

**Department of Animal Sciences - College of Agricultural Sciences**  
**Colorado State University**  
**Foundations in Animal Genetics**  
ANEQ – 328, 3 Credits, Spring Semester

**Course Description:** Foundational information of the influence of the genome and its genes on qualitative and quantitative traits in animal populations. *Prerequisite:* LIFE102 ( $\geq$  biology).

**Course Information:**

Meeting days and time = TR 8:00 to 9:15 am in Clark A201.

Final Exam = Wednesday, May 10, 2:00 to 4:00 pm (***comprehensive***) in Clark A201.

**Instructor:**

Dr. Milt Thomas, J.E. Rouse Chair of Animal Breeding and Genetics

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***Email: [Milt.Thomas@colostate.edu](mailto:Milt.Thomas@colostate.edu) (Only use this email address!!!!!!)***

Office hours: after class TR or by appointment in the Animal Science building

Background: <http://people.agsci.colostate.edu/directory-page/personnel-information/?userName=milthoma>

**Teaching Assistants:**

Courtney Pierce; [courtney.pierce@colostate.edu](mailto:courtney.pierce@colostate.edu); Tuesday 2:00-3:00 pm, AnSci 156.

Kailee Reed; [kailee@rams.colostate.edu](mailto:kailee@rams.colostate.edu); Wednesday 11:00am-12:00pm, AnSci 156.

**Workload:** As per CSU Faculty Council guidelines, this course requires an average of 9 – 12 hours per week for review, reading, homework and study, which is in addition to time in lecture. Lecture attendance is expected. There will be sign-in sheets for 10 bonus points total.

**Course Grading:**

1. Exams (3 x 100 pts = 300 points) will be answered on scantron sheets plus a few problems. Exams will not be returned to the students; however, if you want to view your exam, you may make an appointment with a TA to review the exam within one week after that exam. Calculators may be used for exams. ***Cell phones may not be used!***
2. Homework (2 x 25 points = 50 points).
3. On-line quizzes (5 x 5 points = 25 points)
4. Comprehensive final (200 points).
5. 575 points total and letter grade assigned by standard scale: A  $\geq$  90%, B  $\geq$  80%; C  $\geq$  70%; D  $\geq$  60%; F < 59.9%.

**Student Objectives:** Students who successfully complete this course will gain an understanding of the following concepts as needed for students pursuing a B.S. degree in Animal Science and (or) have expectation of advanced graduate/professional study involving animals.

- I. Animal Phylogeny, Populations (i.e., breeds), and Genomes,
- II. Structure and function of genes and the intracellular processes to synthesize proteins,
- III. Importance of DNA sequence polymorphisms as to phenotype of qualitative traits,
- IV. Mendelian Inheritance, familial relationships, and pedigrees,
- V. Frequencies of alleles and genotypes, Hardy-Weinberg Equilibrium vs. selection,

- VI. Quantitative genetics, polygenic traits, and the genetic model,
- VII. Application of genomics in animal production.

**Knowledge from this course is needed as a pre-requisite for upper division courses in Animal Breeding and Genetics (ANEQ 330 and 334).**

**Excused Absences:** Students with university-excused or instructor-excused absences may be granted an extension on the due date of homework assignments. Exams must be taken on the day they are scheduled, so absences for University events should be submitted in writing in advance.

**Homework:** Homework assignments must be submitted by their respective due dates which will be announced well in advance, and approximately coincide to a week prior to the unit and final exams. If homework is submitted late without approval, 10 points per day for up to 2 days, will be subtracted from the total points earned. Homework submitted more than 2 days late will have a score of zero.

**Integrity Statement:** Colorado State University expects students to adhere to and maintain standards of personal and academic integrity that are in harmony with the educational goals of the institution; to observe national, state and local laws, and University regulations; and to respect the rights, privileges and the property of others. Refer to:

<http://catalog.colostate.edu/general-catalog/academic-standards/academic-policies/>

**Lecture Schedule:**

Section	Topics	Week
I	Animal Phylogeny, Populations (i.e., Breeds), and Genomes	1
I	Cytology, Chromosomes, Genes, and Alleles	2
I	Nucleic Acids (i.e., DNA and RNA), Sequence, and Polymorphisms	3
I	Transcription, Codons, Translation, Amino Acids, and Proteins	4
I	Review and Exam I	5
II	Mitosis and Meiosis (spermatogenesis and oogenesis)	6
II	Mendelian Inheritance and Modes of Inheritance in Animals	7
II	Classic Di-Hybrid Crosses and Epistasis in Animals	8
II	Familial Relations and Pedigrees	9
II	Homework II (Punnett Squares and Pedigree relations) and Exam II	10
III	Introduction to Population Genetics, Allele and Genotypic Frequencies,	11
III	Hardy-Weinberg Equilibrium, Quantitative-Polygenic Traits, and Simple Statistics	12
III	Introduction to Genetic Model and Selection	13
III	Application of Genomics in Animal Production Systems	14
III	Homework III (Allele and Gene Frequencies and Statistics) and Exam III; Review of Foundations of Animal Genetics	15
	Comprehensive Final Exam	16

**Text book (required):** Understanding Animal Breeding (2<sup>nd</sup> edition) by R.M. Bourdon; Prentice Hall, Upper Saddle River, NJ, 2000.