POINT 1902 LOMA NAZARENE UNIVERSITY	***Biology** ***BIO3045 and BIO3045L: Genetics and Genetics Lab** ***4 units (3 units lecture + 1 unit lab)**
Fall 2022	

Meeting days: **Lecture: MWF** **Lab: T or W**	**Instructor:** **Dr. Dawne Page, Professor & Chair of Biology**
Meeting times: **Lecture: 12:15 – 1:15 pm** **Lab: Tue, 8:00 – 11:00 am** **Tue, 1:30 – 4:30 pm** **Wed, 2:45 – 5:45 pm**	**Phone: 619-849-2204**
Meeting locations **Lecture: LA 101** **Lab: SA 108**	**Email: dawnepage@pointloma.edu**
Final Exam: Fri, 12/16, 10:30 am	**Office location and hours:** **In person: Mon & Wed, 10:45 –11:45 am, RS109** **Zoom: Thur, 4:30-5:30 pm**

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 is 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

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.
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.

LAB TECHNIQUES LEARNED AND APPLIED IN BIO3045L

- Use of micropipettes
- Sterile technique for culturing bacteria and yeast
- Carry out dilution series for quantification of bacteria
- Design, execute, and interpret an experiment quantifying bacterial mutation
- Culture, breed, and perform microscopic analysis of *Drosophila*
- Perform PCR
- Perform agarose gel electrophoresis
- Work in teams to collaborate and engage in problem-solving activities
- Write five lab reports

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.

REQUIRED TEXTS/MATERIALS

Genetics: Analysis & Principles, 7th ed., by Robert J. Brooker (2021).

iClicker

COURSE CREDIT HOUR INFORMATION

In the interest of providing sufficient time to accomplish the stated Course Learning Outcomes, this class meets the PLNU credit hour policy for a 4-unit class (3 units lecture, 1 unit lab) delivered over 15 weeks. It is anticipated that students will spend a minimum of 37.5 participation hours per credit hour on their coursework. For this course, students will spend an estimated 200 total hours meeting the course learning outcomes.

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, exams 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, 2022 sections.

ASSESSMENT AND GRADING

Grades will be based on the following:

A	B	C	D	F
A 92-100	B+ 88-89	C+ 78-79	D+ 68-69	F Less than 60
A- 90-91	B 82-87	C 72-77	D 62-67	
	B- 80-81	C- 70-71	D- 60-61	

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 since they are intertwined. Note that the following dates and times may be changed, as determined by the instructors.

630 Points: Exams

Exam I – Review of transcription & translation (100 pts), 9/9: Friday, 12:15 – 1:15 pm
Exam II– 165 points, 10/3: Monday *evening* (6:00 – 10:00 pm)
Exam III– 165 points, 11/7: Monday *evening* (6:00 – 10:00 pm)
Final Exam – 200 points, 12/16, Wednesday (10:30 am – 1:00 pm)

Attendance at all exams is required, unless excused by a doctor's note.

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, 9/9, you may use your lecture notes, your homework problems, and a calculator to take the exam. Exam II & III are designed to be 2 hours long, but extra time is given for those who wish to use it.

172 Points: Problem Sets, Online Quizzes, 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 on the class day following the end of each unit. (So, if we finish the chapter on Friday, your problem set will be due on Monday.) We will drop the 4 lowest grades from the problem sets.

Reading Assignment Quizzes (54 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 2 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 (10 pts): We will read and analyze a research paper.

160 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 lab reports over the semester.

9/26 (Lab 1) – Group Lab Report
10/17 (Lab 2) – Group Lab Report
10/28 (Lab 3) – Individual Lab Report
11/11 (Lab 4) – Group Lab Report
12/9 (Lab 5) – Group Lab Report

38 Points: Class and Lab Participation (participation in group lab reports)

Attendance at the lecture sessions will be recorded via iClicker. You may miss four of them for any reason without losing class participation points.

Attendance at all lab sessions is required, unless excused by a doctor's note.

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.*

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 ACCOMMODATIONS POLICY

Pursuant to Section 504 of the Rehabilitation Act and other applicable laws, PLNU prohibits discrimination and harassment against a qualified individual with a disability. While all students are expected to meet the minimum standards for completion of each course as established by the instructor, students with disabilities may request academic adjustments, modifications or auxiliary aids/services. The PLNU Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2533), is the point of contact for disability issues for all PLNU undergraduate and graduate students, including students enrolled at the Mission Valley Campus and College of Extended Learning students enrolled in PLNU courses at Community College satellite campuses. Current and prospective students seeking an accommodation must follow the reasonable accommodation procedures which may be found on the EAC website.

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 EAC 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 highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

PLNU ATTENDANCE AND PARTICIPATION POLICY

Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions, the faculty member will issue a written warning of 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. For more information, see PLNU's posted Class Attendance policy.

SPIRITUAL CARE

Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith.

If students have questions, a desire to meet with the chaplain or have prayer requests you can contact the Office of Spiritual Development.

ASSIGNMENTS AT-A-GLANCE

See the following page for a schedule of content and due dates for the whole semester.

Note 1: These dates and topics are subject to change, as necessarily determined by the instructors.
Note 2: The color coding corresponds to the content for the three major exams: Exam 2, Exam 3, & Final Exam.
Note 3: * denotes there is a pre-class Canvas quiz on this particular Reading Assignment.

Date	Lectures	Reading	Labs	Homework/Exam/ Lab Report Due
8/30	DNA Structure	Fig 10.7 & 10.23		
8/31	DNA Replication	***Ch 11**: p 260-275, 279-280		
9/2	How do mutations affect proteins?	***Ch 4**: p 79-81		DNA Rep HW
9/5	**HOLIDAY**		Lab 1a: Mutagenesis, Part I	
9/7	Types of mutations	***Ch 19**: p 472-479		
9/9	**EXAM – Txn & Tln (Ch 12, 13)**			Exam 1: Txn/Tln
9/12	Mutations in bioch. pathways	***Ch 13**: p 315-18	Lab 1b: Mutagenesis, Part II	
9/14	How are mutations repaired?	***Ch 19:** p 481-486,492-495	Lab 2a: Mutagenesis, Part I	
9/16	Transposons & Genetic Disease	**Ch 10**: p 238-42		Pathway HW
9/19	Meiosis	***Ch 3**: p 47-63	Lab 3a: Drosophila, Part I	Mutation HW
9/21	Principle of Segregation	**Ch 2**: p 18-26		Meiosis HW
9/23	Principle of Indep. Assortment	***Ch 2**: p 26-35		
9/26	Principle of Indep. Assortment	**Ch 2**: p 26-35	Lab 2b: Mutagenesis, Part II	Lab 1 Due
9/28	Hypothesis Testing	**Ch 2**: p 36-38 (Chi Square)		Mendel HW
9/30	Genes on Sex Chromosomes	***Ch 3**: p 65-71; **Ch4**: p 89-90		Chi-Square HW
10/3	How is gender determined?	**Ch 3:** p 67-69; **Ch 5:** p 110-15	**NO LAB (EXAM WEEK)**	Exam 2 (thru 9/26)
10/5	What Mendel Didn't Know	**Ch 4**: p 78-89, 92-93		Sex-Linked HW
10/7	Complementation	***Ch 4**: p 95-97		
10/10	Gene Interaction	***Ch 4**: p 95-98	Lab 3b: Drosophila, Part II	
10/12	Evidence for Linked Genes	**Ch 6**: p 131-137		Epistasis HW
10/14	Mapping 2 Linked Genes	***Ch 6**: p 133-139		
10/17	Mapping 3 Linked Genes	***Ch 6**: p 143-145	Lab 3c: Drosophila, Part III	Lab 2 Due
10/19	Mapping 3 Linked Genes (online)	**Ch 6**: p 143-145		
10/21	**HOLIDAY**			
10/24	Microorganisms in Biotechnology	**Ch 21**: p 536-539	Lab 4: Yeast Genetics, Part I	Mapping HW
10/26	Genetically Modified Organisms	***Ch 21**: p 539-543, 548-549		
10/28	Stem Cells & Gene Therapy	**Ch 21**: p 543-548		Lab 3 Due
10/31	How do chromosomes mutate?	***Ch 8**: p 178-185	Lab 4: Yeast Genetics, Part II	Biotech HW
11/2	Clinical analysis of inversion	**Ch 8**: p 188-192		
11/4	How do csome numbers change?	***Ch 8**: p 193-203		
11/7	How is the cell cycle regulated?	**Ch 25**: p 629-640	**NO LAB (EXAM WEEK)**	Exam3 (thru10/28)
11/9	What genes cause cancer?	***Ch 25**: p 629-640		Chromosome HW
11/11	How is cancer treated?	**Ch 25**: p 640-642		Lab 4 Due
11/14	Mitochondria & Human Disease	**Ch 5**: p 120-125	Lab 5a: Pop Study, Part 1	Cancer HW
11/16	Mitochondria & Human Migration	**Supplement**		Mito HW1
11/18	Population genetics: Overview	***Ch 27**: p 677-682		
11/21	Alleles in populations	**Ch 27**: p 682-684	**NO LAB: Holiday Week**	Mito HW2
11/23	**HOLIDAY**			
11/25	**HOLIDAY**			
11/28	Predicting allele freq. in pops.	**Ch 27**: p 682-684	Lab 5b: Pop Study, Part 2	
11/30	Populations undergoing selection	***Ch 27**: p 682-684, 687-688		
12/2	How is a phylogeny constructed?	**Ch 29**: p 740-748		Population HW
12/5	HIV Phylogenetics	**HIV Paper**	Lab 6: Phylogenetic Analysis	
12/7	Human genomic data	***Supplement**		Lab 5 Due
12/9	How are molecular clocks used?	***Ch 29**: p. 748-757		MolGen HW
12/16	Final Exam (Comprehensive)			