

## INSTRUCTOR

Dr. Lisa McDonnell

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Office hours: TBD

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Course website: <https://ted.ucsd.edu>

## CLASS TIMES AND EXAM DATES

Class: MWF 3:00pm – 3:50pm Galbraith Hall 242

Discussion Sections: M-F, check schedule at: <https://act.ucsd.edu/scheduleOfClasses/scheduleOfClassesFaculty.htm>

Midterm 1: Jan 25, 2016, 8:00-9:50 pm, Location TBD

Midterm 2: Feb 22, 2016, 8:00-9:50pm, Location TBD

Final Exam: Mar 16, 3:00-6:00pm, Location TBD

## COURSE MATERIALS

1. iClicker: We will have clicker questions for participation points in almost every class. Please bring on the first day. Available new or used at the bookstore. Must have previously registered iClicker on TED, or register it this quarter.
2. TED site: weekly materials (readings, homework problems, lecture notes) will be posted on the site. Please check it often
3. Klug et al. Essentials of Genetics, 8<sup>th</sup> edition. **This book is optional.** For weekly readings I will point you to useful websites and not the textbook. *We are not using mastering genetics*, and I will not be assigning end-of-chapter problems (you can do them, but you will have to decide which ones match the content we are covering).

## COURSE DESCRIPTION

This course aims to develop concepts of genetics as they apply to how information is stored, utilized, and inherited in life. Fundamental concepts include gene and chromosome structure, phenotype, chromosome segregation and recombination, regulation of gene expression, random mutation, and natural selection. We will learn these concepts by studying their roles in biological systems and will apply our understanding of these concepts to explain and predict a wide range of biological and real-life phenomena, e.g. human diseases, agriculture, and populations. Some key themes that we will touch upon several times in this course:

- DNA as a code: information in DNA (both translated and non-translated)
- Phenotype: what we observe, is affected by genotype and environment
- Segregation: gene distribution from parents to progeny
- Mutagenesis: Change in gene function affects phenotype

## BROAD COURSE-LEVEL GOALS

Students will:

- Explain the functions of components of genes and chromosomes
- Given a specific change to a functional DNA sequence, predict the consequences for the different levels of gene function (transcription, translation, protein activity) and overall phenotype.
- Apply knowledge of genetic variation, inheritance, and the role of the environment, to analyze and explain genetic data
- Practice communicating their understanding in groups, and collaborate to solve problems

### Learning in this course

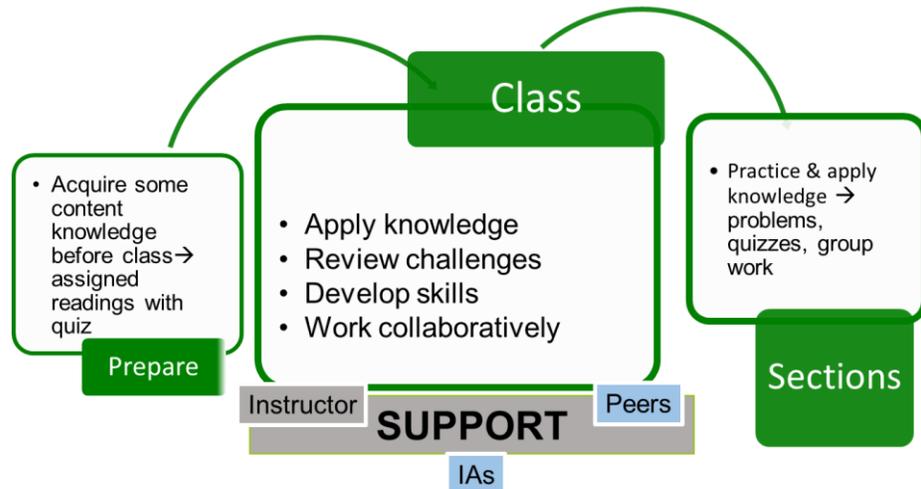
This course is designed to be a collaborative environment for everyone to learn together and construct a shared understanding of the material. Active participation both in class and in discussion sections is expected. Being able to communicate understanding, and confusion, is critical to success in any discipline, and is very useful for learning<sup>1</sup>. To encourage collaboration, class activities and discussions will be done in groups, and grades will not be assigned on a curve.

I like to use class time to work on applying our knowledge, troubleshooting difficult topics, and practice solving problems. Hence, there are targeted readings and quizzes set up that are due before class. This way, we all come to class prepared to contribute to valuable discussions. Continued practice will occur in discussion sections, and these discussion section meetings will also contain opportunities to test your knowledge, and engage in peer discussions.

Instead of memorization, we will focus on developing an understanding of fundamental concepts as they apply to different examples. Therefore, quizzes will include questions that are based on solving problems in new contexts.

<sup>1</sup> Smith et al., 2009. <http://www.sciencemag.org/content/323/5910/122.short>

### Course structure



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### GRADING

- Pre-class reading quizzes: 5% (5 points)
- In-class participation (iClicker): 3% (3 points)
- Discussion section quizzes: 10% (10 points)
- Mid-term 1: 15% (15 points)
- Mid-term 2: 20% (20 points)
- Final exam: 45% (45 points)

These guidelines will be used to assign grades:

90-98% A+, A, A-; 80-89% B+, B, B-; 60-79% C+, C, C-; 50-59% D; Less than 50% Fail

Our course is not graded on a curve (i.e. 20% of students getting A, B, C, and such). Thus, the ability to do well in this course is not dependent on others doing poorly.

### PRE-CLASS READING and QUIZZES: 5 points

Almost every week there will be a quiz on TED that must be completed before class. Check the weekly content folders on TED for reading and quiz details and due dates. Pre-class quizzes are designed to reinforce the background material, so you are prepared for class and can have productive discussions. The quiz questions are at a low level (recall, understanding), which is lower than what you will find on an exam. Most readings/quizzes will be posted approximately 3 days before they are due. Recommended reading (e.g. websites, papers) and guiding questions will be assigned to help you focus on specific material for the upcoming week. If the recommended reading isn't sufficient to clarify your understanding, be resourceful: use an old textbook, or search for info on the internet. You will get 2 attempts at each quiz. My recommendation is that you take the quiz once, identify the content that you are struggling with, do the necessary reading and then take the quiz a second time.

Your highest score will be used as your quiz score. Your lowest reading quiz score will be dropped from your overall grade.

**iCLICKER: 3 points**

Almost every class will have clicker questions. I do not grade for correctness, only participation.

90% or higher = 3 points; 80-89% = 2 points; 70-79% = 1 point; Less than 70%: 0 points

Participation is determined based on the number of questions you answered over the whole quarter.

E.g. if there were 60 questions asked and you answered 50, you would get an 83% participation = 2 points. Because you only need a 90% to get full points, it's OK if you miss a class or forget your clicker one day.

**DISCUSSION SECTIONS: 10 points**

Sections will meet for the first time in week 1 (Jan 4-8). Weekly discussion sections are designed to help you develop the skills in problem solving and data analysis that will be important on the exams, and give you the opportunity to build relationships with fellow students and your Instructional Assistant. Each section meeting is worth 1 point.

You should already be enrolled in section, and you must attend the section which you are enrolled in to receive credit. I am not able to change the number of students in a section, if a section is full you must choose another one. If you cannot find one that suits your schedule, you will have to decide to either not receive credit for the discussion section or enroll in the course another time. The mandatory nature of discussion sections is non-negotiable.

Before the discussion sections (except Week 1) some homework problems will be assigned on TED to prepare you for the quiz that will occur in the discussion section. It is critical that you genuinely attempt the homework problems before coming to tutorial in order to get the most out of these discussion meetings.

There will be a quiz in most discussion section meetings (1 point each). The quizzes will be in a two-stage collaborative format (see below for more information on this format). The quiz gives you an opportunity to test your knowledge, practice working at the level that is expected on the exam, and practice working on a test in groups. Credit will only be given for quizzes taken in the section you are enrolled in. Your lowest quiz score will be dropped from your overall grade calculation. Missed quizzes cannot be rewritten unless you have a documented medical issue or family emergency.

A note about the role of the IA in discussion sections: the best way for you to learn how to solve problems and correct misconceptions is to work through the problem, and discuss the problem with your peers and the IA. The IA is not there to give you the answers, but to facilitate students discovering the answer for themselves.

**TWO-STAGE COLLABORATIVE QUIZZES:** Here's how it works: you write the quiz and hand it in (pretty typical so far!). You then get into a group of 3 to 5 people. In your groups, you will then re-write the quiz a second time, as a group. Your individual score is worth 75% and your group score is worth 25%. If the group score is lower than your individual score, you will get your individual score. If the group score is higher than your individual score, you will get the 75%+25% mixture of scores. Almost always the group test results in everyone's score going up.

**Why use this method?** People learn more from collaborative work compared to doing work alone<sup>2,3</sup>. These collaborative testing opportunities allow students to deepen their understanding, which is essential for success on the midterms and final exams. Additionally, it's an opportunity to practice communicating effectively and collaborating to solve problems.

2 Heller et al., 1992. [http://www.physics.emory.edu/faculty/weeks/journal/Heller\\_AJP\\_91a.pdf](http://www.physics.emory.edu/faculty/weeks/journal/Heller_AJP_91a.pdf)

3 Gilley and Clarkston, 2014. [http://www.cwsei.ubc.ca/SEI\\_research/files/Gilley-Clarkston\\_2-Stage\\_Exam\\_Learning\\_JCST2014.pdf](http://www.cwsei.ubc.ca/SEI_research/files/Gilley-Clarkston_2-Stage_Exam_Learning_JCST2014.pdf)

**Discussion section schedule:**

Section	Day	Time	Location		Instructional Assistant	E-mail
A01	M	1:00p-1:50p	HSS	1305	Daanish Unwalla	dunwalla@ucsd.edu
A02	M	2:00p-2:50p	HSS	1305	Kimberly Dang Pham	kdp007@ucsd.edu
A03	M	4:00p-4:50p	CENTR	217B	Dana Elizabeth Conlisk	dconlisk@ucsd.edu
A04	Tu	5:00p-5:50p	HSS	2321	Harry Liu	hul023@ucsd.edu
A05	W	8:00a-8:50a	YORK	3000A	Ka Man Wong	kmw008@ucsd.edu
A06	W	11:00a-11:50a	CENTR	217A	Szu-Tsen Yeh	s1yeh@ucsd.edu
A07	W	5:00p-5:50p	CSB	4	Mike Matsumoto	mmatsumo@ucsd.edu
A08	W	6:00p-6:50p	CSB	4	Megan Elizabeth Orr	meorr@ucsd.edu
A09	Th	6:00p-6:50p	HSS	2321	Karina Rodriguez Escobedo	krescobe@ucsd.edu
A10	Th	7:00p-7:50p	HSS	2321	Mason Taro Matsubara	mtmatsub@ucsd.edu
A11	F	9:00a-9:50a	WLH	2208	Szu-Tsen Yeh	s1yeh@ucsd.edu
A13	F	12:00p-12:50p	HSS	1128A	Laura Millard	lmillard@ucsd.edu
A12	F	1:00p-1:50p	WLH	2204	Christopher Song	cisong@ucsd.edu

**MIDTERMS**

Midterms will be similar in question style to those seen in discussion sections (problem solving). You will be allowed to bring a 2-sided 8.5 x 11" notes sheet into the midterm. The final exam is cumulative but will have a greater emphasis on the material covered after midterm 2. There are no re-writes for missed midterms. For students with valid documentation (illness or family emergency) the missed marks will be transferred to the final exam.

**REGRADES**

If a grading error has been made, you should submit a re-grade request to Dr. McDonnell at the end of a lecture within one week of return of the exam. The time and date of closing down the appeal process will be announced in class. Simply write "please re-grade Q #" or "arithmetic error on p. #" on the cover of your paper. If you think your answer deserves more points (e.g it is not an arithmetic error), please write a concise description of how your answer compares to the key, and why you think it should have received more points, on a separate but attached piece of paper. No re-grades are possible for exams written in pencil or non-permanent ink. Students who submit exams for re-grading understand that we may (1) re-grade the entire exam, and (2) compare the submitted paper to a scanned copy of the original exam.

**LECTURE NOTES AND PODCASTING:** I will post lecture notes before class, usually the night before. Class lectures are videocast and are available for download soon after lecture. Download videocasts at <http://podcast.ucsd.edu/>

**TECHNOLOGY POLICY:**

Laptop computer policy: Students are welcome to bring laptops to lecture for note-taking purposes. Please see this research study that shows "multi-tasking" on computers is likely to decrease your grade, but it also decreases the grades of people around you who can see your screen<sup>4</sup>! For this reason, we ask that you do not flip between lectures notes and the internet. The use of cell phones, computers, or any other electronic devices is not permitted during exams. Use of a cell phone or other similar electronic devices during an exam or quiz is grounds for receiving a failing grade.

4 Sana et al. 2013. <http://www.sciencedirect.com/science/article/pii/S0360131512002254>

## **DISCUSSION BOARD**

On TED there is a discussion board set up as a place for you to ask questions. Because it can often take me 1-2 days to reply to email, you may want to turn to the discussion board for answers to your questions. If your question relates to homework problems, your peers may be able to help. This is not a place to post answers. Rather, it is a place to HELP one another. An Instructional Assistant will monitor the discussion board daily to moderate or clarify if needed.

Please note that if you email me a question and the answer to your question can be found either 1) in the syllabus, 2) on TED, or 3) in lecture I'm not likely to answer your email (not to be mean, but when there are 200+ students it's not reasonable for me to answer these kinds of questions)

## **ACADEMIC INTEGRITY** | <https://students.ucsd.edu/academics/academic-integrity/index.html>

Integrity of scholarship is essential for an academic community. The University expects that both students and faculty will honor this principle and in so doing protect the validity of University intellectual work. For students, this means that all academic work will be done by the individual(s) to whom it is assigned, without unauthorized aid of any kind.

Below are values adopted from the International Center for Academic Integrity, which we will strive to uphold in BICD 100:

Honesty: We will honestly demonstrate our knowledge and abilities according to standards and expectations. We will also communicate openly and without deception, including citing appropriate sources.

Responsibility: We will complete our work on time and participate fully (both mentally and physically) in class. We will also contribute to work done in teams.

Respect: We will speak openly with one another while respecting diverse viewpoints and perspectives. We will also provide sufficient space for others to voice their ideas.

Fairness: We will contribute equally to laboratory work, papers, project, and team learning, so that we are not "freeloading" off of others on our teams. We will also not seek unfair advantages over others.

Trustworthiness: We will not engage in personal affairs while on class time, and we will be open and transparent about what we are doing in class. We will also not distribute course materials to others.

## **ACCESSIBILITY AND INCLUSION** | <http://disabilities.ucsd.edu> | [osd@ucsd.edu](mailto:osd@ucsd.edu) | 858-534-4382

Any student with a disability is welcome to contact us early in the quarter to work out reasonable accommodations to support their success in this course. Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD). Students are required to present their AFA letters to faculty and to the OSD Liaison in the Division of Biological Sciences in advance so that accommodations may be arranged.

## CALENDAR

A general outline is available below. **More specific details for each week, including reading and assignments, will be provided on TED** (so please check TED often), and in class. \*\*Please note that this schedule may be adjusted, while still focusing on the core concepts of the course.

Date	Topic	Reading (plus check TED for additional reading)	Discussion section
<b>Week 1</b> DNA → Phenotype			
Mon 1/4	Investigating a genetics problem & what to expect in this class	Syllabus – quiz due 1/6 at 9am	Full points for participating this week. Remember all that genetics you learned in 1 <sup>st</sup> year and high school? This session will help.
Wed 1/6	Genes and chromosomes	Reading Quiz due 1/6 at 9am	
Fri 1/8	Phenotype		
<b>Week 2</b> DNA → Phenotype continued			
Mon 1/11	Molecular level regulation & start mutation	Reading Quiz due 1/11 at 9am	Quiz + problems on Week 1 material
Wed 1/13	Mutation & Putting it all together		
Fri 1/15	Mitosis & Meiosis		
<b>Week 3</b> Passing on genetic information			
Mon 1/18	<b>No Class Martin Luther King, Jr. Holiday</b>		Quiz + problems on Week 2 material <b>*If you are in the Monday discussion section you need to attend another section this week</b>
Wed 1/20	Recombination	Reading Quiz due 1/20 at 9am	
Fri 1/22	Simple inheritance: 1 and 2 genes		
<b>Week 4</b> Passing on genetic information continued			
Mon 1/25	Review		Midterm I 8-9:50pm. Topics from weeks 1 through 3  Discussion sections: using what we know to explain something in everyday language
Wed 1/27	X-linkage & sex-determination (dosage)		
Fri 1/29	Pedigrees & probability	Reading quiz due 1/29 at 9am	
<b>Week 5</b> Complications to the genetics we often learn: non-Mendelian inheritance			
Mon 2/1	Non-simple inheritance (e.g. penetrance, expressivity)	Reading Quiz due 2/1 at 9am	Quiz + problems on Week 4 material
Wed 2/3	Non-simple inheritance (e.g. complementation)		
Fri 2/5	Non-simple inheritance (e.g. gene interaction)		
<b>Week 6</b> Find that gene			
Mon 2/8	Molecular markers & mapping B	Reading Quiz due 2/8 at 9am	Quiz + problems on Week 5 material

Wed 2/10	Molecular markers & mapping		
Fri 2/12	SNPs & personal genomics		
Week 7	Find that gene – population level		
Mon 2/15	<b>No Class President's Day Holiday</b>		
Wed 2/17	Quantitative traits & heritability	Reading Quiz due 2/17 at 9am	Quiz + problems on Week 6 material <b>**If you are in Monday discussion section you need to attend another one this week</b>
Fri 2/19	Heritability & GWAS		
Week 8	Genetics at the population level		
Mon 2/22	Review		Midterm II 8-9:50pm. Topics from weeks 4 through 7 Discussion sections: using what we know to explain something in everyday language
Wed 2/24	Population genetics		
Fri 2/26	Population genetics	Reading quiz due 2/26 at 9am	
Week 9	Genotype → Phenotype when things go bad		
Mon 2/29	Cancer	Reading quiz due 2/29 at 9am	Quiz + problems on week 8 material
Wed 3/2	Cancer		
Fri 3/4	Changes to chromosome # and structure		
Week 10	Manipulating genotype		
Mon 3/7	Genome Editing	Reading quiz due 3/7 at 9am	Quiz + problems on Week 9 material
Wed 3/9	Genome Editing		
Fri 3/11	Last Class		
3/16	Final Exam	3:00-6:00pm Location TBD	