Principles of Animal Breeding
ANEQ 330

Course Description: Genetic principles underlying animal improvement; elementary population genetics; heritability; systems of mating and selection.

Course Dates

Regular class: August 21, 2017 through December 8, 2017
Meeting days: T, Th
Class times: 9:30am to 10:45am

Final Exam: Monday, December 11, 2017 from 9:40am to 11:40am

Location Clark C250

Prerequisites

ANEQ 328, BZ 350 or SOCR 330, and 3 credits of statistics (200 or above)

Instructor Information

Name and contact:

Dr. Scott Speidel
Animal Sciences, Room 006
Office: 491-5419
Email: scott.speidel@colostate.edu

Office hours: 9am to 10am MW, 006 Animal Sciences
or by appointment

Teaching Assistants

Name and contact:

Miguel Sanchez
Animal Sciences Room 156
Email: miguel.sanchez_castro@colostate.edu
Office hours: W, 3:30 – 4:30 pm

Heather Foxworthy
Animal Sciences Room 156
Email: heather.foxworthy@colostate.edu
Office Hours: M, 2 – 3 pm.

Student Objectives

Course goals:

1. To gain an understanding of the steps involved in developing an animal improvement program with particular emphasis on food animals.
2. To learn genetic principles underlying animal improvement; elementary population genetics; heritability, and systems of mating and selection.
3. To understand the likely consequences of choosing particular animals as parents of the next generation
4. To communicate knowledge of animal improvement.

Integrity statement

Colorado State University expects students to maintain standards of personal 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 property of other people (see Policies and Guiding Principles, http://www.catalog.colostate.edu/). Students will adhere to the Colorado State University General Catalog Academic Integrity Policy and Student Conduct Code.

We take academic integrity seriously. At a minimum, to achieve academic integrity no one will use another's work as their own. The CSU writing center defines plagiarism in this manner:

> Plagiarism is the unauthorized or unacknowledged use of another person's academic or scholarly work. Done on purpose, it is cheating. Done accidentally, it is no less serious. Regardless of how it occurs, plagiarism is a theft of intellectual property and a violation of an ironclad rule demanding "credit be given where credit is due."
> Source: (Writing Guides: Understanding and Avoiding Plagiarism. http://writing.colostate.edu/guides/guide.cfm?guideid=17 Accessed, August 14, 2017)

Plagiarism will result in lost credit for the assignment.

Text

Understanding Animal Breeding, R.M. Bourdon, Prentice Hall, 2nd Edition, 0-13-096449-2
(Text is **required**)

Grading Policies

Homework Assignments	300 points
Quizzes (10 Total)	100 points
Exams (3 in-class; 1 Final)	400 points
Total	**800 points**

There will be a total of 10 quizzes worth 10 points each, given at various times throughout the semester. Quizzes will be given on Canvas, will be released Thursday's at 1:00 pm and will be due the following Monday at 5:00 pm. There will be no quiz the first or last week of class, nor will they be given the week of an exam. Quizzes cannot be made up.

There will be 4 exams (as tentatively scheduled below; 3 during the course and a final exam) during the semester. Each in-class exam is worth 100 points and the final is also worth 100 points. Students are required to take all 4 exams. The final exam is comprehensive. A missed exam will result in a 0 for that exam.

Life happens. Occasionally, a medical emergency or death in the family may mean you miss an exam. In such cases, you must notify the professor by email within 24 hours of the missed exam. Written documentation of the emergency must be submitted to the instructor before you will be allowed to make up a missed exam. These are the only university unexcused absences that will be accepted for missing an exam.

Students with university excused absences (judging team, etc) on exam days, must take the exam **before** the excused trip occurs. Homework assignments and quizzes which are due during an excused absence are still subject to relevant due dates.

Due dates for homework assignments will be announced in class and updated in Canvas as assignments are given. Homework assignments are due at **8 am** of the day listed. All homework assignments will be submitted through the Canvas environment. Late homework assignments will be penalized 10% **per** day late starting with assignments handed in after 8 am.

Questions on homework or exam scores must be brought to the attention of the professor **no later than 1 week** after the homework or test is made available to the student.

The grading scale is the following and will be no stricter than outlined below. However, the professor reserves the right to curve the course at the end of the semester.

Letter Grade	Point Percentage
A	90 to 100 %
B	80 to 89 %
C	70 to 79%
D	60 to 69%
F	Below 60%

As per Faculty Council guidelines, this course requires an average of 6 hours per week for review, reading, homework, and study; in addition to lecture times.

Course outline (dates are tentative start dates for material and will be adjusted through the course of the semester)

Week 1 – Tuesday, August 22
- Introduction of professor
- Discussion of expectations
- Why be concerned about animal breeding?
- Steps in an animal breeding program
- Basic terminology
- **Reading: Chapter 1 and 2**

Week 2 – Tuesday, August 29
- Review of Statistics
- **Reading: Chapter 8**

- Review of Mendelian Inheritance
- Gene effects
  - Additive gene action
  - Dominance
  - Epistasis
- **Reading: Chapter 3 through 7**

Week 3 – Tuesday, September 5
- Simply inherited versus polygenic traits
- Heritability and Repeatability
- **Reading: Chapter 9**

Week 4 – Tuesday, September 12
- Concept of the breeding objective
  - Traits influencing the goal
  - Relative emphasis on those traits
  - Brief review of current tools

Week 5 – Tuesday, September 19
- The concept of direct selection
  - Selection on breeding value
  - Selection on phenotype
- Factors influencing the rate of genetic change
- **Reading: Chapter 10**

Exam 1 – Thursday, September 21

Week 6 – Tuesday, September 26
- Genetic Prediction
  - EPD
  - Accuracy
  - Possible change
- Sire Summaries
- **Reading: Chapter 11 and 12**

Week 7 – Tuesday, October 3
- Indirect selection
  - Correlated Traits
- **Reading: Chapter 13**

Week 8 – Tuesday, October 10

- Multiple Trait Selection
  - Tandem
  - Independent culling levels
  - Selection Index
  - Decision support
- Determining relative emphasis on traits
- **Reading: Chapter 14**

Week 9 – Tuesday, October 17

- Selection Strategies
  - Simply inherited traits
- **Reading: Chapter 15**

Week 10 – Tuesday, October 24

- Flex lesson

Exam 2 – Thursday, October 26

Week 11 – Tuesday, October 31

- Mating strategies
  - Performance based
    - Assortative mating
  - Relationship based
    - Inbreeding
    - Outbreeding
- **Reading: Chapter 16 and 17**

Week 12 – Tuesday, November 7

- Hybrid vigor
- Complementarity
- **Reading: Chapter 18**

Week 13 – Tuesday, November 14

- Crossbreeding systems
  - Evaluation criteria
  - Rotational systems
  - Terminal systems
  - Composite systems
- **Reading: Chapter 19**

Week 14 – Tuesday, November 28

- Commercial genetic tests
  - Parentage
  - Performance markers
    - Usefulness
- **Reading: Chapter 20**

Exam 3 – Thursday, November 30

Week 15 – December 5

- Putting it all together
- **Reading: Chapter 21**

Course Wrap-Up – Thursday, December 7

Final Exam— Monday, December 11, 2017 from 9:40 am to 11:40 am