

BIOL 3814 Cell & Molecular Biology
Example

PROFESSOR: Dr. Teresa Golden

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OFFICE HOURS: TBD

- I am happy to communicate with you via emails, but I cannot guarantee an immediate response to all emails. If something is very important please follow up if you do not hear back from me.

- As Chair of the department I am required to attend meetings or assist students on short notice. I will always leave a note on my office door with more information if I am unexpectedly unavailable during my listed office hours.

TEXTBOOK: If you are seeing this before the semester starts, please do NOT try to use the online code before classes start. You will need to enroll in a specific online section to receive your grades that won't be available until after the first lecture class!

Becker's World of the Cell with Mastering Biology code; **9th** edition; Hardin, and Bertoni.
+e-text with Mastering access code **OR** printed textbook with an access code

COURSE OBJECTIVES

-The purpose of this course is the study of eukaryotic cell structure and function. The course covers information from cell biology, molecular biology, biochemistry, gene regulation, physiology and biotechnology. See next page for Department learning goals for this course.

EQUITY AND NON-DISCRIMINATION STATEMENT

Southeastern Oklahoma State University, in compliance with all applicable federal and state laws and regulations, does not discriminate on the basis of race, color, religion, national origin, sex, age, disability, sexual orientation, gender identity, or status as a veteran in any of its policies, practices, procedures, or programs. This includes, but is not limited to: admissions, employment, financial aid, and educational services. Inquiries regarding non-discrimination and equity policies may be directed to: Michael Davis, Director of Compliance and Safety & Title IX Coordinator, (580) 745-3090, or mdavis@se.edu.

DISABILITY ACCOMMODATIONS

Any student needing special accommodations due to a disability should contact the Office of Compliance and Safety, Administration Building, Suite 311 or call (580) 745-3090 (TDD# 745-2704). It is the responsibility of each student who anticipates or experiences barriers to their academic experience to make an official request for disability related accommodations in a timely manner.

COUNSELING CENTER

Any student experiencing mental or emotional issues who desires free, confidential, clinical counseling is encouraged to contact the SE Counseling Center at (580) 745-2988 to schedule an appointment during normal working hours Monday-Friday, 8:00AM to 5:00PM. For after-hours mental health emergencies, please call SE Campus Police at (580) 745-2911 or the Mental Health Crisis Hotline at 1- (800) 522-1090.

DEPARTMENT LEARNING GOALS FOR THIS COURSE

Consistent with the goals of the Biological Sciences Department, upon completion of this course students will be able to:

- 1) Apply the language of science (with understanding) relating to cellular function and processes. This includes, but is not limited to: identifying the monomers of the cell such as amino acids, biochemical processes in the cell such as enzyme kinetics, cell movement, cell signaling and cancer.
- 2) Identify all cellular organelles with an increased understanding of what functions occur in each organelle and its overall importance to a cell.
- 3) Explain and calculate some of the chemical and biochemical reactions occurring inside and outside of the cell as well as those used in the laboratory to approximate these functions.
- 4) Describe and illustrate some of the common cell signaling pathways that allow gene expression to influence cell function and response.
- 5) Identify ways in which cells interact with each other and the environment surrounding them.
- 6) Describe the ways cells attempt to deal with disruptions and the potential disease causing results.
- 7) Apply knowledge of the scientific method to understand how biological discovery occurs.
- 8) Identify and recognize common cell biology, molecular biology and molecular genetic experiments/techniques used in the lab setting and those used to make recent discoveries.
- 9) Safely use hands-on molecular biology techniques, calculate formulas, and investigate current online and other resources to expand understanding of gene expression and modern experimentation in the laboratory.
- 10) Demonstrate proficiency in maintaining a laboratory notebook.

The goals listed above relate to Biology department degree program goals. These objectives correlate with Biology Program goals 1-6; with Fish and Wildlife Program goals 1-5; and with Science Education Program NSTA standards 1a and 1b. A full list of these program goals can be found here: <http://homepages.se.edu/biology/degree-programs/>.

CHEATING

-Students are expected to abide by the highest standards of academic conduct. Cheating in any form is not allowed. Cheating can include the giving or receiving unauthorized aid, divulging test material to students who have not yet taken it, and allowing others to observe your paper during an exam or quiz. If a student is caught cheating, he or she will receive a zero for the exam, homework, lab or quiz. In addition, cheating is grounds for expulsion from Southeastern Oklahoma State University. All suspected cheating, acts of plagiarism, or suspicious behavior during class will be reported via the Maxient Incident Reporting Form.

Please keep in mind that no single grade (be it a quiz, exam, or whatever) is worth risking your entire college career over!!!

COPIERS

-The copiers in the Biological Sciences Building are **not** for student use. The only exceptions are for students working for Student Support Services. Copiers for student use are available in the library.

CELL PHONE/IPOD/ETC. POLICY

- Please have devices turned off (or in silent mode) during lecture. iPads/tablets/cell phones and computers are allowed for use during class for taking notes or viewing slides. Any student using such a device who is causing a distraction for other students or obviously doing something other than classwork will be asked to turn the device off or leave the classroom as well as having the device banned from future use in the class. Students must

notify me if they intend to audio/video record my lectures. All devices (including watches, earbuds and bluetooth) must be put away and phones must be out of sight OR alternatively turned over (placed away from you) on the desk during quizzes and exams. If your cell phone goes off or it is accessed at any time during a quiz or exam, at the instructor's discretion, you may receive a zero for that quiz or exam.

CALCULATOR

-I would strongly recommend that students bring a calculator to every lecture and lab. **Cell phone and watch calculators are not acceptable for use during quizzes and exams.**

WITHDRAWAL FROM THE COURSE

-If you stop coming to class, you are NOT automatically withdrawn from the class and will receive an F unless you officially withdraw from the class. The last day to drop the class with the possibility of a W grade is _____. Incompletes can only be given in extreme emergencies and require approval of the instructor. The student is responsible for processing any forms necessary for dropping the class or taking an incomplete.

GRADE DETERMINATION

-Five examinations will be given for the course. Examinations may contain multiple choice questions, fill-in-the-blank questions, true/false and short essay or calculation questions. Most exams will require a student provided scantron for at least part of the exam. Exams can be comprehensive (often new material builds on previous material) and will cover material from the lecture and the text. If you must miss an exam because of a legitimate reason a make-up may be given at the instructor's discretion. A legitimate reason usually requires written documentation from an official source (i.e. a doctor, nurse, ER personnel, funeral director, school official, or court official). The format for these make-up exams may be essay questions. If a verified excuse is presented before an exam (such as a University excuse for an upcoming event) the exam will be in a similar format to the class.

The final exam is a stand-alone grade meaning that it is required and is factored into your course average separately from the other exam scores. The final examination (exam#5) consisting of questions based on 1-new material from the last section of the course and 2-the remaining based on comprehensive material from the entire course (a study guide will be provided) will be given during final exam week. The final exam cannot be missed!

Study guides are often provided. The guides are just a general listing of the important topics to review and/or to let you know what topics will or will not be covered on the exam. These are not meant to be complete notes! Often students will do just as well or even better not using the guides, but by making up their own review sheets and reviewing chapter summaries in the text.

Exam and quiz day policies: If you arrive to take the exam or quiz after the first person has finished, you must arrange for an essay make-up. If you must go to the restroom during the exam/quiz (or leave the room for any other reason), you must turn in your paper and arrange for an essay make-up.

-Quizzes and/or homework assignments will be given during the semester. Homework assignments can be found on the Mastering that is available as a link through Blackboard. **One of the quiz or homework grades will be dropped.** The material covered on each quiz is listed in the schedule. If you must miss a quiz because of a legitimate reason a make-up may be given at the instructor's discretion. The make-up will not necessarily be in the same format as the original. Quizzes taken as a make-up may also be assessed a 'late penalty' deduction at the instructor's discretion.

-LAB: The lab schedule/syllabus is part of this syllabus so please bring this with you to the lab. The Lab is worth 25% of your final grade. It is very difficult to make up a missed lab.

-The overall course grade will be determined by the examination grades, quizzes, participation and the laboratory grades. **NO** individual extra credit projects will be given.

Exams (semester 1-4)	45% total	A = 90% – 100%
Quizzes & Homework—one dropped	15%	B = 80% – 89%
Final Exam—required	15%	C = 70% – 79%
Laboratory Average--	25%	D = 60% – 69%
		F = below 60%

-Attendance in lecture will be taken and noted although there is no course penalty. It will only count in the case where a student has the potential to have a final grade rounded up to the next letter grade. Rounding to the next letter grade is NOT AUTOMATIC and will be at the discretion of the instructor based on **attendance, effort, and final exam grade.**

Also, some on-campus programs and scholarships require updated attendance. If you know that you are in such a program be sure to double-check that I have noted your attendance each day. Experience shows that students who regularly attend lectures have higher exam scores. Attendance in the lab is required.

-Please be assured that I want students to learn and to receive the good grades they deserve. A grade is earned and not given. If you have undue difficulty with your work in the course please make an appointment to discuss it with me.-

BLACKBOARD:

Blackboard will be used to provide downloadable copies of the syllabus and other important files. The link to the Mastering homework will also be available here. Course grades and schedule changes will be posted as well. Please note that lab grades (quizzes, reports, notebooks, etc) will be listed here also, but may not be updated as frequently as the lecture grades. Save any papers returned in the lab in case questions about grading arise later in the semester. If at any point you wish to calculate your course grade refer to the percentages listed in the section above to calculate the grade. Blackboard will list columns of grade estimates, but they are subject to dramatic change as new grades are entered.

The course schedule listed on the next page is only a guide. It is very likely that some topics will be completed quicker than anticipated and some slower.

Please keep up to date with changes and announcements in class and on Blackboard.

-The University Schedule can be found here: <http://www.se.edu/dept/registrar/calendar/>

-Also, please be aware that questions about general policies and procedures may be answered in the online Undergraduate and Graduate Catalogs at www.se.edu/academics/catalogs.-

CLASS SCHEDULE

Instructor reserves the right to change- please listen in class and check Blackboard regularly.

Week or date	Chapter	Topic
	1	Class Policies; homework assignment, Introduction to Molecular & Cell Biology
	3	Macromolecules: Proteins and Amino Acids
	3	Macromolecules: DNA, RNA, and nucleotides
	3	Macromolecules: Lipids and Polysaccharides_
	4	Cells: Prokaryotes vs. Eukaryotes
	4	Major Organelles: Names and Functions
	10 pgs 243-250	Mitochondria
--		Quiz1: Know the 20 amino acids, their one and three letter abbreviations and their class (eg. nonpolar[hydrophobic], polar, uncharged [hydrophilic], polar charged [hydrophilic], acidic [negative charge] or basic [positive charge]),
5		Energy of Life: part I- through entropy on pg. 115
--		EXAM 1 Ch. 1, 3, 4, 10 (pgs 243-250) and part I of chapter 5
5		Energy of Life: part II ΔG , K_{eq} (pg. 115-124)
6		Enzymes: Catalysis and Activation Energy
6		Enzymes: Kinetics (Michaelis-Menton)
7		Membrane Structure: Fluid Mosaic Model and Function
--		-Quiz2: Chapter 5&6: Explain the meaning of: +/-ΔG, K_{eq}, V_{max}, K_m, and K_{cat}. Definitions and comparisons. Know substrate, saturation, standard state, how a V_{max} or K_m is calculated off a graph, etc.
	12-thru pg 325	ER and Golgi
	19-pgs.556-566	Cotranslational Import
	12-pgs.325-347	Endosomes, etc...
--		EXAM 2 Ch. 5 (part II), 6, 7, 12, 19-pgs.556-566
22		Action Potential; Nerve Impulse Transmission
23		Signal Transduction: G Protein Linked Receptors
23		Signal Transduction: Protein Kinase Signal Transduction cont.: Hormones
--		-Quiz3: G-Protein Signaling Pathways
15		Extracellular Matrix
--		EXAM 3 Ch. 15, 22, 23
13		Cytoskeleton: Microtubules
13		Cytoskeleton: Microfilaments; Intermediate Filaments

14	Microtubule Movement
14	Actin Based Movement- muscle
14	Actin non-muscle
16 pg 454-462	DNA; Chromatin; Nucleus
--	-Quiz4: MICROTUBULES, MICROFILAMENTS & ACTIN, chapters 13&14, describe/diagram a microtubule and microfilament. Know the meaning of, 'plus end','minus end',and the importance of a MTOC. Also, the cyclic process of muscle contraction and know the proteins of thick and thin filaments .
--	EXAM 4 Ch. 13, 14, 16 pgs 454-462,
24	Cell Cycle; cdks; Apoptosis
26	Cancer cont. Review for final exam

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Final Exam week **EXAM 5 Ch. 24, 26 & comprehensive**

BIOL 3814L (Cell & Molecular Biology Lab)
EXAMPLE

Cell and Molecular Laboratory (3814L) tentative SCHEDULE:

Week or date

	Lab 1: Introduction and Policies; Introduction to take-home Lab 1, Molecular Databases Take home and read Lab 2, try example questions
	Lab 2: Aqueous Solutions: Molarity and Micropipetting
Quiz1 (labTH1)	Lab 3: Restriction Enzymes & DNA/Plasmid Mapping
	Lab 4: The Length of DNA Molecules**
Quiz2 (lab2&3)	Lab 5: Transformation Lab
Quiz3 (lab4)	Lab 6: Chromatography Lab
Quiz4 (lab5&6)	Barcode Experiment Introduction (Lecture) Collect Lab notebooks (covers labs 4, 5 & 6)
	Lab 7: Barcode Experiment part I
	Lab 8: Barcode Experiment part II
Quiz5 (BEIntro&lab7)	Lab 9: Analyze Barcode Data part A
	Lab 10: Analyze Barcode Data part B
Quiz6 (lab 8&9)	Lab 11: Southern Blot part I
Quiz7 (lab10-11)	Lab 12: Southern Blot part II Lab Notebooks Due (includes labs 7, 8, 11, and 12)

-There is no lab manual to purchase for this course. A lab notebook will be required (details are listed below and will be discussed in lab).

-Unless stated otherwise, all lab questions are due at the end of that day's lab.

- It is the student's responsibility to keep up with handouts. Please, do not lose your copy of the lab or steal a copy from another student!-

Lab Notebook: **Use of notebook begins for Lab 4. See lab instructions next page.-

Lab Notebook INSTRUCTIONS:

Often your lab book / manual / handout give you all the information you need but **you must interpret your own data**. You are required to maintain a laboratory notebook for this course.

1. Purchase a laboratory notebook with the following characteristics:
 - Pages approximately 8 1/2 by 11" or if you prefer, composition book size.
 - Bound permanently (does not have to be an expensive chem. notebook) **no loose-leaf**.
 - **ALL Pages numbered (you may manually number the pages in ink before the first lab)**
2. Write your name in your notebook in a prominent location.
3. Paste the list of lab safety rules in the beginning pages of the book.
4. Save the next one or two pages for the Table of Contents.
5. Make all entries **in ink**. If you need to add pages from other sources (like printouts of graphs, handouts, *etc.*), tape or paste them into the notebook securely. However, everything else should be **handwritten**. **Type written experiments will not be graded.**
6. Begin a new experiment/lab on a new page. **Even labs that are a continuation must have a new page.**
7. For each experiment, use the following headings. Note: even if experiments are run through consecutive lab meetings **start a new entry for each lab even if you repeat information from the previous lab.**

Title - A one-sentence meaningful description of the experiment.

Date - List the date you performed the experiment.

Objective/Background - A few sentences (bullets would be ok) describing the purpose of the experiment. That is, why are we doing it (this includes the major question or hypothesis) and what is the predicted result? This should be brief! **DO NOT copy the background sections from the lab handouts!**

Protocol - List the steps to be followed, being specific about times, temperatures, volumes and equipment used. You are welcome to copy the protocol provided to you and paste directly into your notebook. If you make **any minor changes in procedure, strike out the old method and carefully note what you actually did.** This is a great section to write in the times you started and stopped incubations. Be sure to include any errors you made while performing the experiment (ex. the tube was incubated for 15 minutes instead of 3.)

Results - List results obtained **as you see them**. Drawings/sketches/tables are very useful. Also, tape into this section of your notebook printed results (gel pictures, graphs, *etc.*). **DO NOT USE STAPLES.** If the lab will not have results until the next lab meeting write in *'see results in next lab #'*.

Discussion & Conclusions - A thoughtful interpretation of your results. **Each lab must have at least one comment in this section.** Use this section as a comparison of your results with the predictions. What did you demonstrate? Did anything go wrong and why? This is the only section that is allowed to contain opinions and speculations.

8. Remember, your notebook should allow another scientifically literate individual to understand what, why, and how you did a particular experiment. There should be sufficient detail to permit someone to duplicate your experiment.
9. **Notebooks need to be signed off by me before you can leave the lab!!!** When I sign your notebook I will check you off for attendance on the roster. If I do not sign and check off your name then you risk not getting credit for the lab. Your entry for that day does not need to be complete but it should be started. Usually, 'downtime' during the course of the lab will leave you enough time to begin or even finish your entry for the lab.

You may ask yourself, 'why go to so much trouble for a lab notebook?' The reason is that if you have any intention of being a scientist/professional in any field, now is the time to learn how to take careful and accurate notes. This seems simple, but when a scientist goes back to write a manuscript if the notebook is full of chicken scratch or there was a measurement they were so sure they wouldn't forget (and did) it can delay publishing. If you were to work for a

biotechnology company your lab notes would be signed off on a daily basis by your supervisor. This would be done not only to see if you were working, but it would be a critical component in the company's ability to track its technology development. Most companies and many scientists will file for a patent on their discoveries. Everything from the lot number of the chemicals one uses to the date and time in a lab notebook are necessary to prove you are the original discoverer (in case the patent is challenged).

The notebook is heavily weighted in the final grade as not only does it achieve the above, but hopefully will help reinforce what you are learning.

QUIZZES AND LAB QUESTIONS (REPORTS):

-The information for next week's lab may be handed out in advance. Please note the quiz schedule which indicates what date and what topics will be on the quiz. Also, note that quizzes will occasionally have questions covering previously covered important topics even if not listed as a specific topic for that particular quiz (for example: questions about pipetting).

Often labs will have questions/reports at the end which will usually be due at the end of the lab class. If you are unsure of when a lab is due please ask.

LAB GRADING: The Lab grade will be made up of three components:

- a. Each Lab (**excluding** labs 1, 2 & 3) will be signed off by me in your notebook. My signing of the notebook will be my attendance sheet. Your presence and entries in your notebook that day (even though I may not thoroughly examine them at that time) are worth **30%** of your grade.

Before Fall Break, all notebooks will be collected and graded. You will receive a grade based on the criteria listed above and whether you missed any of the labs. If you miss a lab please leave a space where the lab write up should be in the notebook. Depending on the reason for a missed lab (see below) if you write up the lab as best as possible (i.e. get results from lab partners, etc) you may only lose a few points on the notebook part of the grade. At the end of the semester notebooks will be collected and graded again. Therefore, with a little effort it should be easy to maintain a good notebook for **30%** (15%+15%) of the final laboratory grade. **If you do not understand the notebook format please check with me as early as possible so I can help you to get it right before any grading occurs!**

Notebook Grading Details-

Each time the notebook is graded points will be given as follows:

- points for having followed all of the directions above including: the safety rules (see 3 above), a correct table of contents (see 4 above), and notebook written in ink (see 5 above).
- points for each of the headings (see 7 above) for each lab clearly written and completed with a signature (see 9 above).
- bonus points for particularly well written sections and/or clearly included/described data.

- b. Take-home labs: As currently scheduled there will be one take-home lab. This lab (and any additional if scheduled) will make up **5%** of your final grade.
- c. Quizzes (**35%**) and end of lab questions (**30%**) together will make up the final **65%** of the lab grade. **The lowest quiz grade is dropped. Even with this policy it is not a good idea to intentionally miss a quiz however- see next section. NO LAB REPORT ASSIGNMENT will be dropped.**

Missed labs: It is difficult to make up a lab as they are progressive and reagents often have a shelf-life of only a few days. Attendance is mandatory. Missing a lab even for a legitimate reason can put you behind for the next lab. If you must miss a lab for a legitimate reason please discuss it with me in advance and/or provide a written excuse. If an excuse is acceptable, instead of making up the lab it will not be included in

your final lab average (which means the other labs count more). Also, missing a lab will result in a partial entry in your lab notebook (please see part a about writing up a missed lab). Missing more than three labs may result in a grade of 'I' incomplete for the course.

I do not want you to come to lab if you have the flu, etc., but I do want you to think carefully before missing a lab for a minor problem.

Please note that vacation travel is NOT an acceptable excuse for missing a lab and I cannot give you full credit for a lab that you did not attend since it is not fair to the other students who did attend.

IMPORTANT!:

1) Just because you are working together as a group **does not** mean that it is acceptable to copy your answers from your lab partner! This is particularly true for reports and quizzes. It is reasonable to discuss the lab procedures and information that you will need to keep in your lab notebook but the discussions and conclusions should be your own and written in your own words! If you have copied answers you risk failure for that lab and possible disciplinary action. If I find lab notebooks with obvious word-for-word copies from lab partners I will deduct points in those sections (excluding procedures).

2) Do not cut out or scan procedures, data, figures, or anything else from a lab notebook done by another student in a previous semester! This would be equivalent to scientific fraud in the real world. I will give a failing grade for the entire notebook if I find even a single copied item.

Grading percentages described above:- EXAMPLE

Lab notebook—collected twice	30% (15% each time)
Lab quizzes—8 scheduled, (one drop)	35% total
Lab questions/reports-13 scheduled, (no-drop)	30% total
Take home lab—1 scheduled	5%

Final lab average counts for 25% of total course grade.