

**Animal Science 3423
Animal Genetics
Spring, 2009**

Instructor: Udaya DeSilva
329P Noble Research Center
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Office Hours: MWF 9:30-10:00 – at 206 ANSI
Afternoons by appointment or walk-in at 329P NRC

Teaching Assistants:

Shivani Adhikari	344 NRC	744-2735
Mallika Achantha	213 ANSI	744-7365
Jessica Sovereign		jessica.sovereign@okstate.edu

Lecture: MWF 0830, ANSI 123
Disussion: to be determined, ANSI 123

Text: Russell, Peter J. iGenetics; a Mendelian Approach. Benjamin Cummings Publishers

Course Objectives:

To acquaint the student with basic principles of classical, molecular and population genetics as it applies to animals (including humans). Topics discussed will include basic processes of gene transmission including random segregation and independent assortment of genetic material, the physical and chemical nature of heredity, mutation, expression and regulation of genes. An introduction to recombinant DNA technology, linkage mapping, genome analysis and a survey of some common inherited disorders of humans and domestic animals.

Grading Policy:

4 Exams	80%
Unannounced quizzes	20%

Letter grades will be assigned based upon the following scale: A=90-100, B=80-89, C=70-79, D=60-69, F=<60

Your grade in the course will be based entirely on the points accumulated on the exams and the quizzes. There is no provision for extra-credit work (does not apply to students who are in the honors program). Under certain circumstances the grading scale may be lowered for the entire class – but the scale will not be raised under any circumstance. Only the final exam will be comprehensive. Students who intend to take this course for honors credit should talk to Dr. DeSilva regarding additional requirements.

Exam Schedule:

February 13	(Friday)	Exam 1
March 27	(Friday)	Exam 2
April 24	(Friday)	Exam 3

May 8 (Friday) Final Exam 8:00 – 9:50 AM

Unannounced quizzes:

You may earn a maximum of 100 points in this category. Each quiz carries 5 points, will generally be given at the end of the class and will usually be over the material covered in that lecture. There will be more than 20 quizzes given over the semester. Students who do not miss class should have little trouble earning their 100 points. There will be no “make-up” for pop quizzes. Almost all quizzes (with one or two exceptions) would be conducted using electronic responders. An electronic responder would be assigned for you at the beginning of the class at free-of-charge to you. It is your responsibility to return it at the end of the semester. \$50.00 will be charged to your Bursar’s account for lost or non returned responders.

Policy on Missed Work:

If you know you will miss an exam see Dr. DeSilva as soon as possible. You must also provide a written excuse for each absence. You must visit with Dr. DeSilva and provide the written excuse. The written excuse must be provided on a card that you obtain from Debra Danley in ANSI 206. The written excuse must say when (date and time) you will take the make-up. You may take an exam early (the prior afternoon) or late (within three working days after the scheduled exam day) if you will be absent for a university-sponsored event. You may take an exam late (within three days after the scheduled exam date) if you become ill and cannot attend. Validity of other excuses for absence will be reviewed by case. If you take the final exam late, you will receive an “I” in the class to be replaced with a letter grade after the exam is made up.

Policy on dropping exam scores:

No exam scores will be dropped.

Information on the class on the web:

Information on the class is posted at the class D2L site at <http://oc.okstate.edu>

Students who need help or instructions on how to log-in to a D2L site should contact Dr. DeSilva or one of the teaching assistants without delay.

The site would include class notes, old exams, study guides etc.

Attendance:

Attendance is expected at all classes.

Problem assignments:

Problems will be assigned from the text and lectures. They will be posted in the D2L site. The ability to solve assigned problems is essential for your success in this course. The instructor and teaching assistants will be available during the discussion sessions to assist you.

Reading Assignments:

Chapters from the textbook will be assigned as required reading. Copies of relevant articles will either be handed out in the class or will be posted on the class D2L site as reading assignments. You will also be directed to obtain specific information from the Internet. Information from these reading and Internet assignments will form the basis for some exam questions.

Help Sessions:

A help and discussion session will be held each week at a time to be determined. There will be an on-line help session prior to exams using D2L "chat" feature. Instructions on joining and the times would be announced in class.

Assistance from the Instructor:

You should always feel free to contact me outside of class, either during office hours or by appointment. It is perfectly acceptable to call and stop by the office at any time although I prefer you coming in the afternoons. You may call me at home (780-7588) in the evenings (at a reasonable hour) or on weekends. Please do not hesitate to seek any appropriate out-of-class assistance from me in your efforts to master the subject matter of this course.

Brief Course Outline:

Following is a tentative list of topics that would be covered over the semester. Few changes in the topics and the order might occur and students will be notified if and when such a change occurs.

Genetics; An introduction	Chapter 1
Classical and Modern Genetics	
Basic Concepts of Genetics	
Geneticists and Genetic Research	
Mendelian Genetics	Chapter 2
Mendel	
Genotype and Phenotype	
Monohybrid Crosses and Principle of Segregation	
Dihybrid Crosses and Principle of Independent Assortment	
Basic Probability and Chi-Square test	
Mendelian Genetics in humans and domestic animals	
Pedigree Analysis	
Chromosomal Basis of Inheritance	Chapter 3
Chromosomes and Cellular Reproduction	
Chromosome Theory of Inheritance	
Chromosome Numbers	
Sex Chromosomes and Sex Determination	
Sex Linkage	
Nondisjunction of X Chromosome	
Sex Determination	
Analysis of Sex Linked Traits in Humans and Other Animals	
Extensions of Mendelian Genetic Analysis	Chapter 4
Multiple Alleles	
ABO blood group and <i>Drosophila</i> eye color	
Incomplete Dominance and Codominance	
Molecular basis of above	
Gene Interactions and Epistasis	
Penetrance and Expressivity	
Gene expression and Environment	
Non-Mendelian Inheritance	Chapter 23
Mitochondria and Chloroplasts	
Organization of Extranuclear Genomes	

Examples of Extranuclear Inheritance
Maternal Effects and Genomic Imprinting

Variations in Chromosome Number and Structure	Chapter 8
Types of Chromosomal Mutations	
Variations in Chromosomal Structure	
Deletion, Duplication, Inversion, Translocation and Fragile Sites	
Variations in Chromosomal Number	
Aneuploidy and Polyploidy	
Gene Mapping in Eukaryotes	Chapter 6
Discovery of Genetic Linkage	
Gene Recombination and Role of Chromosome Exchange	
Construction of Genetic Maps	
Two-point and three-point Test Crosses	
Advanced Gene Mapping in Eukaryotes	Chapter 7
Mitotic Recombination	
Mapping Human Genes	
DNA: The Genetic Material	Chapter 10
The Search for the Genetic Material	
The Composition and Structure of DNA and RNA	
Organization of DNA in chromosomes	
DNA replication	Chapter 11
Semiconservative DNA Replication	
Enzymes involved in Replication	
DNA Replication in Eukaryotes	
Gene Function	Chapter 12
Gene Control of Enzyme Structure	
One Gene-One Enzyme Hypothesis	
Genetically Based Enzyme Deficiencies in Humans	
Gene Control of Protein Structure	
Genetic Counseling	
Gene Expression: Transcription	Chapter 13
The Transcription Process	
Transcription in Eukaryotes	
Gene Expression: Translation	Chapter 14
Proteins	
The Nature of the Genetic code	
The Process of Protein Synthesis	
Recombinant DNA Technology	Chapter 16
DNA Cloning	
Recombinant DNA Libraries	
Finding a Specific Clone in a Library	
Polymerase Chain Reaction	
Applications of Recombinant DNA Technology	Chapter 17
DNA testing for Human Genetic Diseases	
Isolation of Genes	

DNA Typing
Gene Therapy
Commercial Products

Genomics Chapter 18

Structural Genomics
Functional Genomics
Comparative Genomics
Ethics and the Human Genome Project

Population Genetics Chapter 24

Genetic Structure of Populations
Hardy-Weinberg Law
Forces that Change Gene Frequency in Natural Populations

Quantitative Genetics Chapter 5

Nature of Continuous Traits
Polygenic Inheritance
Heritability

Molecular Evolution Chapter 25

Patterns and Modes of Nuclear Substitution
Molecular Phylogeny