SR ANSC 4305 Agricultural Genetics & Biotechnology (web-based course) Summer 2025

Department: Agriculture & Industry

Course Delivery: Asynchronous (Online via Blackboard)

Credit Hours: 3

Length: 6 Weeks

Instructor: Felipe Padilha, DVM, PhD

Email: fxg25cn@sulross.edu

Virtual Office Hours: By appointment (via Blackboard Collaborate or Zoom)

Course Description

This course introduces students to the fundamental and applied principles of genetics and biotechnology in animal agriculture. Topics include Mendelian and molecular genetics, genetic selection, reproductive technologies, genetic engineering, and bioinformatics. Students will analyze the impact of gene frequency, heritability, and breeding systems on livestock improvement. Applications of biotechnology—including PCR, CRISPR-Cas9, marker-assisted selection, cloning, and genomics—will be explored with a focus on ethical, environmental, and regulatory considerations. Emphasis is placed on how these technologies contribute to efficiency, health, and sustainability in animal production systems.

Student Learning Outcomes (SLO)

- - Describe foundational concepts of animal genetics, including Mendelian inheritance and gene action.
- - Interpret population genetics principles and apply them to selection decisions.
- - Apply reproductive and molecular biotechnology tools to real-world animal production.
- - Estimate breeding values using statistical and genomic methods.
- - Evaluate ethical, biosafety, and legal implications of using genetic engineering in animals.

Animal Science Marketable Skills

- - Proficiency with reproductive and molecular tools used in animal breeding.
- - Ability to evaluate scientific data and apply statistical reasoning to selection decisions.
- - Familiarity with regulatory frameworks governing biotechnology in agriculture.
- - Skill in formulating ethical positions and practical solutions for biotechnological challenges.
- - Competency in scientific communication in written and spoken formats.

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Animal Science Learning Outcomes (ASLO)

- - Demonstrate the ability to interpret and apply scientific research.
- - Apply critical thinking and ethical reasoning in problem-solving.
- - Communicate effectively using discipline-appropriate formats.

Textbook and Materials

- Primary Text: Animal Genetics by F.W. Nicholas (recommended)

- Supplementary: Selected peer-reviewed journal articles, FAO/WHO documents, and online resources provided in Blackboard.

Laboratory / Practical Activities

- - DNA extraction protocols
- - PCR and gel electrophoresis walkthroughs
- - BLAST searches and genetic data analysis
- Reproductive biotechnology case studies (AI, ET)
- - CRISPR simulations and ethics debates

Course Schedule (6 Weeks)

Week	Topics & Activities
Week 1 (May 28)	Introduction to Genetics in Agriculture;
• Quiz 1	History of Agricultural Biotechnology;
Discussion 1	Mendelian Genetics, Meiosis, and
	Linkage; Introduction to Genotype vs
	Phenotype
Week 2 (June 4)	Quantitative Genetics; Heritability; Basic
• Quiz 2	Biostatistics for Breeding ; Breeding
Discussion 2	Programs and Genetic Selection Methods
	(EBV, EPD); Population Genetics; Hardy-
	weinberg Equilibrium
Week 3 (June 11)	Molecular Genetics: DNA Structure, Gene
• Discussion 3	Expression, Mutations; Marker-Assisted
Midterm Exam	Selection
Week 4 (June 18)	Reproductive Biotechnologies: Artificial
• Quiz 3	Insemination, Embryo Transfer, Cloning;
Discussion 4	Case Studies
Week 5 (June 25)	Genomics, CRISPR-Cas9, Genetic
• Quiz 4	Engineering; Ethics and Regulatory
Discussion 5	Frameworks; Future Trends in
	Biotechnology; Bioinformatics;
Week 6 (July 2) – last class day	Final exam 8:00 am

Assessment & Grading

Assessment Components:

- - Weekly Quizzes (4 total, 25 points each) 100 points
- - Discussion Board Participation (Weekly 20 points/week) 100 points
- - Midterm Exam (Week 3) 100 points
- - Genetic Selection Case Study Report (Week 5) 100 points
- - Final Exam (Week 6) 100 points

Total: 500 points

Grading Scale

- - 90% 100% = A
- - 80% 89% = B
- - 70% 79% = C
- - 60% 69% = D
- - <60% = F

Required and Recommended Literature

Primary Textbook:

Nicholas, F. W. (2010). Introduction to Veterinary Genetics. 3rd ed. Wiley-Blackwell. This book provides fundamental knowledge of animal genetics with a focus on applications in animal breeding and biotechnology.

Recommended Readings:

- - Templeton, A. R. (2006). Population Genetics and Microevolution. Sinauer Associates.
- - Brown, T. A. (2016). Gene Cloning and DNA Analysis: An Introduction. 7th ed. Wiley-Blackwell.
- - Wheeler, M. B. (2013). Biotechnology in Animal Agriculture. CAB International.
- - FAO. (2011). Biotechnologies for Agricultural Development. Food and Agriculture Organization of the United Nations.

Course Goals

- - Introduce students to the principles of inheritance and variation as applied to animal populations.
- - Develop competency in evaluating and designing breeding programs using both traditional and modern biotechnological tools.
- - Build foundational understanding of molecular biology concepts relevant to genetic manipulation and analysis.
- - Foster critical thinking in the ethical and societal implications of genetic engineering and biotechnology.
- - Equip students with skills in data interpretation, scientific communication, and real-world problem-solving in animal genetics.

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ADA Statement

SRSU Accessibility Services. Sul Ross State University (SRSU) is committed to equal access in compliance with the Americans with Disabilities Act of 1973. It is SRSU policy to provide reasonable accommodations to students with documented disabilities. It is the student's responsibility to initiate a request each semester for each class. Students seeking accessibility/accommodations services must contact Mrs. Mary Schwartze Grisham, LPC, SRSU's Accessibility Services Director or Ronnie Harris, LPC, Counselor, at 432-837-8203 or email mschwartze@sulross.edu or ronnie.harris@sulross.edu. Our office is located on the first floor of Ferguson Hall, room 112, and our mailing address is P.O. Box C122, Sul Ross State University, Alpine. Texas, 79832.

Student Responsibilities

All full-time and part-time students are responsible for familiarizing themselves with the Student Handbook and the Undergraduate & Graduate Catalog and for abiding by the University rules and regulations. Additionally, students are responsible for checking their Sul Ross email as an official form of communication from the university. Every student is expected to obey all federal, state and local laws and is expected to familiarize him/herself with the requirements of such laws.

SRSU Distance Education Statement

Students enrolled in distance education courses have equal access to the university's academic support services, such as library resources, online databases, and instructional technology support. For more information about accessing these resources, visit the SRSU website.

Students should correspond using Sul Ross email accounts and submit online assignments through Blackboard, which requires a secure login. Students enrolled in distance education courses at Sul Ross are expected to adhere to all policies pertaining to academic honesty and appropriate student conduct, as described in the student handbook. Students in web-based courses must maintain appropriate equipment and software, according to the needs and requirements of the course, as outlined on the SRSU website. Directions for filing a student complaint are located in the student handbook.

Counseling

Sul Ross has partnered with TimelyCare where all SR students will have access to nine free counseling sessions. You can learn more about this 24/7/365 support by visiting Timelycare/SRSU. The SR Counseling and Accessibility Services office will continue to offer in-person counseling in Ferguson Hall room 112 (Alpine campus), and telehealth Zoom sessions for remote students and RGC students.

Libraries

The Bryan Wildenthal Memorial Library and Archives of the Big Bend in Alpine offer FREE resources and services to the entire SRSU community. Access and borrow books, articles, and more by visiting the library's website, library.sulross.edu/. Off-campus access requires logging in with your LobolD and password. Librarians are a tremendous resource for your coursework and can be reached in person, by email (srsulibrary@sulross.edu), or by phone (432-837-8123).

No matter where you are based, public libraries and many academic and special libraries welcome the general public into their spaces for study. SRSU TexShare Cardholders can access additional services and resources at various libraries across Texas. Learn more about the TexShare program by visiting library.sulross.edu/find-and-borrow/texshare/ or ask a librarian by emailing srsulibrary@sulross.edu.

Academic Integrity

Students in this class are expected to demonstrate scholarly behavior and academic honesty in the use of intellectual property. Students should submit work that is their own and avoid the temptation to engage in behaviors that violate academic integrity, such as turning in work as original that was used in whole or part for another course and/or professor; turning in another person's work as one's own; copying from professional works or internet sites without citation; collaborating on a course assignment, examination, or quiz when collaboration is forbidden. Students should also avoid using open AI sources unless permission is expressly given for an assignment or course. Violations of academic integrity can result in failing assignments, failing a class, and/or more serious university consequences. These behaviors also erode the value of college degrees and higher education overall.

Classroom Climate of Respect

Importantly, this class will foster free expression, critical investigation, and the open discussion of ideas. This means that all of us must help create and sustain an atmosphere of tolerance, civility, and respect for the viewpoints of others. Similarly, we must all learn how to probe, oppose and disagree without resorting to tactics of intimidation, harassment, or personal attack. No one is entitled to harass, belittle, or discriminate against another on the basis of race, religion, ethnicity, age, gender, national origin, or sexual preference. Still, we will not be silenced by the difficulty of fruitfully discussing politically sensitive issues.

Supportive Statement

I aim to create a learning environment for my students that supports various perspectives and experiences. I understand that the recent pandemic, economic disparity, and health concerns, or even unexpected life events may impact the conditions necessary for you to succeed. My commitment is to be there for you and help you meet the learning objectives of this course. I do this to demonstrate my commitment to you and to the mission of Sul Ross State University to create a supportive environment and care for the whole student as part of the Sul Ross Familia. If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with me. I want to be a resource for you.

Tutoring Center

The Lobo Den Tutoring Center offers FREE tutoring support to help you excel in your courses. Whether you need assistance in Writing, Math, Science, or other subjects, we're here to help!

Important Information:

- Drop-in and Scheduled Appointments: Flexible options to fit your needs.
- Hours of Operation: Monday–Friday, 8:00 AM 5:00 PM.
- Workshops: Attend our regularly hosted academic workshops on STEM topics and professional development, often in collaboration with specialized faculty.

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- Location: BWML Room 128.
- Contact Us: For more information or to book an appointment, email tutoring@sulross.edu or call (432) 837-8726.

Looking for additional support?

- Tutor.com offers FREE 24/7 online tutoring in over 200 subjects, including specialized support for ESL and ELL learners with native Spanish-speaking tutors.
- Access Tutor.com via Blackboard: Log in to your Blackboard account to get started anytime, anywhere.

Take advantage of these valuable resources to boost your confidence and performance in your classes. We look forward to helping you succeed

