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**ASCI 431/831
Advanced Animal Breeding
Spring 2017**

Instructors

Dr. Gota Morota (A218f Animal Science Building; (402) 472-6362; morota@unl.edu)
Dr. Ron Lewis (A218i Animal Science Building; (402) 472-6378; ron.lewis@unl.edu)

Course Meetings

Tuesday & Thursday, 2:00 – 3:30 p.m., A128 Animal Science Building

Office Hours

The instructors will hold office hours as specified on the course Blackboard site.

Prerequisites

ASCI 330 (Animal Breeding), or its equivalent, is the prerequisites for this course. Please do not enroll in ASCI 431/831 until you have successfully completed that prerequisite course.

Materials

There is no textbook required for this course. Due to the nature of the course, handouts prepared by the instructors and guest lectures, and reading assignments from the scientific literature, web-based materials and reports will be used to illustrate principles, demonstrate applications, and focus lectures on practical outcomes of advanced breeding programs.

Learning Objectives

The objective of this course is to provide students with the necessary knowledge, exposure to research results, and explanation of breeding applications to critically evaluate strengths, weaknesses and expected outcomes of present and potential animal breeding strategies.

Upon successful completion of this course, students will be able to:

1. Demonstrate an understanding of the state-of-the-art applications of animal breeding and quantitative genetics (including their benefits and limitations) to the genetic improvement of livestock within the United States and elsewhere in the world.
2. Demonstrate an ability to locate and interpret research results, and recognize the applications of such research to livestock breeding programs.
3. Demonstrate an understanding of sources of variation in performance of animals, and the methods used to control or adjust for this variation.

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4. Predict responses to selection for a broad array of selection situations, including the use of molecular markers.
5. Predict average performance of crossbred populations and mean industry values for breeding systems using crosses of several different breeds.
6. Plan future breeding program strategies contingent upon the goals that are established.

Course Content

1. Introduction to R programming
2. Review of statistics used in animal breeding
3. Numerator relationship matrix
4. Models for evaluating selection methods
 - a. Variances and covariances
 - b. Direct and maternal effects
5. Predicting responses to selection
6. Evaluating alternative selection strategies
7. Methods for predicting breeding value
 - a. Selection index
 - b. Best linear unbiased prediction (BLUP)
 - c. Major genes/molecular markers and Marker Assisted Selection (MAS)
 - d. Genome-wide selection (GS)
8. Economic selection indexes for multiple traits
 - a. Relative economic values
 - b. Predicting overall responses and responses in component and correlated traits
9. Industry structure and costs of selection
10. Performance/breeding objectives
11. General concepts in using existing breed (line) differences
 - a. Estimation of heterosis and breed differences
 - b. Crossing systems: animal and industry levels
 - c. Molecular markers to maximize heterosis
12. Genotype by environment interaction

Student Learning Activities and Assessments

Assessments	Percentage	Points
Class discussion sessions (2)	10%	100
Homework assignments (8)	40%	400
Project	20%	200
Exams		
Midterm exam	15%	150
Final exam	15%	150
Total for course	100%	1,000

1. Class discussion sessions

A key element of this course will be for students to gain the skills and confidence to critique and discuss the literature and principles of animal breeding. This can best be achieved by preparing for class sessions by studying the assigned materials and by actively participating in class discussions.

During the semester, each student will lead two class discussions, considering an assigned reading or a principle relevant to the course material. The topic of the discussion will be agreed beforehand with the instructors. Each session led will contribute 3% (or 30 points) toward the final grade (6% or 60 points in total).

Students also will be evaluated based on their active participation in class discussions, which will contribute 4% (or 40 points) toward the final grade.

In total, leading and participating in class discussion sessions will contribute 10% (or 100 points) toward the final grade.

2. Problem sets

There will be 8 take-home problem sets during the course. They will be distributed at least one week before they are due. All students will complete some problems on a problem set. However some students (those enrolled in ASCI 831) may be assigned different or additional problems, with those solutions then shared with the rest of the class.

For full credit, a problem set is due by the start of class of its assigned due date. Late assignments will be penalized 10% each calendar day late (defined as 2:00 p.m. on a given day). No credit will be given to a problem set received after the respective problem set is returned, discussed in class or an answer key is made available.

Each problem set will contribute 5% (or 50 points) toward the final grade (40%, or 400 points, in total).

3. Project

There will be a major problem/project for each student in which the student will develop a breeding program for a particular species. The objective of the project is to develop a breeding program that will result in a line for use by commercial producers of a livestock species. Further details of the assignment will be provided in a separate handout.

The project report will be due at the start of class on Thursday, April 20. It will contribute 20% (200 points) towards the final grade.

4. Midterm and Final Examinations

There will be two exams during the course: a midterm and a final. These exams may include both in-class and take-home portions. For those students enrolled in ASCI 831, the exams will have extra questions.

The in-class portion of the midterm exam will be on Tuesday, Feb. 28, during the class session. The in-class portion of the final exam will be on Tuesday, May 2, from 3:30 – 5:30 p.m. Each exam will contribute 15% (150 points) toward the final grade (30%, or 300 points, in total).

Grading policy

Numerical grades will be used for all work. Final grades will be determined by the cumulative number of points earned in the course. Students are assured of earning a final grade within a category shown below by earning the number of points specified. The scale will be no higher than that listed below, but may be lower if the instructors feel material was too difficult for students to achieve these standards.

Expectations, and thereby grading scales, will differ for students enrolled in ASCI 431 and those enrolled in ASCI 831.

Points	Grade category
930 or above	A
900 - 929	A-
870 - 899	B+
830 - 869	B
800 - 829	B-
770 - 799	C+
730 - 769	C
700 - 729	C-
670 - 699	D+
630 - 669	D
600 - 629	D-
599 or below	F

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ACADEMIC DISHONESTY POLICY

Students are expected to adhere to guidelines concerning academic dishonesty outlined in Article III.B. of the University's Student Code of Conduct which can be found at <http://stuafs.unl.edu/dos/code/>. Students are encouraged to contact the instructor to seek clarification of these guidelines whenever they have questions and/or potential concerns.

Additionally, each academic program has approved a policy for student appeals involving courses in that program. Those policies for the Department of Animal Science are provided below.

ACADEMIC PROGRAM APPROVED POLICY

Academic dishonesty can involve cheating; fabrication or falsification of information; plagiarism, including copying of written materials or "cutting and pasting" from websites without proper referencing; destroying, defacing, stealing, or making inaccessible library or other academic resource material; complicity in the academic dishonesty of others; falsifying grade reports; or misrepresenting illness, injury, accident, etc., to avoid or delay an examination or the timely submission of academic work.

Consequences of academic dishonesty in Animal Science courses, depending on the degree of severity as interpreted by an instructor, may range from a warning to assigning an F for the course. The instructor may also choose to assign a zero or partial credit for a specific assignment, quiz, examination or laboratory report in which dishonesty was involved. Before imposing an academic sanction the instructor shall first attempt to discuss the matter with the student. In all cases the instructor must document the instance(s) of student activity, which constitutes academic dishonesty. Documentation must be kept by the instructor for a minimum of one year and must be made available to appropriate department, college, and UNL authorities if cases of academic dishonesty result in disciplinary hearings and/or appeals at those levels. When an academic sanction is imposed that causes a student to receive a lowered course grade, the instructor shall make a report in writing of the facts of the case, and of the academic sanction imposed against the student, to the Animal Science Department Head and the UNL Director of Student Judicial Affairs. The student shall be provided with a copy of this report. Further, the instructor may recommend the institution of CASNR or UNL disciplinary proceedings against the student for violation of the Student Code of Conduct if the instructor, in the exercise of his or her professional judgment, believes that such action is warranted.

If a student facing sanctions due to academic dishonesty in an Animal Science Department course wishes to appeal such a sanction, the following process must be followed. First is a written appeal to the chief instructor of the course. Failing obtain resolution the student can appeal (in writing) to the Animal Science Department Head. The Department Head will refer the appeal to the Animal Science Curriculum Committee who will interview both the student

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and instructor, review all pertinent documentation, and then issue a decision. If a member of the Animal Science Curriculum Committee is also an instructor of the course in which academic dishonesty has been reported, the Animal Science Department Head will temporarily appoint a different faculty member to the committee hearing the appeal. If a solution satisfactory to the student is not achieved at the department level, the student may then appeal through the CASNR Dean's office and the University Director of Student Judicial Affairs, in that order and subject to the processes and requirements of those offices.

CLASSROOM EMERGENCY PREPAREDNESS AND RESPONSE INFORMATION

- **Fire Alarm (or other evacuation):** In the event of a fire alarm: Gather belongings (Purse, keys, cellphone, N-Card, etc.) and use the nearest exit to leave the building. Do not use the elevators. After exiting notify emergency personnel of the location of persons unable to exit the building. Do not return to building unless told to do so by emergency personnel.
- **Tornado Warning:** When sirens sound, move to the lowest interior area of building or designated shelter. Stay away from windows and stay near an inside wall when possible.
- **Active Shooter**
 - **Evacuate:** if there is a safe escape path, leave belongings behind, keep hands visible and follow police officer instructions.
 - **Hide out:** If evacuation is impossible secure yourself in your space by turning out lights, closing blinds and barricading doors if possible.
 - **Take action:** As a last resort, and only when your life is in imminent danger, attempt to disrupt and/or incapacitate the active shooter.
- **UNL Alert:** Notifications about serious incidents on campus are sent via text message, email, unl.edu website, and social media. For more information go to: <http://unlalert.unl.edu>.
- Additional Emergency Procedures can be found here: http://emergency.unl.edu/doc/Emergency_Procedures_Quicklist.pdf

STUDENTS WITH DISABILITIES

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY.