BIO 3045 (3) and BIO 3045L (1): GENETICS
Syllabus, Fall, 2019

I will praise Thee; for I am beautifully and wonderfully made: marvelous are Thy works, and that my soul knoweth right well. *Psalm 139:14*

I am Thy servant; give me understanding, that I may know Thy testimonies. Psalm 119:125

Instructor: Dr. Dawne Page
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Office Hours: 11:00 - Noon on Monday, 1:30 – 3:00 on Wednesday, or email, or drop by my office.

Text: Genetics: Analysis & Principles, 6th ed. by Robert J. Brooker

Equipment: 1) iClicker 2) Any kind of notebook for lab

Lecture: MWF, 12:15 – 1:10 p.m., LA1

Lab: Section 1: Monday, 2:45 – 5:45 p.m., SH108
Section 2: Tuesday, 8:00 – 11:00 a.m., SH108
Section 3: Tuesday, 1:30 – 4:30 p.m., SH108

PLNU Mission: To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service becomes an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Course Description (from PLNU catalog):

BIO 3045 (3): The study of the inheritance, organization, expression and variability of genes. Prerequisite(s): BIO 2010. A grade of "C" or better in BIO 2010 or instructor consent. Corequisite(s): BIO 3045L

BIO 3045L (1): An inquiry-based laboratory that is a co-requisite for BIO 3045. Letter graded. Corequisite(s): BIO 3045

Course Learning Outcomes:

Genetics students will be able to

1. apply the basic principles of Genetics, including Gene Expression, Eukaryotic Genetics, Prokaryotic Genetics, Cancer Genetics, Population Genetics, and Molecular Evolution, to solving Genetics problems.
2. conduct laboratory investigations in genetics, including designing and conducting at least one independent investigation.
3. analyze data, formulate conclusions, and design a follow-up experiment for each lab investigation.
4. analyze and discuss different viewpoints concerning social issues that relate to genetics, including diverse viewpoints within the Christian community.

Course Spiritual Outcome:

We would like to create an atmosphere in Genetics that embodies the verses:

> You shall love your neighbor as yourself. (Matthew 22:39)
>
> The stranger who dwells among you shall be to you as one born among you, and you shall love him as yourself; for you were strangers in the land of Egypt. (Leviticus 19:34)

To this end, we will be thinking about how we can help each other succeed in this class and beyond, both academically and spiritually, and how we can take responsibility for each other's achievement.

Assessment and Grading:

This course will consist of a total of **1000 points.** Please note that your grade for BIO3045 and BIO345L will be calculated together, and the same grade will be given for both courses. In addition, the following dates and times may be changed, as necessarily determined by the instructors.

630 Points: Exams
Exam I – Review of transcription & translation (100 pts)
Exams II & III – 165 points each (330 pts)
Final Exam – 200 points, 12/20, 10:30 am – 1:00 pm

Final Examination Policy: Successful completion of this class requires taking the final examination **on its scheduled day**. The final examination schedule is posted on the Class Schedules site. No requests for early examinations or alternative days will be approved.

> NOTE: No cell phones, iPods/MP3 players, computers, or other electronic devices/smart technology may be used during an exam. For all exams, except the one on Friday, 9/13, you may use your lecture notes, your homework problems, and a calculator to take the exam.

157 Points: Problem Sets, Reading Assignments, Lab Quizzes, & Paper Analysis

End of Unit Problem Sets (96 pts): Each "unit" we discuss in class will have an associated set of problems for you to work out. The assignments will be posted on Canvas and available to you once we begin the unit. Problem sets are due in class (as a hard copy) on the day following the end of each unit. (So, if we finish the chapter on Friday, your problem set will be due on Monday.) You may drop the 4 lowest grades from the problem sets.

Reading Assignments (36 points): For many of our classes, you will be required to read the material in advance and take a quiz or solve a Genetics problem. Most of these assignments will be on Canvas, but some you will bring to class. You may drop the 3 lowest grades from these assignments.

Lab quizzes (12 pts): You can expect a brief quiz at the beginning of some of the lab periods. The quiz will cover the current day's laboratory investigation, unless told otherwise. You may drop the 2 lowest grades from the lab quizzes.

Paper Analysis (13 pts): We will read and analyze 2 research papers as part of our laboratory experience.

175 Points: Lab Reports: The purpose of lab reports is to help you develop the skills of data analysis, interpretation, and communication. There will be 5 reports over the semester (see schedule below).

38 Points: Class and Lab Participation (iClicker, participation in group lab reports). You may miss up to 4 iClicker days without losing class participation points.

Extra Credit: Up to 20 points of extra credit will be available.

Late work: For work that is one day late, 10% will be deducted from the grade. For work that is two days late, 20% will be deducted from the grade. ***Late work will not be accepted after graded homework has been returned to the class.***

Exams:
9/13: Friday, during class
10/7: Monday ***evening*** (6:30 – 10:30 pm)
11/11: Monday ***evening*** (6:30 – 10:30 pm)
12/20: Final Exam, 10:30 am – 1:00 pm

Lab Reports:
9/27 (Lab 1) – Individual Lab Report
10/14 (Lab 3a) – Group Lab Report due for Peer Review
10/25 (Lab 3b) – Final Group Lab Report
11/1 (Lab 4) – Group Lab Report
11/8 (Lab 2) – Individual Lab Report
12/13 (Lab 5) – Group Lab Report

PLNU Copyright Policy: Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law**. In particular, all homeworks, assignments, and laboratories are owned by Drs. Page and Lineback and may not be shared with other individuals or groups outside of the students registered for the BIO3045, Fall, 2019 sections.** It is a violation of copyright law to otherwise distribute these materials in any form.

PLNU Academic Honesty Policy: Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See Academic Policies for definitions of kinds of academic dishonesty and for further policy information.

> NOTE: We will do a lot of group work in this class, and I encourage you to work in groups; you have much to learn from each other. However, when you work together, each member of the group should be contributing to the final product, and each person must hand in their own homework. **Each assignment must be written in your own words, and no electronic files should be exchanged.** Work together, contribute to the final product, and don't copy someone else's work.
>
> **It is also plagiarism if you use old homeworks, lab reports, exams, etc. to get ideas for how to complete current homeworks, labs, and exams.** In addition, if you use someone else's ideas, you will not get the benefit of figuring the assignment out on your own, which will greatly decrease your chance of success on the exams.

PLNU Academic Accommodation Policy: While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. (DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

PLNU Attendance and Participation Policy: Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member has the option of filing a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See Academic Policies in the Undergraduate Academic Catalog.

> NOTE: Class participation counts for 5% of your grade, and participation will be assessed via iClicker on a daily basis. *Attendance at all labs and exams is required, unless you have a doctor's note excusing you.*

Participation and Cooperation: By engaging, collaborating, and working together with your peers in this class, you will be developing teamwork and collaborative skills, while deepening your understanding of genetics. Such skills will be applicable in many situations over the course of your life, no matter the direction you choose to take!

Therefore, to create the best learning environment possible, all students should work in groups when asked to do so – whether in the lab or lecture. In lecture, you will be discussing topics with the students of your choice. In lab, I will assign groups, and I will shuffle the groups several times during the semester. You may be surprised how much you can learn from one another, especially from people who you may not have chosen to work with in lab. Cell phones must be muted/on vibrate during class and lab. Please, NO texting during class or lab, as it distracts both you and people around you.

Please note that these dates and topics are subject to change, as necessarily determined by the instructors.

Date	Lectures	Reading	Labs	Homework/Exam/ Lab Report Due
9/4	DNA Structure	Fig 10.7 & 10.17	Lab 1: Mutagenesis, Part I (WRF)	
9/6	DNA Replication	***Ch 11**: p 252-67, 270-2		
9/9	How do mutations affect proteins?	***Ch 4**: p 78-79	Lab 1: Mutagenesis, Part I (MT)	DNA Rep HW
9/11	Types of mutations	***Ch 19**: p 461-464,465-468		
9/13	**EXAM – Txn & Tln (Ch 12, 13)**			Exam 1: Txn/Tln
9/16	Mutations in biochemical pathways	***Ch 13**: p 306-309	Lab 2a: Drosophila, Part I	
9/18	How are mutations repaired?	***Ch 19:** p 470-475,481-484		
9/20	Transposons & Genetic Disease	**Ch 20**: p 499-500		Pathway HW
9/23	Meiosis	***Ch 3**: p 46-62	Lab 3a: Mutagenesis, Part II	Mutation HW
9/25	Principle of Segregation	**Ch 2**: p 18-26		Meiosis HW
9/27	Principle of Indep. Assortment	***Ch 2**: p 26-35		Lab 1 Due
9/30	Hypothesis Testing	**Ch 2**: p 36-38 (Chi Square)	Lab 3b: Mutagenesis, Part III	Mendel HW
10/2	Genes on Sex Chromosomes	***Ch 3**: p 64-70; **Ch4**: p 86-88		
10/4	How is gender determined?	**Ch 3:** p 66-68; **Ch 5:** p 106-110		Chi-Square HW
10/7	What Mendel Didn't Know	**Ch 4**: p 81-86, 90	Lab 2b: Drosophila, Part II	Exam 2 (thru 9/27)
10/9	Complementation	***Ch 4**: p 92-93		Sex-Linked HW
10/11	Gene Interaction	***Ch 4**: p 92-95		
10/14	Evidence for Linked Genes	**Ch 6**: p 127-8	Lab 4: Yeast Genetics	Lab 3b (Peer Review)
10/16	Mapping 2 Linked Genes	***Ch 6**: p 129-135		Epistasis HW
10/18	Mapping 3 Linked Genes	***Ch 6**: p 135-141		
10/21	Analyze Yeast Plates		**NO LAB: Holiday Week**	
10/23	Mapping 3 Linked Genes	**Ch 6**: p 135-141		
10/25	**HOLIDAY**			Lab 3b Due
10/28	Microorganisms in Biotechnology	**Ch 22**: p 539-542	Lab 2c: Drosophila, Part III	Mapping HW
10/30	Genetically Modified Organisms	***Ch 22**: p 542-546, 551-552		
11/1	Stem Cells & Gene Therapy	**Ch 22**: p 546-551, 555-558		Lab 4 Due
11/4	How do chromosomes mutate?	***Ch 8**: p 177-184	Lab: Paper Analysis	Biotech HW
11/6	Clinical analysis of inversion	**Ch 8**: p 187-192		
11/8	How do csome numbers change?	***Ch 8**: p 192-201		Lab 2 Due
11/11	How is the cell cycle regulated?	**Ch 25**: p 624-634	**NO LAB**	Exam 3 (thru 11/1)
11/13	What genes cause cancer?	***Ch 25**: p 624-634		
11/15	How is cancer treated?	**Ch 25**: p 634-636		Chromosome HW
11/18	Mitochondria & Human Disease	**Ch 5**: p 116-121	Lab 5a: Pop Study, Part 1	Cancer HW
11/20	Mitochondria & Human Migration	**Supplement**		Mito HW1
11/22	Population genetics: Overview	***Ch 27**: p 675-680		Mito HW2
11/25	Alleles in populations	**Ch 27**: p 675-680	**NO LAB: Holiday Week**	
11/27	**HOLIDAY**			
11/29	**HOLIDAY**			
12/2	Predicting allele freq. in pops.	**Ch 27**: p 680-2, 685-686	Lab 5b: Pop Study, Part 2	
12/4	Populations undergoing selection	***Ch 27**: p 680-2, 685-686		
12/6	How is a phylogeny constructed?	**Ch 29**: p 738-746		Population HW
12/9	HIV Phylogenetics	**HIV Paper**	Lab 6: Phylogenetic Analysis	
12/11	Human genomic data	***Supplement**		
12/13	How are molecular clocks used?	***Ch 29**: p. 746-755		Lab 5 Due
12/20	Final Exam (Comprehensive)			

* denotes there is a pre-class Canvas quiz on this particular Reading Assignment.