
BICD100

Genetics

Course Description

An introduction to the principles of heredity emphasizing diploid organisms.

Broad Learning Goals

Students will:

Understand the nature of genetic variation and how it contributes to phenotypic variation

Develop skills in the interpretation and analysis of data from genetic experiments

Learn about ways that genetics is used as tool to study biological processes and solve “real world” problems

Grading

Grades will be determined based on the total number of points earned through the evaluations described in the right column:

≥425 points (85%) A (A+, A or A-)

≥375 points (75%) B (B+, B or B-)

≥300 points (60%) C (C+, C or C-)

≥250 points D

If necessary, these cutoffs will be adjusted downward so that at least 50% of students receive an A or a B, but they will not be adjusted upward for any reason. See page 4 for important information about exam and quiz policies.

Fall 2013
MWF 10:00-10:50 Peterson 108/110

Instructor: Laurie Smith
E-Mail: lgsmith@ucsd.edu
Instructor Office Hours: M 11:00-11:50am in Muir Bio Rm. 1208

Website: <http://ted.ucsd.edu> (click on BICD100 FA13)

Evaluation

Midterm (180 points): November 4, 8-9:30pm

Several locations – students will be assigned to locations just before the exam date. Covers material through October 28.

Final (220 points): December 13, 8-11:00am

Cumulative but heavily emphasizing material new since the midterm. Location TBA.

Pop Quizzes/Section Participation (60 points)

Three pop quizzes will be given in discussion sections, each worth 20 points and consisting of a problem from the previous week’s problem set. You can only receive credit for taking a quiz in the section you are enrolled in as shown at <http://sections.ucsd.edu> after section enrollment closes on October 13th. It is your responsibility to know what section you are enrolled in so please confirm after Oct. 13th! If your quiz point total is <60, up to 10 additional points can be awarded by your TA for consistent attendance and high quality participation in discussion sections to bring you up to a maximum of 60 points.

Clicker Questions (40 points)

Questions will be asked in class that you will respond to using an iClicker. Each question is worth 1 point (half for answering at all, another half for answering correctly). Questions will start counting for credit in week 2 (Oct. 7) and will continue through Dec. 2nd with a similar number of questions asked each day. There will be at least 50 clicker questions altogether throughout the quarter. See Clicker section pg. 3 for more info.

Class Schedule

9/27 Course intro: logistics, historical perspective

9/30 Mendel I: principle of segregation

10/02 Mendel II: independent assortment

10/04 Meiosis, non-disjunction, X-linkage, sex determ

10/07 Pedigrees

10/09 Extensions to Mendel I: incomplete penetrance, variable expressivity, complementation

10/11 Extensions to Mendel II: gene interactions

10/14 Gene and chromosome structure

10/16 Mutations I: DNA damage and repair

10/18 Mutations II: functional classification

10/21 Genes and cancer

10/23 Epigenetics (Prof. Julie Law, Salk Institute)

10/25 Gene mapping I: recombination and linkage

10/28 Gene mapping II: DNA markers, LOD scores

10/30 Bacterial genetics and genomics

11/01 The human genome

11/04 Optional midterm support session (no clicker Qs)

11/06 Population genetics I: Hardy-Weinberg, application to DNA fingerprinting

11/08 Population genetics II: inbreeding

11/11 VETERANS DAY HOLIDAY (no class)

11/13 Population genetics III: genetic drift, gene flow

11/15 Population genetics IV mutation, selection

11/18 Quantitative traits, measuring heritability

11/20 Quantitative Trait Loci (QTL) mapping, application to marker assisted selection in breeding

11/22 Complex traits, GWAS, personal genomics

11/24 Gene therapy, genetic engineering

11/27 Reverse genetics: gene knockouts, RNAi

11/29 THANKSGIVING HOLIDAY (no class)

12/02 Genetics of the future: genome editing, genome reconstruction (synthetic biology)

12/04 Genes & behavior (Prof. Ralph Greenspan, Kavli Institute for Brain and Mind, UCSD)

12/06 The end: telomeres, aging and cancer (Prof. Vicki Lundblad, Salk Institute)

Assigned Reading (chs. & pgs. in Klug et al. 8th ed.)
Note: chapter intros also recommended for all partial chapter reading assignments

Ch. 1 (all)

Ch. 3: 3.1-3.8

“

Ch. 4: 4.11, Ch.5: 5.3; Ch. 6: 6.1-6.2

Ch. 3: 3.9; Ch. 4: “Mitochondrial Mutations” pg. 81

Ch. 4: 4.9, 4.13 thru pg. 77

Ch. 4: 4.8, 4.10

Ch. 9: 9.6; Ch. 11: pg. 222-224; Ch. 15: 15.6, 15.8

Ch. 14: 14.1 -14.5; Ch. 6: 6.4 - 6.6 thru pg. 117, 6.7 thru pg. 119, 6.8; Ch. 4: 4.1, 4.3 - 4.5

Ch. 16: 16.1, 16.2 16.4, 16.6; pg. 335

Ch. 4: 4.14; “DNA methylation” pg. 308-309; special topics section on epigenetics pg. 493-501

Ch. 7 thru pg. 135

Ch. 7: 7.5; Ch. 19: section on ASOs pg. 403-404

Ch. 8 thru first half pg. 157; 8.4 - 8.5

Ch. 17: 17.1; Ch. 18: 18.1, 18.4, 18.5; pg. 415

Ch. 22: 22.1 – 22.3; “DNA Forensics” pg. 502-511

Ch. 22: 22.8; “Purebred Dogs” pg. 82-83

Ch. 22: 22.4 - 22.7

Ch. 21: 21.2 – 21.4

Ch. 21: 21.5; pg. 450

Ch. 19: 19.6

Ch. 19: 19.1 – 19.3; 19.7, 19.8

Ch. 15: 15.12; pg. 250

Ch. 19: 19.4

Ch. 10: 10.7; section on telomeric DNA sequences pg. 227; Telomere box pg. 213

READINGS

Assigned readings for this class are from Klug et al. Essentials of Genetics, 8th edition. It is available new or used at the UCSD Bookstore and many other sources. There is no difference between the version available at the Bookstore vs. elsewhere – as long as you get the 8th edition you have the right book. We are not using Mastering Genetics (online homework module associated with this book) so you do not need to purchase an access code for that or purchase a new book to get this access code.

Another resource for this class is the Study Guide that goes with the textbook (for sale at UCSD Bookstore). This has detailed answers to all chapter end problems and explanations for how they were arrived at. Homework for this class is posted weekly and consists of problem sets and keys created by the instructor. On each problem set, selected problems from the textbook will also be suggested for additional practice; the Study Guide will be useful for those doing these extra homework problems. Most students do not buy this study guide and it is not essential for success in the class.

CLICKERS

You will need an i>clicker for this class – other clicker brands will not work. The new “i>clicker 2” is available at the UCSD Bookstore, but older models of i>clicker still work too. If you already have an i>clicker purchased for use in another class this quarter or in the past, you can use it for this class also – you just need to register it for this class (see below). You can also buy or borrow used i>clickers from other sources. However it will not work well to share a clicker with another student this quarter (the conflicting registrations cause problems). Please do not switch clickers mid-quarter unless it’s absolutely necessary (e.g. you replace a malfunctioning clicker with a new one) but if you do switch, you will need to notify the instructor immediately because your old clicker response record needs to be preserved and manually stitched together with your new one at the end of the quarter. Note that allowances will not be made for forgotten or malfunctioning clickers (e.g. dead batteries), absence from class regardless of the reason, or adding the class late. There will be enough “extra” clicker questions (at least 50 total) to give everyone a fair shot at earning the maximum of 40 clicker points in spite of these kinds of issues.

Clicker registration is necessary to link your clicker responses to your identity in the student database for this course. To register your i>clicker for this class: Log in to the course website. On the home page, see the course menu on the left and click on Tools. Near the lower right corner of the Tools page, click on “i>clicker Remote Registration” and enter the ID number on the back of your clicker in the box provided (see illustration). If you have a clicker with an illegible serial number, see Prof. Smith after class or at office hours.

DISCUSSION SECTIONS

Weekly discussion sections are an integral part of this class. They are designed to help you develop the skills in problem solving and data analysis that will be important for the exams. They will also give you the opportunity to build relationships with fellow students and your TA. You must be enrolled in a discussion section to receive credit for pop quizzes (see Evaluation section on pg. 1). You can view the discussion section schedule any time at <http://sections.ucsd.edu>; beginning at 6:00 PM on Sun. Sept. 29th, you can enroll in a section at this site. Login using your UCSD student PID and select this class. Concurrent enrollment students use their Extension Student ID number (UXXXXXXXX) to login (these are obtained from UCSD Extension as part of the course enrollment process). After logging in, if you are enrolled in the class, you can then enroll in any of the sections that still have space available by clicking the “enroll” button for that section. The section you are enrolled in will then be highlighted in green. If you are not yet enrolled in the class, you will only be able to indicate your preferences; when you are enrolled in the class, the system will then enroll you in your top ranked choice among those that still have openings (but be aware it takes a day or two from the time you add the class when you have access to section enrollment). Sections will meet for the first time in week 2 (Oct. 7-11). Up to 6:00 PM on Sun. Oct. 13th, you can change your section enrollment if necessary by logging in and clicking on the “enroll” button for a different section.

EXAM AND QUIZ POLICIES

Students with accommodations for exams from the Office of Students With Disabilities must provide their accommodation letter to Dr. Smith at the beginning of the quarter or as soon thereafter as the letter becomes

available. Please contact Dr. Smith about a week before each exam to arrange for your accommodation. Please speak with your TA regarding how your accommodation will be applied to pop quizzes.

After the grading of each exam is completed, you can view your score at the course website (go to Tools in the course menu, and click on “My Grades”). A weekly running total of your clicker points will also be posted here each Friday afternoon. After the quarter ends, your discussion section points and final grade will also be posted here. If you find an error in the grading of your exam, you can request a regrade by submitting your exam to Dr. Smith in class with a note attached explaining the grading error within one week of when graded exams were first made available for pickup; no requests will be considered after this date, except for correction of point addition errors.

If you have an illness, injury or personal crisis that you believe will prevent you from performing adequately on an exam, contact the instructor about this problem before the exam to discuss your options. If you cannot do this and miss an exam for one of these reasons, you must contact the instructor within 24 hours of the exam to discuss your options. Once you have taken an exam (or part of it), you will not be able to drop the score or negotiate a reduction in its impact on your grade for any reason, therefore it is imperative that you decide you are well enough to take an exam before it starts. If a pop quiz is missed due to a similar sort of problem, contact your TA no later than 24 hours after the missed quiz. If you miss a quiz because you were not in section on the day it was given, allowances for the lost points will only be made for a reason that is serious and beyond your control, as for an exam, e.g. illness or injury. For example, missing a quiz because you had a non-emergency doctor’s appointment, sports event, performance, or other event scheduled at the same time as section is not grounds for an excused absence. Therefore, make sure you are signed up for a section at a time you can regularly attend and avoid scheduling conflicting activities at this time.

ACADEMIC DISHONESTY

Academic dishonest (aka cheating) will not be tolerated in this class. According to UCSD policy, academic dishonesty includes:

- taking an exam for another student
- allowing another student to take an exam for you
- copying another student’s work on an exam or quiz
- allowing another student to copy your work
- altering graded assignments and submitting them for a regrade

Since clicker questions earn you course credit, responding to them using another person’s clicker will also be considered an act of academic dishonesty (you are doing that person’s work for them). If the TAs see a student using more than one clicker, both clickers will be confiscated immediately for the remainder of the class period. Altering an exam and submitting it for a regrade is an incredibly bad idea since some exams will be photocopied prior to returning them to students, and any exam handed in for a regrade will be checked against the original. Any student caught or suspected of cheating (including those found using two or more clickers in class) will be reported to the UCSD Academic Integrity Coordinator and the Dean of the student’s college. Confirmed cases of cheating will result in a reduction in the student’s grade – violations determined by the instructor as particularly serious (e.g. cheating on an exam or repeated instances of cheating) will result in the student receiving an F as their final grade as well as other disciplinary actions determined appropriate by the Academic Integrity Coordinator.