

Meeting times: MWF 12:15 or 1:30PM	Instructor title and name: Dr. Kristopher J. Koudelka	
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Office Hours: M 2:45-4:00, TR 11:00-12:00, and by appointment.		Course Units: 3 (+1 Lab)
Text: Molecular Biology: Structure and Dynamics of Genomes and Proteomes		ISBN: 0815345046

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 aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

OVERVIEW

Welcome to Molecular Biology! This course will explore the mechanisms by which genes are expressed in prokaryotic and eukaryotic organisms. In addition, regulation of these processes will be emphasized. Utilizing these principles in lab, virus procapsids will be produced and their structure probed by student-designed experiments.

DESCRIPTION

A study of the regulatory mechanisms that govern gene expression in eukaryotic and prokaryotic cells and their viruses. Alterations of normal eukaryotic genetic regulatory mechanisms resulting from the transformed (cancerous) state also are discussed. Laboratory includes practical experience with the methodologies of modern genetic engineering. Lecture and lab. Offered every year.

COURSE LEARNING OUTCOMES

Students will be able to:

- 1) Understand and apply how the molecular structure of nucleic acids and proteins dictate function, the mechanism of each process that allows for genes to be expressed as proteins, and regulation of the Central Dogma.
- 2) Perturb any of the above processes, and correctly predict the outcome.
- 3) Develop specific skills, competencies, and points of view needed by professionals in molecular biology
 - a) Form experimental hypotheses and accurate predicted results prior to actual experimentation.
 - b) Utilize skills and techniques critical to experimentation in a molecular biology laboratory setting.
 - c) Create informative figures, using raw data, that leads a reader to accurate conclusions.

EVALUATION AND GRADING

Your grade for this course will be based on four distinct evaluation tools in class (exams, team-based learning [TBL], homework modules, and participation); and five distinct evaluation tools in lab (hypotheses and predicted results, figures, an experimental plan, a final presentation, and participation). Each is described in detail below. A total of 800 points are possible for the entire course.

CLASS

Exams (400 points) - There will be three midterms and a final exam. Each exam will consist of true/false, multiple choice, and short answer questions. All of science is cumulative such that scientific knowledge must build and expand upon previous knowledge. The same is true when learning science, you must remember and apply all that you have previously learned in order to completely understand and apply newer material. Although the focus of each midterm will be on recent material, each should be thought of as a cumulative exam. The final exam will be semi-cumulative, with about one-third to half of the points coming from the previous chapters and the rest from the most recent chapters.

Exam I: 100 points

Exam II: 100 points

Exam III: 100 points

Final Exam: 100 points

Team based learning activities (75 points – 4 events) - Team based learning allows students to use and apply course concepts. Application of foundation knowledge is important to all sciences, and is a critical skill for every person regardless of field. We will have four team-based learning events this semester. Each event will consist of an individual pre-quiz, a group version of the same quiz, an additional activity, and a peer evaluation questionnaire. Points will be awarded for the individual quiz, for the group quiz, and for the peer questionnaire.

Individual pre-quizzes = 16 points

Group quizzes = 32 points

Peer evaluation questionnaire = 27 points

Homework modules (50 points – 13 modules) – The text, in conjunction with RocketMix, has self-contained learning modules. Each module explores an important theme in molecular biology and the writing style of the modules is aimed at an undergraduate audience. Each module should take 15-30 minutes to complete, and includes at least five multiple choice questions. The modules were created by me for the text; therefore, they are an excellent study source for this course. For every module completed on time you will receive max points. At the end of the semester, if your first answer correct rate is above 75% you will earn the last 2 possible points. You can access these modules using the Canvas enrollment link.

Class participation (25 points) - I teach largely by a lecture/discussion style. I hope that everyone will participate in the discussion through asking and answering questions. Your general class participation includes discussion, attentiveness,

iClicker participation, not abusing computer privileges or checking texts. I realize that this is a large class and therefore it is hard to directly participate all the time. Thus, I am requiring **iClickers** and will have questions throughout the course that you must answer by your iClicker. **I am looking for thought and participation, not whether or not you answered the question correctly. Everyone must have their own iClicker and it must be registered with your student ID number by the end of the first week.**

LABORATORY

Hypotheses and predicted results (4 x 5 points each) – Forming testable hypotheses is a critical skill for every scientist. An equally important skill is extending these hypotheses to predicted results. Thinking about results and what they mean before actual experimentation is an important transition in scientific thinking. **Waiting until during or after the experiment is too late to consider the impact of your experiment!** Prior to specific labs students will turn in typed hypotheses, predicted results, and a brief sentence on what each result means. This should include both positive and negative experimental outcomes.

Figures (3 x 25 points each) – A picture is worth a thousand words. Properly formed figures should be able to stand alone and support your conclusion. Any reader should be able to look at a figure and clearly understand your experiment and analysis without additional text. Creation of such figures can take as long, or longer, than writing an actual report. Figure creation will be one of the centerpieces of the lab experience.

Experimental Plan (30 points) – This lab sequence will include a group self-designed experiment. Significant planning, hypothesis formation, and predicted results are expected prior to starting experimentation. These plans will clearly layout: hypotheses, predicted results, and what each result means; reagents and instrumentation needed; and a clear procedure.

Final presentation (100 points) – On the final day of lab students will present the results of their self-designed experiments to the rest of the class. These presentations will take place in the oral format and last 10-12 minutes, followed by 5 minutes of questions. Each presentation should cover hypotheses, predicted results, raw data, analysis, and conclusions.

Lab participation (25 points) – Much of lab work is completed in teams in both industry and academia. Students must be active, contributing members of their team to earn all possible points.

Late Policy

0-24 hours late = can achieve up to 75% of possible points; 24-48 hours late = can achieve up to 50% of possible points; and more than 48 hours late = will not be accepted.

Approximate grade breakdown

A	93.33-100%	B	83.34-86.66%	C	73.34-76.66%	D	63.34-66.66%
A-	90-93.33%	B-	80-83.33%	C-	70-73.33%	D-	60-63.33%
B+	86.67-89.99%	C+	76.67-79.99%	D+	66.67-69.99%	F	0-59.99%

STUDENT CONDUCT

Attendance of all lectures and lab sessions is required; role will be taken regularly (by iClicker participation) to encourage compliance. Because lab sessions are 3 hours, missing a lab counts as 2 absences. **However, be aware that it may be very difficult to make up points from an unexcused lab session.** A total of three *unexcused* absences will be permissible. More than three absences will result in forfeiture of two percentage points per absence from your final grade unless documentation of a valid excuse is provided (see below). **Three weeks of absences (9 lectures or 3 labs) will result in de-enrollment from the course, according to University policy.** Missed in-class assignments cannot be made up without prior instructor approval or documentation of a legitimate excuse. Since we meet for 55 minutes each period, arriving late or leaving early is considered ½ absence.

I am asking you not to use laptops:

I strongly recommend not using laptops in class. The reasons are four-fold:

1. It is hard to not check other things, which impairs your learning. You most likely are not aware of the impairment, but the research is quite clear.
http://www.slate.com/articles/health_and_science/science/2013/05/multitasking_while_studying_divided_attention_and_technological_gadgets.html
2. Even if it doesn't impair your learning, it impairs others learning.
<http://www.sciencedirect.com/science/article/pii/S0360131512002254>
3. You write more but learn less. Writing your notes creates synthesis which increases your learning.
<http://pss.sagepub.com/content/early/2014/04/22/0956797614524581.abstract>
http://chronicle.com/blogs/linguafranca/2014/08/25/why-im-asking-you-not-to-use-laptops/?cid=at&utm_source=at&utm_medium=en
4. It also impairs long-term retention. This new study shows a causal effect with grades being lower by about half a letter grade.
https://www.insidehighered.com/news/2018/07/27/class-cellphone-and-laptop-use-lowers-exam-scores-new-study-shows?utm_source=Inside+Higher+Ed&utm_campaign=f85b018bfd-DNU_COPY_01&utm_medium=email&utm_term=0_1fcbc04421-f85b018bfd-198405577&mc_cid=f85b018bfd&mc_eid=d720a84995

So I am asking you not to use laptops unless you need or strongly prefer a laptop to take notes. In that case talk to me and we will make that work.

IClickers I will take attendance by iClicker question participation. If you answer the question, I know you were there. I get to know everyone pretty early so please don't send your clicker with someone else so they can answer for you. It becomes obvious fast if there are 30 answers and only 20 students in the room. **Answering for someone else will be considered cheating by the person answering, and the person whose clicker is being used to answer questions despite their absence.** The university takes cheating very seriously so you do not want to do this!!!

Respect for one another and for the instructor is essential for an effective classroom environment. You are expected to show respect to your classmates and instructors by:

- listening when others are speaking,
- refraining from discussing non-related issues during class,

- do not belittle the opinions of others, even when you disagree.

Behavior intended to embarrass or ridicule others will not be tolerated and will have serious consequences.

Academic honesty Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. As explained in the university catalog, 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. Violations of university academic honesty include cheating, plagiarism, falsification, aiding the academic dishonesty of others, or malicious misuse of university resources. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for a) that particular assignment or examination, and/or b) the course following the procedure in the university catalog. Students may appeal also using the procedure in the university catalog. See [Academic Policies](#) for further information.

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 Dr. Koudelka and may not be shared with other individuals or groups outside of the students registered for this section. It is a violation of copyright law to otherwise distribute these materials in any form.

Cell phones must be silenced before class begins, and use during class not permissible unless specifically directed to do so. Points may be deducted from your grade for in class cell phone use.

Excused absences are those that result from situations beyond the control of the student. These include (but are not limited to) personal illness, serious family illness or death, and sanctioned University events (athletics, debate team, etc.). Excused absences require some formal documentation such as a doctor's note, email from a coach, etc. Work done on a day for which you have an excused absence can be made up in a reasonable amount of time at the instructor's discretion.

Unexcused absences are those that are preventable by the student or are recreational in nature. These include (but are not limited to) oversleeping, forgetting to come to class, attending family functions (weddings, family trips, etc.), and personal leave days. Work performed on days for which you have an unexcused absence cannot be made up and points are forfeited.

ACADEMIC ACCOMMODATIONS

While all students are expected to meet the minimum academic standards for completion of this course as established by the instructor, students with disabilities may request academic accommodations. At Point Loma Nazarene University, students must request that academic accommodations by filing documentation with the [Disability Resource Center](#) (DRC), located in the Bond Academic Center. Once the student files documentation, the Disability Resource Center will contact the student's instructors and provide written recommendations for reasonable and appropriate accommodations to meet the individual needs of the student. See [Academic Policies](#) in the (undergrad/graduate as appropriate) academic catalog.

FERPA POLICY

In compliance with federal law, neither PLNU student ID nor social security number should be used in publicly posted grades or returned sets of assignments without student written permission. Also in compliance with FERPA, you will be the only person given information about your progress in this class unless you have designated others to receive it in the

“Information Release” section of the student portal. See [Policy Statements](#) in the (undergrad/ graduate as appropriate) academic catalog.

FINAL EXAM 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.

STRATEGIES FOR SUCCESS

Cumulative Knowledge. Biology courses usually "build up" so that a concept you learn early on in the course will be used repeatedly during the semester, and will be required to understand subsequent concepts.

I'm here to help you learn. If you get stuck or have any questions on a particular topic or assignment, come to office hours, or make an appointment to see me.

Know your notes. Come to class and take good notes. Borrowed notes never make as much sense. Review, re-write or re-organize your notes while they are still fresh in your mind.

Do not be afraid to ask questions during lecture. Questions are a positive sign of involvement in the course. If you are confused, there are probably other students who feel the same way.

Do not fall behind. Budget a minimum of two hours of studying time between each lecture. Biology and Chemistry are like languages unto themselves - regular practice is essential.

Pay attention to detail. Pay close attention to any scientific terms that we cover in lecture. You will be expected to know and use those terms correctly. I also suggest paying close attention to the details. The “Big Concepts,” are important, but the details can be critical.

What's Important? The more time I spend on a particular topic in class, the more likely that same topic will appear on your exams, and at a similar level of detail. If we cover it in class or in the reading, you can consider it fair game for the exam.