explain it, analyze/critique it, create with it, or solve problems with it. Don't be fooled by thinking you "understand" what's being said in a reading passage as your read it — you will only really understand if you use the knowledge/concept, which requires active engagement and practice, not merely passive "reading."
- When you study, keep a running list of questions and issues you are having with the material. Bring those questions to office hours or a study group.
- It's better to study for short bursts (<50 mins) often rather than in massive cramming sessions. Cramming a few days or the night before an exam doesn't work well for the sort of deep thinking you will need to solve problems. Cramming is short-sighted: you don't retain things in long-term memory, and this may come back to haunt you on the comprehensive final (or on any pre-health professional exam you might take that requires an understanding of Genetics (e.g. the MCAT)).
- Learn and study the material by yourself first. Then study with others to make sure you really understand and check your blind spots. Don't group study before you understand the basics; note too that only very few rare individuals do not benefit from studying with others. Change your study area occasionally to keep you from getting complacent.
- Memorization is important but not enough! You are free to use flashcards to remember key vocabulary and facts, but you will certainly not do well in this course if that is all you do for studying. We will be testing higher levels of thinking; memorization is the foundation upon which we build, but you will need to use facts and concepts to solve problems. Memorization alone does not mean you know how to *think critically*, and that is a large part of Genetics.

Watch these videos linked below for even more effective study tips: http://bit.do/9beststudytips. Since your grade will be decided entirely from your combined score on several assessments and not based on how you compare to other students in the class, it will never hurt you to help fellow students with questions. In fact, research on learning has shown that whether you are on top of the material or are having a hard time understanding the concepts, you will improve your learning by discussing the material with other students. Participation in study groups and in peer discussion of TopHat questions is therefore, highly recommended.

Blackboard™ Management System: We will be using Blackboard (https://blackboard.olemiss.edu) to post class announcements/updates, assignments, syllabus revisions, **grades**, additional reading materials, etc. regularly throughout the semester. Please check Blackboard regularly and pay attention to notifications that are sent out from the Blackboard system. Help for students: http://goo.gl/4bm8Xm.

Disability Access and Inclusion: The University of Mississippi is committed to the creation of inclusive learning environments for all students. If there are aspects of the instruction or design of this course that result in barriers to your full inclusion and participation, or to accurate assessment of your achievement, please contact the course instructor as soon as possible. Barriers may include, but are not necessarily limited to, timed exams and in-class assignments, difficulty with the acquisition of lecture content, inaccessible web content, and the use of non-captioned or non-transcribed video and audio files. If you are approved through SDS, you must log in to your Rebel Access portal at **https://sds.olemiss.edu** to request approved accommodations. If you are NOT approved through SDS, you must contact Student Disability Services at **662-915-7128** so the office can: 1. determine your eligibility for accommodations, 2. disseminate to your instructors a Faculty Notification Letter, 3. facilitate the removal of barriers, and 4. ensure you have equal access to the same opportunities for success that are available to all students.

Diversity and inclusion: The ideal scientist strives to keep an open mind and to look at questions from all different perspectives. That is why integrating a diverse set of experiences is important for a truly comprehensive understanding and study of biology. However, science is conducted by humans and thus has not always met this ideal, especially historically where formal science and science education has often been restricted to subset of perspectives. This is true for science teaching as well.
As principal investigators and science educators we try to create an environment that supports a diversity of thoughts, perspectives and experiences. Since this is a continually evolving process we welcome your feedback (you can either contact us electronically, in person or anonymously). If you prefer to speak with someone outside of the course, Katrina Caldwell, the Vice Chancellor for Diversity and Community Engagement (kmcaldw1@OleMiss.edu) is an excellent resource or the Ombuds office (ombuds@olemiss.edu). Finally, as a participant in the course and in course discussions, you should also strive to honor and integrate a diverse set of perspectives and identities.

Academic Integrity: Cheating is an amazingly bad idea—just don't do it! Academic dishonesty will not be tolerated in this course and will be handled according to the University of Mississippi's Policy Code: ACA.AR.600.001 (https://goo.gl/oDF3W3). **If you are found to have cheated on an exam, quiz, or assignment, you should expect to receive *minus the points (not just a zero)* of your graded exam/assignment score—and you should be prepared to fail the course right then and there. Cheating of any kind will not be tolerated; by continuing on in this course, you consent to the academic integrity policy outlined here**. Academic dishonesty includes:

- taking an exam for another student or allowing another student to take an exam for you
- copying another student's work on an exam (keep your wandering eyes off others' exams!)
- allowing another student to copy your work on an exam/quiz (facilitating someone else's dishonesty is also dishonest)
- altering a graded exam and submitting it for a regrade
- sharing questions, answers, or details about exams/quizzes, etc. with other students who have not yet taken the assessment without express consent from the instructor (this includes sharing inappropriately on social media platforms like GroupMe)
- viewing or taking an exam/quiz outside without the knowledge of the instructor or the ground rules established by the instructor
- Rearranging the sequence of words or replacement of words is still plagiarism just as improperly citing (or lack thereof) a source or direct usage of information without citation. Whether done maliciously or "innocently," plagiarism is considered a form of cheating and will not be tolerated.

Since TopHat questions earn you course credit, responding to them using another person's device or trying gain access to TopHat questions at inappropriate times will also be considered acts of academic dishonesty. Using more than one TopHat device, colluding to share answers inappropriately (when not explicitly permitted), or referring inappropriately at notes when taking a TopHat assessment will also be considered acts of academic dishonesty. Any student caught cheating or suspected of cheating will be reported to the Dean of the student's college; strict procedures will be followed, and we will be stricter with enforcement going forward than in previous years. These procedures can be found here: http://bit.do/umacademicconductdiscipline.

By registering for BISC 336 and the corresponding lab section you are tacitly consenting to a full recognition and acknowledgement of the expectations, policies, guidelines, and information as stated above.

This syllabus is subject to change at the discretion of the instructor to accommodate instructional, and/or student needs.

Course Schedule (short version; effective 8/20/18)*

** This schedule and associated assignments (to be announced in class and on Blackboard) are **subject to revisions**. Any changes will be posted on Blackboard with an effective date; you will be responsible for keeping up with these. **Please check on Blackboard regularly for materials and announcements**.*

Lec	Date	Topic	Lab
		Part 1: Foundations of Genetics [Dr. Hom Lectures]	
1H	**Week 1** 8/20,M	Introduction to Genetics | Central Dogma | Biological Polymers | Genetic Code	Lab Skills | (1) Experimental Evolution 1
2H	8/22,W	The Basic Cell | Chromosome and DNA Organization | Anatomy of a Gene	
3H	8/24,F	The Cell Cycle | Mitosis | Meiosis	
4H	**Week 2** **8/27,M**	Principles of Mendelian Inheritance (The Ideal) | Monohybrid Crosses **Intake Survey Due by 11:59PM (Extra Credit)**	(2) *Drosophila* 1
5H	**8/29,W**	Probability and Mendelian Genetics | Dihybrid Crosses **Problem Set 1 Due by 11:59PM**	
6H	8/31,F	Modification of Mendelian Ratios I: Dominance | Sex-linkage | Extranuclear Inheritance	
—	**Week 3** 9/3,M	— NO CLASS – LABOR DAY HOLIDAY —	(2) *Drosophila* 2
7H	9/6,W	Modification of Mendelian Ratios II: Polygenic Traits | Epistasis | Penetrance & Expressivity	
8H	9/7,F	Other Non-Mendelian Realities I: Epigenetics	
9H	**Week 4** **9/10,M**	Other Non-Mendelian Realities II: Dosage Compensation **Problem Set 2 Due by 11:59PM**	(2) Chi-Sq
10H	9/12,W	Other Non-Mendelian Realities III: Symbiosis (Wolbachia) | Transposons	
—	**9/14,F**	**EXAM #1 — *you must bring Scantron form F-289 + #2 pencil + calculator!***	
11H	**Week 5** 9/17,M	Linkage and Genetic Mapping I: Two-Point Crosses	(1) Exp Evo 2
12H	9/19,W	Linkage and Genetic Mapping II: Three-Point Crosses | Guest Lecture	
13H	9/21,F	Population Genetics I: Hardy-Weinberg Equilibrium (HWE Model)	
14H	**Week 6** **9/24,M**	Population Genetics II: Non-HWE Realities **Problem Set 3 Due by 11:59PM**	(3) Pop Gen | (1) Exp Evo 3 | Figure 1 due
15H	9/26,W	Mutations | Error Rates	
16H	9/28,F	Genomics I: SNPs & CNVs | Sanger Sequencing	
17H	**Week 7** 10/1,M	Genomics II: Next-Generation Sequencing **(Last day to withdraw)**	(4) Pick a bug 1
18H	10/3,W	Genomics III: Phylogenetic Trees	
19H	**10/5,F**	Omics **Problem Set 4 Due by 11:59PM**	
		Part 2: Applications of Genetics [Below: Dr. Bloomekatz Lectures]	
—	**Week 8** **10/8,M**	**EXAM #2 — *you must bring Scantron form F-289 + #2 pencil + calculator!***	
20B	10/10,W	Human Genetics I	(4) Pick a bug 2
21B	10/12,F	Human Genetics II	
22B	**Week 9** 10/15,M	Human Genetics III	(4) Pick a Bug 3
23B	10/17,W	Human Genetics IV	
24B	**10/19,F**	Human Genetics V **Problem Set 5 Due by 11:59PM**	
25B	**Week 10** 10/22,M	Human Genetics VI	(1) Exp Evo 4

26B	10/24,W	Model Systems and Human Applications I	
27B	10/26,F	Model Systems and Human Applications II	
28B	**Week 11** 10/29,M	Model Systems and Human Applications III	(1) Exp Evo 5
29B	10/31,W	Model Systems and Human Applications IV	
30B	**11/2,F**	Model Systems and Human Applications V **Problem Set 6 Due by 11:59PM**	
31B	**Week 12** 11/5,M	Model Systems and Human Applications VI	Article Critique "Journal Club" | Figure 2 due
32B	11/7,W	Central Dogma 2.0 & Human Disease I	
—	**11/9,F**	**EXAM #3 — *you must bring Scantron form F-289 + #2 pencil + calculator!***	
33B	**Week 13** **11/12,M**	Central Dogma 2.0 & Human Disease II **Course Improvement Survey Due on Tue 11/13 by 11:59PM (Extra Credit)**	Article Critique Presentations
34B	11/14,W	Central Dogma 2.0 & Human Disease III	
35H	11/16,F	Central Dogma 2.0 & Human Disease IV	
—	**Week 14** 11/19,M 11/21,W 11/23,F	— NO CLASS – THANKSGIVING HOLIDAY —	NO LABS
36B	**Week 15** **11/26,M**	Central Dogma 2.0 & Human Disease V **Problem Set 7 Due by 11:59PM**	(1) Exp Evo 6 (Analysis) | Figure 3 due
37B	11/28,W	Central Dogma 2.0 & Human Disease VI	
38B	11/31,F	Central Dogma 2.0 & Human Disease VII	
—	**Final** **12/5,W** **or** **12/7,F**	**Final EXAM #4 (Comprehensive)** ***— you must bring Scantron form F-289 + #2 pencil + calculator!***	—

(A longer, more detailed version of the course schedule is found on next two pages)

Course Schedule: Longer Version

(subject to revisions, please check on Blackboard regularly for materials and announcements)

Major assignment due dates are indicated in red; exams in blue.

Lec	Date	Topic	Lab
		Part 1: Foundations of Genetics [Dr. Hom Lectures]	
1H	***Week 1*** 8/20,M	Class Overview | Introduction to Genetics | Genes | Central Dogma (Nucleic Acids, Amino Acids)[1] | Structure and Properties of Biopolymers | Genetic Code	Lab Skills | (1) Experimental Evolution 1
2H	8/22,W	The Basic Cell | Chromosome Structure and DNA Sequence Organization | Anatomy of a Gene	
3H	8/24,F	The Cell Cycle | Mitosis, Cytokinesis | Meiosis	
4H	***Week 2*** **8/27,M**	Mendelian Genetics I: Postulates & Terminology | Monohybrid Crosses | Punnett Square **Intake Survey Due by 11:59PM (Extra Credit)**	(2) Cross: *Drosophila* 1
5H	**8/29,W**	Mendelian Genetics II: Monohybrid Cross Probabilities (Genotypic vs. Phenotypic Ratios) | Dihybrid Crosses | Forked-line method | Probability Rules | Chi-Squared Test **Problem Set 1 Due by 11:59PM**	
6H	8/31,F	Modifications of Mendelian Ratios I: Dominance revisited | Multiple Alleles | Lethal Alleles | Sex-linked Traits | Extranuclear Inheritance (Organellar)	
—	***Week 3*** 9/3,M	**— NO CLASS – LABOR DAY HOLIDAY —**	(2) Cross: *Drosophila* 2
7H	9/5,W	Modifications of Mendelian Ratios II: Polygenic Traits | Epistasis | Penetrance & Expressivity | Environmental Impacts	
8H	9/7,F	Other Non-Mendelian Realities I: Epigenetics (DNA & histone modifications)	
9H	***Week 4*** **9/10,M**	Other Non-Mendelian Realities II: Dosage Compensation | Sex Determination **Problem Set 2 Due by 11:59PM**	(2) Chi-Sq Analysis
10H	9/12,W	Other Non-Mendelian Realities III: Polygenic Traits & GWAS | Symbiosis (Wolbachia) & Horizontal Gene Transfer (HGT) | Transposons (Mobile Elements) | Viruses	
—	**9/14,F**	**EXAM #1** ***>> you must bring Scantron form F-289 + #2 pencil + calculator! <<***	
11H	***Week 5*** 9/17,M	Linkage & Eukaryotic Gene Mapping I: Two-point mapping | Three-point mapping	(1) Exp Evo 2
12H	9/19,W	Linkage & Eukaryotic Gene Mapping II: Three-point mapping cont'd | Dr. Garrick Guest Lecture: Case Study	
13H	9/21,F	Linkage & Eukaryotic Gene Mapping III: Three-point mapping cont'd | Coefficient of Coincidence & Interference | Population and Evolutionary Genetics I: Frequencies, HWE Model and Assumptions	
14H	***Week 6*** **9/24,M**	Population and Evolutionary Genetics II: HWE Violations | Evolution and Natural Selection | Speciation **Problem Set 3 Due at 11:59PM**	(3) Pop Gen | (1) Exp Evo 3 | Figure 1 Fruit Fly due
15H	9/26,W	Mutations: Types of DNA mutations | Error Rates | Chromosome Mutations	
16H	9/28,F	Genomics I: Human Genome Variations (SNPs and CNVs) | Anatomy of a Gene Revisited | Sanger Sequencing | Genetic and Physical Maps | Human Genetic Diseases	
17H	***Week 7*** **10/1,M**	Genomics II: Whole Genome & Next Gen Sequencing (Illumina, PacBio, Nanopore) | Genome Annotations **(Last day to withdraw)**	(4) Pick a bug 1 (Extract, PCR, Primers)
18H	10/3,W	Genomics III: Phylogenetic Trees	
19H	**10/5,F**	Omics: Omics Methods | Metagenomics | Microbiomics,‡ Pharmacogenomics **Problem Set 4 Due at 11:59PM**	
—	***Week 8*** **10/8,M**	**EXAM #2** ***>> you must bring Scantron form F-289 + #2 pencil + calculator! <<***	
		Part 2: Applications of Genetics [Below: Dr. Bloomekatz Lectures]	

[1] You will be tested on these on Exams 2 and the Final so please start committing these and their properties to memory.

20G	10/10,W	Human Genetics I: Types of Experiments		(4) Pick a Bug 2 (Gels)
21G	10/12,F	Human Genetics II: Pedigrees		
22G	***Week 9*** 10/15,M	Human Genetics III: Polymorphisms and Pedigrees | Trios		(4) Pick a Bug 3 (Phylo Trees)
23G	10/17,W	Human Genetics IV: Linkage Disequilibrium – GWAS, Ancestry, Forensics – Part 1		
24G	**10/19,F**	Human Genetics IV: Linkage Disequilibrium – GWAS, Ancestry, Forensics – Part 2 **Problem Set 5 Due by 11:59PM**		
25G	***Week 10*** 10/22,M	Human Genetics V: Linkage Disequilibrium – GWAS, Ancestry, Forensics – Twins		(1) Exp Evo 4
26G	10/24,W	Model Systems and Human Applications I: Forward Genetics, Screens		
27G	10/26,F	Model Systems and Human Applications II: Reverse Genetics – Transgenes & Gene Therapy – Part 1		
28G	***Week 11*** 10/29,M	Model Systems and Human Applications III: Reverse Genetics – Transgenes & Gene Therapy – Part 2		(1) Exp Evo 5 (DNA extract)
29G	10/31,W	Model Systems and Human Applications IV: Reverse Genetics – Removing Genes from the Genome – Part 1		
30G	**11/2,F**	Model Systems and Human Applications V: Reverse Genetics – Removing Genes from the Genome – Part 2 **Problem Set 6 Due by 11:59PM**		
31G	***Week 12*** 11/5,M	Model Systems and Human Applications VI		Article Critique "Journal Club"
32G	11/7,W	Central Dogma 2.0 & Human Disease I: Replication – Part 1		
—	**11/9,F**	**EXAM #3** ***>> you must bring Scantron form F-289 + #2 pencil + calculator! <<***		
33G	***Week 13*** **11/12,M**	Central Dogma 2.0 & Human Disease II: Replication – Part 2 **Course Improvement Survey Due by 11:59PM (Extra Credit)**		Article Critique Presentations | Figure 2 Pick-a-bug due
34G	11/14,W	Central Dogma 2.0 & Human Disease III: Gene Expression Regulation – Part 1		
35G	11/16,F	Central Dogma 2.0 & Human Disease IV: Gene Expression Regulation – Part 2		
—	***Week 14*** **11/19,M** 11/21,W 11/23,F	— NO CLASS – THANKSGIVING HOLIDAY —		NO LABS
36G	***Week 15*** **11/26,M**	Central Dogma 2.0 & Human Disease V: Gene Expression Regulation – Part 3 **Problem Set 7 Due by 11:59PM**		(1) Exp Evo 6 (Analysis) | Figure 3 Yeast Evolution due
37G	11/28,W	Central Dogma 2.0 & Human Disease VI: Regulation of Translation – Part 1		
38G	11/31,F	Central Dogma 2.0 & Human Disease VII: Regulation of Translation – Part 2		
—	***Final*** **12/5,W or 12/7,F**	**EXAM #4 (FINAL) @ 8am-noon** **Sections 1-8: 12/5,W** **Sections 9-13,15: 12/7,F** ***>> you must bring Scantron form F-289 + #2 pencil + calculator! <<***		—