

OKLAHOMA BAPTIST UNIVERSITY

MOLECULAR AND CELLULAR BIOLOGY

BIOL 3014

SPRING 2011

COURSE/CATALOG DESCRIPTION

A study of nucleic acid structures and functions, protein structure, synthesis and regulation, properties of enzymes, biosynthetic pathways and energy metabolism, cell structure and function, physico-chemical organization of cells, energetics, transport, mobility, irritability and homeostatic mechanisms, cell growth and division, cell differentiation and transformations, evolutionary potentials of cells, and protistan evolution and origin of multicellularity.

COURSE OBJECTIVES

In keeping with the overall goals of the Science Division, this course is designed to provide students with the opportunity to enhance their understanding of complex biological subject matter and to develop the skills necessary for independent and critical analysis of complex phenomena, data, and observations encountered in the scientific endeavor. In this multidisciplinary approach, our academic exploration will include but will not be limited to analysis of anatomical, physiological, ecological, evolutionary, genetic, and cellular systems in plants, animals, and microbes. Emphasis will be placed on developing students' skills in inquiry-based problem solving, design and execution of experiments, interpretation of experimental data, and presentation of experimental results in both written and oral format. Moreover, it is the intent of this course to enhance the students' understanding of the interconnectedness of the sciences by relating the major concepts of chemistry, earth/space sciences, and physics, to the Biological sciences; and to emphasize and apply mathematical concepts, including statistics and pre-calculus to investigations in biology and the analysis of data. Finally, it is the goal of this course to provide an environment in which the students can explore the relatedness of historical, sociological, technological, and ethical issues and developments to the study of contemporary Biology.

CLASS DATES

Section A:	Mon., Wed., Fri.,	12:00 – 12:50pm	Wood Sci. Bldg. Room 118
Laboratory:	Thurs.,	2:00 – 5:00pm	Wood Sci. Bldg. Room 109

INSTRUCTOR

Bradley Jett, Ph.D.

Office: WSB 119B

Phone: 405-878-2043

Office Hours: T 11am – 1pm; W 1pm – 3pm; R 12-1pm

Email: brad.jett@okbu.edu

CREDIT HOURS

4 Credits

TEXTBOOKS TO PURCHASE

“Molecular Cell Biology” 6th Edition, By: Lodish, Berk, Kaiser, Krieger, Scott, Bretscher, Ploegh, and Matsudaira

“Working With Molecular Cell Biology: A Study Companion” 5th Edition, By: Storrie

PREREQUISITES

BIOL 2034, 2044, CHEM 3104, 3114

CLASS PARTICIPATION

50 minutes is simply insufficient time to cover every aspect of a textbook chapter in detail. Therefore, it is imperative that you are prepared to discuss the subject matter PRIOR to coming to class. Hopefully, we will then

be able to specifically address problems you are having with a given concept, or answer your specific questions. Remember that the best learning experience is that in which we learn from each other. As such, active participation by each student during classroom discussions is both encouraged and expected. This course will quickly become impossible if you wait to prepare for lecture and exams until the night before.

EXAMS

There will be 4 major exams and a comprehensive final exam, all of equal value. In some cases, 2 hours will be allocated for major exams. Exams can be made up only under EXTRAORDINARY circumstances, such as death in the family or serious illness. The final exam will emphasize molecular and cellular biology techniques, applications of equipment and instruments, experimental design, laboratory mathematics, and data analysis.

LABORATORY

Attendance: Attendance at all laboratory sessions is required. I expect to be informed in advance if illness or other serious emergency prevents your attendance in lab or lecture.

Laboratory Notebook: You will be expected to maintain a laboratory notebook in which you will carefully document your experiments and observations. The laboratory notebook may be turned in periodically for grading. The quality, completeness, and accuracy of the laboratory notebook will contribute to the final grade as outlined below.

Group Project: Students will plan, conduct, and report on an independent group project in which techniques in molecular/cellular biology are employed. The group presentation of the project will be oral and visual, using the format of a scientific poster presentation. The presentation date for this project is indicated in the schedule below. Details pertaining to this project, including progress report deadlines and grading criteria, will be explained in class.

RESEARCH PAPER AND PRESENTATION

Research Paper and Oral Exam: You are expected to search and read the current scientific literature on a topic within the field of molecular and cellular biology, and prepare a succinct manuscript. After submitting the manuscript for grading, you will meet with me for a graded oral discussion of your topic.

- Paper should be 4-6 pages, typed, double-spaced, 12-point font.
- The paper must cite at least THREE current (< 2 years old) scientific journal articles. Other sources may be cited, such as reputable Internet sites, news articles, etc. Penalties will be assessed if THREE, recent scientific journal articles are not used.
- Along with a copy of your paper, you must submit THREE COPIES of your THREE primary peer-reviewed sources cited in the paper.
- You should discuss your proposed topic with me PRIOR to beginning your research, to insure that it is acceptable.
- Only papers turned in by the listed deadline will be graded. Therefore, you are encouraged to develop your idea early.
- Plagiarism will result in severe penalties, as outlined in University regulations pertaining to academic misconduct, a minimum of which will be zero credit for the paper.
- During your oral exam of the manuscript, you can expect to be asked questions and engage in a discussion of the topic, your written report of the topic, and the implications of the research and questions it stimulates. You will be graded subjectively on the quality of your understanding of the topic and your ability to discuss it intelligently with me.

Oral Presentation/Journal Club: Students will obtain a very recent (< 1 year old) scientific journal article and present the paper to the class orally, using computer multimedia format. These presentations will be delivered during a laboratory period according to the schedule below.

- Presentation must be no more than 15 minutes in length, with 5 minutes reserved for question/answer time.
- Presentation will be graded according to knowledge of subject, critical analysis of the material, clarity of presentation, quality of text and diagrams, and response to questions.

HOMEWORK ASSIGNMENTS

Homework assignments will be given periodically. Homework will only be awarded points if it is delivered on

time. Students should be aware that homework assignments are designed to supplement the existing text and are considered to be testable material for exams.

GRADES

Grades will be based on the standard scale of percent of total points available: A (100-90%), B (89-80%), C (79-70%), D (69-60%), F (59-0%). Percentages will be based on the following components:

- 4 exams x 100 points each: 400 points
 - Final Exam at 100 points: 100 points
 - Laboratory notebook: 100 points
 - Laboratory group project: 50 points
 - Research paper: 50 points
 - Oral Exam of Research Paper: 20 points
 - Journal Club presentation: 25 points
 - Homework assignments: 50 points
- TOTAL POINTS: 795 points

ATTENDANCE

The Oklahoma Baptist University attendance policy will be followed according to guidelines published in the Student Handbook.

STUDENTS WITH DISABILITIES

Oklahoma Baptist University complies with Section 504 of the Rehabilitation Act and with the Americans with Disabilities Act. Students with disabilities who need special accommodations must make their requests and submit documentation to the Director of Student Services. The Student Services office is located in the Geiger Center, Room 101.

ADDITIONAL IMPORTANT ACADEMIC INFORMATION FOR OBU STUDENTS

Please refer to the following link, http://www.okbu.edu/academics/forms/syllabus_attachment_spring11.pdf for important information regarding class attendance policies academic policies and expectations, tutoring information, library hours, important dates and holidays, inclement weather policies, chapel attendance policies, and more.

COURSE SCHEDULE

DATE	ASSIGNMENT	TOPIC
Jan 24	NONE	Introduction and Review of Chapters 1 and 2 (chapters 1, 2 homework assignment)
Jan 26	Chapter 3 (chapter 1, 2 homework due)	Protein Structure and Function
Jan 28	Chapter 3	Protein Structure and Function
Jan 31	Chapter 3	Protein Structure and Function
Feb 2	Chapter 4 (4.1-4.5, 4.7)	Basic Molecular Genetic Mechanisms
Feb 4	Chapter 4 (4.1-4.5, 4.7)	Basic Molecular Genetic Mechanisms
Feb 7	Homework Discussion	“DRUGS AND DISEASE”
Feb 9	Chapter 5 (5.2, 5.3, 5.5)	Molecular Genetic Techniques
Feb 11	Chapter 5 (5.2, 5.3, 5.5)	Molecular Genetic Techniques
Feb 14	EXAM #1	
Feb 16	Chapter 9	Visualizing, Fractionating, and Culturing Cells
Feb 18	Chapter 9	Visualizing, Fractionating, and Culturing Cells
Feb 21	Chapter 10	Biomembrane Architecture
Feb 23	Chapter 10	Biomembrane Architecture

Feb 25	Chapter 11	Transmembrane Transport of Ions and Small Molecules
Feb 28	Chapter 11	Transmembrane Transport of Ions and Small Molecules
Mar 2	Chapter 12	Cellular Energetics
Mar 4	Chapter 12	Cellular Energetics
Mar 7	EXAM #2	
Mar 9	Journal Article and Homework Questions	Critical Analysis of Scientific Data
Mar 11	Chapter 13	Moving Proteins into Membranes and Organelles
Mar 14-18	SPRING RECESS	
Mar 21	Chapter 13	Moving Proteins into Membranes and Organelles
Mar 23	Homework Discussion	"M AND C IN-THE-NEWS"
Mar 25	Chapter 14	Vesicular Traffic, Secretion, and Endocytosis
Mar 28	Chapter 14	Vesicular Traffic, Secretion, and Endocytosis
Mar 30	Chapter 23	Nerve Cells
Apr 1	Chapter 23	Nerve Cells
Apr 4	Handouts	Neurotoxins and other Naturally-produced Biologically Active Compounds
Apr 6	Chapter 15	Cell Signaling I: Signal Transduction and Short-Term Cellular Responses
Apr 8	Chapter 15 PAPER DUE	Cell Signaling I: Signal Transduction and Short-Term Cellular Responses PAPER DUE AT BEGINNING OF CLASS
Apr 11	Homework Discussion	"M AND C IN-THE-NEWS"
Apr 13	Chapter 16 (selected readings)	Cell Signaling II: Signaling Pathways that Control Gene Activity
Apr 15	EXAM #3	
Apr 18	Chapter 17	Cell Organization and Movement I: Microfilaments
Apr 20	Chapter 18	Cell Organization and Movement II: Microtubules and Intermediate Filaments
Apr 22	GOOD FRIDAY [NO CLASS]	
Apr 25	Chapter 19	Integrating Cells into Tissues
Apr 27	Chapter 20 (20.1-20.4) Chapter 21 (21.1, 21.5)	Regulating the Eukaryotic Cell Cycle Cell Birth, Lineage, and Death
Apr 29	Chapter 24 (24.1, 24.2) Chapter 25 (selected readings)	Immunology Cancer
May 2	EXAM #4	
May 4	REVIEW DAY	Review for Final Exam
May 6	REVIEW DAY	Review for Final Exam

LABORATORY SCHEDULE

DATE	EXERCISE
Jan 27	INTRODUCTION Protease Analysis by Spectrophotometry
Feb 3	Enzyme Assay Protein Assay Michaelis-Menten Kinetics
Feb 10	Protein Expression Induction SDS-polyacrylamide gel electrophoresis
Feb 17	Protein purification: Set-up, extraction, precipitation, and ultrafiltration
Feb 24	Protein purification: Gel-filtration chromatography and other techniques
Mar 3	Work on Group Project
Mar 10	Continue Work on Group Project
Mar 17	SPRING RECESS
Mar 24	Overview of Molecular Biology Techniques
Mar 31	Bacterial Growth Curve
Apr 7	Polymerase Chain Reaction
Apr 14	Oral Exam of Research Paper, Continue Working on Group Projects
Apr 21	Journal Club Presentations
Apr 28	Group Project Poster Presentations
May 5	Clean-Up and Check-Out

FINAL EXAM: THURSDAY, MAY 12, 8:00am-10:00am