OKLAHOMA BAPTIST UNIVERSITY
GENETICS, BIOL 4014
FALL 2010

CATALOG DESCRIPTION
Includes classical genetics, cytological basis of inheritance, molecular genetics, physical basis of the genes, gene action, biochemical genetics, cytoplasmic inheritance, mutations, chromosomal aberrations and polyploidy, genetic basis of evolution and speciation, population genetics, and biomedical and genetic engineering.

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: MWF 1 – 3pm; TR 1-2pm
Email: brad.jett@okbu.edu

CREDIT HOURS
4 Credits

TEXTBOOKS TO PURCHASE
"Genetics: From Genes to Genomes" 3rd Edition, by Hartwell.

PREREQUISITES
BIOL 3014 or CHEM 3054 (Molecular Biology or Biochemistry)

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.

LABORATORY
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. 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.

LABORATORY PROJECT
Students will work in groups of two and will conduct a experiment of their own design. At a designated time early in the semester, students will examine the scientific literature and plan an experiment which can be conducted during a specified period of time. Students will then present their research project in an informal "poster"-style presentation at a specified time at the end of the semester. Additional details about this project will be provided.

RESEARCH PAPERS AND PRESENTATIONS
Research Paper: You are expected to search and read the current scientific literature on a topic to be announced in class, and summarize it in a manuscript.

- Papers should be 4-6 pages, typed, double-spaced, 12-point font.
- These papers 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 accessed if THREE, recent scientific journal articles are not used.
- General topics for each paper are listed in the schedule below.
- Only papers turned in by the listed deadlines will be graded. Therefore, you are encouraged to develop your ideas early.

Oral Presentation: Students will choose a topic relating to a recent advancement in genetics and present an oral, audio/visual report to the class during a laboratory period according the schedule below.

- Presentation must be no more than 10 minutes in length, with 5 minutes reserved for question/answer time.
- Presentation will be graded according to knowledge of subject, clarity of presentation, quality of text and diagrams, and response to questions.

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 project 50 points
- Research paper: 50 points
- Oral presentation: 50 points
- Homework assignments: 50 points

TOTAL POINTS: 800 points

STUDENTS WITH DISABILITIES

Oklahoma Baptist University complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Students with disabilities who need special accommodations must self-identify and submit acceptable documentation in the Student Services office located in the Geiger Center, Room 101.

ADDITIONAL IMPORTANT INFORMATION FOR OBU STUDENTS

Please refer to the following link, http://www.okbu.edu/academics/forms/syllabus_attachment_fall10.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.

CLASS SCHEDULE

DATE	ASSIGNMENT	TOPIC
Aug 27	Introductions, and Chapter 1	Introduction
Aug 30	Chapter 2	Mendellian Genetics
Sept 1	Chapter 2 (continued)	Mendellian Genetics
Sept 3	Chapter 3	Extensions to Mendel
Sept 6	Labor Day Recess	None
Sept 8	Chapter 3 (continued) Chapter 21 (selected readings)	Extensions to Mendel Population Genetics
Sept 10	Chapter 4	Chromosome Theory
Sept 13	Chapter 5	Linkage and Recombination and Gene Mapping

Sept 15	EXAM 1	
Sept 17	Chapter 6	DNA: Biochemistry, Replication, and Recombination
Sept 20	Chapter 6 (continued)	DNA: Biochemistry, Replication, and Recombination
Sept 22	Chapter 7	Structure and Function of Genes
Sept 24	Chapter 7 (continued)	Structure and Function of Genes
Sept 27	Chapter 8	Gene Expression
Sept 29	Chapter 8 (continued)	Gene Expression
Oct 1	Chapter 9	Recombinant DNA Technologies
Oct 4	Chapter 9 (continued)	Recombinant DNA Technologies
Oct 6	Review	
Oct 8	EXAM 2	
Oct 11	Chapter 10	DNA and Genome Analysis
Oct 13	Chapter 10 (continued)	DNA and Genome Analysis
Oct 15	NCBI Exercises	
Oct 18	Handouts	Human Genetic Diseases
Oct 20	Chapter 11	Genetic Markers and Genotyping and Positional Cloning
Oct 22	Fall Recess	None
Oct 25	Chapter 11 (continued)	Genetic Markers and Genotyping and Positional Cloning
Oct 27	Genetics and Society	In-Class Discussion and homework
Oct 29	Chapter 12	Systems Biology and Proteomics
Nov 1	Chapter 13	Eukaryotic Chromosomes
Nov 3	Chapter 14	Chromosomal Rearrangements
Nov 5	EXAM 3	
Nov 8	"The Double-Helix"	Discussion of book and homework
Nov 10	"The Double-Helix"	Discussion of book and homework
Nov 12	Chapter 15 Chapter 16 (selected readings)	Prokaryotic Chromosomes Organelle Chromosomes
Nov 15	Chapter 17	Prokaryotic Gene Expression
Nov 17	Chapter 17 (continued) PAPER DUE	Prokaryotic Gene Expression
Nov 19	Handout	Phage Lambda Genetics
Nov 22	Chapter 18	Eukaryotic Gene Expression
Nov 24 – Nov 26	Thanksgiving Recess	None
Nov 29	Chapter 18 (continued)	Eukaryotic Gene Expression
Dec 1	Chapter 19	Cell Cycle Regulation and Cancer
Dec 3	Clinical Case Study	
Dec 6	Chapter 22	Molecular Evolution
Dec 8	EXAM 4	
Dec 10	Final Exam Review	

FINAL EXAM: December 15th (Wednesday), 10:15am-12:15pm

LABORATORY SCHEDULE

DATE	EXERCISE
Aug 26	Laboratory Introduction; Begin Medellian genetics exercises
Sept 2	Continue Medellian genetics exercises
Sept 9	Complete Medellian genetics exercises and begin human karyotyping exercise
Sept 16	Complete human karyotyping exercise
Sept 23	Computer lab session; selection of human gene for recombinant DNA exercise
Sept 30	Isolation of human DNA; DNA concentration by UV spectrophotometry
Oct 7	Perform polymerase chain reaction using custom primers; analyze PCR products by agarose gel electrophoresis
Oct 14	Ligate human genes into TA Cloning vector; transform *E. coli* by chemical transformation
Oct 21	Fall Recess
Oct 28	Pick recombinant *E. coli* colonies and purify plasmids
Nov 4	Field Trip to OUHSC Genome Sequencing Facility
Nov 11	Generate labeled probes for recombinant plasmids; restrict and blot target DNA
Nov 18	Analyze DNA sequence Data from OUHSC Genome Sequencing Facility
Nov 25	Thanksgiving Recess
Dec 2	Poster Presentations for Group Projects
Dec 9	Oral Presentations; approximately 10 minutes each on Recent Advance in Genetic Technology