

VIRGINIA STATE UNIVERSITY
DEPARTMENT OF BIOLOGY
SCHOOL OF ENGINEERING, SCIENCE & TECHNOLOGY
BIOL 320-01/10 & 11 PRINCIPLES OF GENETICS
Lecture and Laboratory
COURSE SYLLABUS Spring 2004

Instructor: *Regina M. Knight-Mason, Ph.D.*
Associate Professor

Office hours: Monday—1-3:00
Tuesday---9:30-11:30, 2-3:00
Wednesday--- NONE
Thursday---9:30-11:30
Friday--- 1-3:00

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Lecture time: Tuesday & Thursday 12:30-1:50
Room 109 Lockett Hall

Lab time: Wednesday, 3-4:50
Room: 203 Lockett Hall

Course Description

Principles of Modern Genetics expounds the fundamental principles of genetics, including a special emphasis on the application of Medelian genetics and recombinant DNA technology in the study of DNA, RNA, and the mechanisms of gene expression. The laboratory is required for all biology majors and complements the course.

Text Book: Essential 'i' Genetics by Peter J. Russell, 2003, Benjamin Cummings, Publishers. Study Guide and Solutions Manual, by Bruce Chase. The laboratory textbook: Genetics; Laboratory Investigations by Thomas R. Mertens and Robert Hammersmith, 12th edition. Books are available in the VSU Bookstore.

All students are required to read each chapter before class discussion. An outline of chapter sequences will be available to each student through **Blackboard**. Students will be assigned questions, problems and various internet activities throughout the semester. Students will also be required to write one formal term paper on a genetic disorder or molecular genetic research. This paper will be considered as a test grade. Exams will be announced one week in advance. **The final exam will be comprehensive (4/28/04).** There will be at least four formal exams plus the final exam. Students are required to maintain all laboratory records in the formal Genetics laboratory textbook from the VSU Bookstore. If you decide not to use the VSU notebook, the lab should be typed in standard scientific method format. Write ups are due February 18, March 3, and April 21.

Grades (lecture)	Midterm	Final
Quizzes and Homework	20%	15%
Exams, term paper	80%	70%
Final	0 %	15%

Lab Grades will be based on

Lab notebook	60%	55%
Participation*	20%	20%
Midterm exam	20%	10%
Final Exam	0 %	15%

*Participation is attendance and contribution to labs.

Knowledge of the Principle of Genetics

1. Students are given in-depth knowledge of the general and fundamental principles of classical and molecular genetics, including special emphasis on the relationship with recombinant DNA technology.
2. Mendelian genetic principles, as well as historical perspectives are taught extensively. At this point, basic mathematical principles relevant to genetics are discussed.
3. Major biochemical concepts are discussed early in the course, relating them to molecular as well as cellular and organismic concepts.
4. Proteins are discussed as related nucleic acids and gene regulation.

Skills Derived From Genetic Knowledge

1. Mathematical approaches such as probability will be employed in solving and analyzing genetic problems and principles.
2. Students will be guided to develop skills in problem solving, single-concept exercises, those that require the use of several concepts in logical order, and quantitative problems requiring numerical solutions.
3. Students will learn basic techniques of maintaining fruit flies, *Drosophila melanogaster*.
4. Basic experiments using *Drosophila melanogaster* will be recreated, the data obtained will be analyzed, and pertinent conclusions reached.
5. Manipulation of genes to alter and regulate their expression.

Dispositions Resulting From Acquired Skills

1. Student can use genetic principles to address the problems related to inheritance in biological organisms, genetic diseases such as sickle cell disease.
2. Students understand the biochemical and molecular principles of inheritance.
3. Students understand the quantitative and evolutionary principles of genetics.
4. Student can apply genetic principles to recombinant DNA technology.
5. Application of recombinant DNA technology in law as it relates the forensic medicine.

BIOL 320 Lecture and Lab Schedule (Tentative)

Week of	Lecture	Lab
Jan 12	Chapter 1 Introduction	Introduction, Investigation 5 Mitosis
Jan 19	Chapter 2, 3 Mendelian Genetics Chromosomal Inheritance	Investigation 6 Meiosis
Jan 26	Test, Chapter 4 Extensions of Mendelian	Investigation 1,2 Monohybrid and Dihybrid Crosses Investigation

Feb 2	Chapters 5,6 Gene Mapping	1,2 continued Investigations 1 & 2 continued
Feb 9	Chapter 7, Test Non-Medelian Genetics	Investigation 3 Probability
Feb 16	Chapters 8, 9 DNA: Genetic Material	Investigation 4 Chi-Square
Feb 23	Chapter 9, 10 DNA Replication	Investigations 8 & 9 Polytene Chromosomes
Mar 1	Chapter 11, <u>Midterm</u> Gene Control/Protein	Midterm Exam
March 8-14	Spring Break	
Mar 15	Chapter 12,13 Gene Expression	Investigation 10 Sex Chromosomes
Mar 22	Chapters 14, 15 Test cDNA, Genome Analysis	Investigation 11 Human Chromosomes
Mar 29	Chapters 16,17 Gene Regulation	Investigations 15, 16 DNA
Apr 5	Chapters 18,19 Genetics of Cancer	Investigations 15. 16 DNA
Apr 12	Chapters 20, 21 DNA Mutation & Repair Chromosomal Mutations	Investigations 23 and/or 26 Population Genetics
Apr 19	Chapters 22, 23 Test Population Genetics, Quantitative Genetics Molecular Evolution	Lab Final
Apr 26	Final Exam April 28, 10:30-12:30	