**APSC 5404: Reproductive Technologies in Cattle (3 credits)**

**Description:** Reproductive principles and techniques in dairy and beef cattle. Topics include general bovine reproductive anatomy and physiology, conventional and novel reproductive technologies, estrous cycle control, estrous detection, timed artificial insemination schemes, pregnancy diagnosis, cow health concerns, and emerging reproductive technologies.

**Course Restrictions:** Graduate standing (3H, 3C)

**Credit Hours:** 3

**Laboratory Time:** Online

**Locations:** NA

**Instructors:**

Alan D. Ealy, PhD, Associate Professor

3430 Litton-Reaves

e-mail: [ealy@vt.edu](mailto:ealy@vt.edu)

Office Hours: By appointment. Please e-mail to schedule appointments.

Vitor R. Mercadante, PhD, Assistant Professor

364 Litton-Reaves

e-mail: [Mercadante@vt.edu](mailto:Mercadante@vt.edu)

Office Hours: By appointment. Please e-mail to schedule appointments.

**Learning Objectives:**

Having successfully completed this course, the student will be able to:

* + - 1. Compare and contrast the principles of female reproductive anatomy, ovarian physiology and follicular/luteal dynamics in cattle
* Construct plans for optimizing estrous detection and timed insemination for maximal fertility
* Debate the use of conventional and novel reproductive technologies, including sexed semen, embryo transfer, and pregnancy diagnosis on specific dairy and beef operations
* Break down the various nutrition, health, and environmental influences that affect fertility in cattle
* Integrate emerging technologies and management strategies into current reproductive management schemes for cattle

**Course Information:**

Course materials will available through Canvas.

Lecture and laboratory topics will include:

* Female anatomy and physiology
  + - * + Semen handling
        + Artificial insemination technique
        + Sexed semen
        + Diagnosing pregnancy
        + Estrous detection aides
        + Estrous synchronization and resynchronization strategies
        + Calving and dystocia
        + Transrectal ultrasonography for:

Ovarian assessments

Pregnancy diagnosis

* Embryo quality assessment
* Embryo transfer

**Supporting Text:**

Required: None

Recommended: Senger, P.L. (2012). *Pathways to Pregnancy and Parturition* (3rd ed.). Pullman, WA: Current Conceptions, Inc., 373.

**Grading:**

Topic: % Final Grade

Quizzes: 50

Mid-term exam: 25

Final Exam: 25

Quizzes: (50% of total grade)

* Quizzes will be administered for each topic module via Canvas.
* Students are not required to meet a weekly deadline for completing quizzes but they will be required to complete quizzes for the first 8 modules by the time the mid-term exam is given. They also will be required to complete quizzes for the remaining modules by the date of the final exam.
* Quizzes will be comprised primarily of short answer and essay-based questions.
* Students will be able to drop the lowest one quiz score.

Mid-term Exam: (25% of total grade)

* This exam will be open for completion for 5 days at the mid-point of the semester.
* The exam will focus on course information provided up to that point in the course.
* Questions used for quizzes may be included in this exam.
* The exam will be comprised of fill in the blank, short answer and essay questions.

Final Exam: (25% of total grade)

* This exam will be open for completion for 5 days at the end of the semester.
* The exam will focus primarily on course information provided after the mid-term exam. However, information from the entire course may be needed to properly answer questions.
* Questions used for quizzes may be included in this exam.
* The exam will be comprised of fill in the blank, short answer and essay questions.

Make-up quizzes and exams:

* Make-ups will be available to students ONLY with proper documentation of absence and ONLY when it will not be possible to complete the on-line quiz at the scheduled testing time.
* Plagiarism will result in no credit on this assignment, and a zero for the quiz grade.

**Grading Scale (based on final grade percentage):**

A 93-100%

A- 90-92%

B+ 87-89%

B 83-86%

B- 80-82%

C+ 77-79%

C 73-76%

C- 70-72%

D+ 67-69%

D 63-66%

D- 60-62%

F -059%

**Cell Phones:** Cell phones are not to ring or be used during the class period.

**Special Needs:** Any student who feels that he/she may need an accommodation because of a disability (learning disability, ADD, psychological, physical, etc.) is encouraged to make an appointment with the instructor as soon as possible.

**Honor Code:** The Virginia Tech Honor Code will be enforced in this class. The Virginia Tech honor pledge is as follows: "As a Hokie, I will conduct myself with honor and integrity at all times, I will not lie, cheat, or steal, nor will I accept the actions of those who do.”

Students enrolled in this course are responsible for abiding by the Honor Code. A student who has doubts about how the Honor Code apples to any assignment is responsible for obtaining specific guidance from the course instructor before submitting the assignment for evaluation. Ignorance of the rules does not exclude any member of the University community from the requirements and expectations of the Honor Code.

As stated in Article I: The Honor Code is the University policy, which expressly forbids the following academic violations:

Cheating -- Cheating includes the actual giving or receiving of any unauthorized aid or assistance or the actual giving or receiving of any unfair advantage on any form of academic work, or attempts thereof.

Plagiarism -- Plagiarism includes the copying of the language, structure, programming, computer code, ideas, and/or thoughts of another and passing off the same as one's own original work, or attempts thereof.

Falsification -- Falsification includes the statement of any untruth, either verbally or in writing, with respect to any circumstances relevant to one's academic work, or attempts thereof. Such acts include, but are not limited to, the forgery of official signatures; tampering with official records; fraudulently adding, deleting, or manipulating information on academic work, or fraudulently changing an examination or other academic work after the testing period or due date of the assignment.

**Module Topics**

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| **Module:** | **Topic:** |
| 1 | General features of reproductive anatomy and physiology in cattle |
| 2 | Physiological factors mediating fertility |
| 3 | Conventional bovine reproductive technologies |
| 4 | Preparing the cow for breeding |
| 5 | Breeding alternatives |
| 6 | Estrous detection and induction schemes |
| 7 | Timed insemination schemes: The basics |
| 8 | Timed insemination schemes: Specific schemes |
| 9 | Semen sexing and embryo transfer technologies |
| 10 | Pregnancy diagnosis schemes |
| 11 | Cow health concerns with reproductive performance |
| 12 | Cow nutrition concerns with reproductive performance |
| 13 | Heat stress and environmental concerns with reproductive performance |
| 14 | Reproductive diseases and their prevention |
| 15 | The future of bovine reproduction |