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| **1** | **Course title** | Reproduction and Artificial Insemination |
| **2** | **Course number** | 0602451 |
| **3** | **Credit hours (theory, practical)** | 3 |
| **Contact hours (theory, practical)** | (2,1) |
| **4** | **Prerequisites/corequisites** | Dairy Production (602215) |
| **5** | **Program title** | B.Sc. Animal Production |
| **6** | **Program code** |  |
| **7** | **Awarding institution**  | University of Jordan  |
| **8** | **School** | Agriculture |
| **9** | **Department** | Animal Production |
| **10** | **Level of course**  | 3rd – 4th Year  |
| **11** | **Year of study and semester (s)** | 2nd semester |
| **12** | **Final Qualification** | Passing grade |
| **13** | **Other department (s) involved in teaching the course** | None |
| **14** | **Language of Instruction** | English  |
| **15** | **Date of production/revision** | 20/2/2021 |

**16. Course Coordinator:**

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| **Dr. Mohamed Abedal-Majed****Office numbers**: 127**Office hours:** Sunday, Tuesday, and Thursday at 9:30-10:30 and 12:30-1:30 (If these times not working with you, please ask/email for weekly availability) **Email address:** m.ayoub@ju.edu.jo |

**17. Other instructors:**

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| Office numbers, office hours, phone numbers, and email addresses should be listed. |

**18. Course Description:**

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| This course concentrates on the importance of reproductive processes and techniques in farm animal's management through clarification and discussion of reproductive system in both female and male, estrous cycle, fertilization, gestation and parturition. In addition, the course give high attention for the modern biotechnologies related to reproduction such as semen collection and preservation, artificial insemination (AI), estrus and ovulation synchronization programs, multiple ovulation and embryo transfer (MOET) and in vitro fertilization (IVF).  |

**19. Course aims and outcomes:**

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| A- Aims:The General objective of this course is to establish the basic knowledge of reproductive terms and processes of farm animals and to boost the students with the prerequisite information to be able for managing and evaluating the reproductive status of farm animals.B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to  |
| A-Knowledge and UnderstandingA1. Student should have the scientific knowledge regarding the basic concepts and subjects of reproduction and reproductive biotechnologies in farm animals.**A2.** Student should be capable to combine between all subjects regarding the reproductive processes in order to give proper decisions.**A3.** Student should understand how to apply the modern reproductive biotechnologies in efficient management of farm animals in order to obtain the most possible fertility outcomes.**A4.** Student should expect the reproductive problems or imbalances that may occur in a farm to be ready to solve it. |
| B- Intellectual Analytical and Cognitive Skills**B1.**The student's ability to distinguish and analyze the effects of reproductive imbalances on the farm animal's fertility and productivity.**B2.** The capability of student to apply the modern reproductive biotechnologies on farm animals in order to distinguish its beneficial effects on farm animal's fertility and productivity. |
| C- Subject Specific Skills**C1.** Preparing scientific reports on various topics related to reproductive management and biotechnologies of farm animals based on different resources including scientific papers in refereed journals.**C2.** Applying the topics of the course especially those about reproductive biotechnologies in the laboratory and field.**C3.** Applying skills gained through the course topics theoretically and practically and scientific reports in the field training courses. |
| **D1.** The student has the skill to manage and improve the reproductive status of farm animals depending on the acquired knowledge and skills in this course.**D2.** The student uses all his energies with the acquired skills and knowledge in this course to improve the level of knowledge and skills of others especially farmers. |

**20. Topic Outline and Schedule:**

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| Topic | Week | **Assignments** | **Reference**  | Achieved ILOs |
| **Introduction and objectives*** Lifetime sequence of reproductive events
* Sex cell
* Genetic improvement of cattle
* The role of Artificial Insemination
* Advantages of Artificial Insemination
* Sex determination and sex semen
 | **(**1st week**)** | Assigned video as posted on Moodle | * + Chapter 1 and 13, Bearden and Fuquay, Applied Animal Reproduction, 2004.
	+ Animal reproduction and reproductive biotechnologies internet sites.
 | A1, A2, A3, D2 |
| **The Reproductive System of the Cow/ewe/mare/hen*** Origin and development
* The Ovaries
* Tubular genitalia
 | **(**2nd +3rd week**)** | Assigned video/HW as posted on Moodle | * + Chapter 2, Bearden and Fuquay, Applied Animal Reproduction, 2004.
 | A1, A2 |
| **The Estrous Cycle*** Hormones that regulate estrous cycle
* Puberty and first estrus
* Periods of the estrous cycle
* Ovarian and tubular changes
* Artificial control of the estrous cycle
 | **(**4th +5th week**)** | Assigned Case study as posted on Moodle | * + Chapter 4, 5 and 18, Bearden and Fuquay, Applied Animal Reproduction, 2004.
 | A1, A2, A3, D2 |
| **Ovulation and Fertilization*** Ovigenesis
* Ovulation
* Fertilization
* *In vitro* fertilization (IVF)
* Superovulation and embryo transfer (ET)
 | **(**5th +6th week**)** |  | * + Chapter 7 and 18, Bearden and Fuquay, Applied Animal Reproduction, 2004.
	+ Animal reproduction and reproductive biotechnologies internet sites
 | A1, A2, A3, C1, C2, C3, D1, D2 |
| **Gestation*** Preparation of the reproductive tract
* Changes in the uterus
* The hormones in pregnancy
* Diagnosis of pregnancy
 | **(**7th week**)** |  | * + Chapter 8 and 20, Bearden and Fuquay, Applied Animal Reproduction, 2004.
	+ Animal reproduction and reproductive biotechnologies internet sites.
 | A1, A2, A3, A4, B1 |
| **Parturition*** Initiation of parturition
* Signs of approaching parturition
* Normal and abnormal presentation of the fetus
* Stages of parturition
 | **(**8th week**)** |  | * + Chapter 9, Bearden and Fuquay, Applied Animal Reproduction, 2004.
	+ Animal reproduction and reproductive biotechnologies internet sites.
 | A1, A2, A4,D1, D2 |
| **The reproductive tract of the bull, and ram*** The scrotum
* The testes
* The duct system
* The accessory sex glands
* The penis
 | **(**9th + 10th week**)** |  | * + Chapter 3, Bearden and Fuquay, Applied Animal Reproduction, 2004.
	+ Animal reproduction and reproductive biotechnologies internet sites.
 | A1, A2 |
| **The formation and ejaculation of spermatozoa*** Spermatogenesis
* Spermiogenesis
* Endocrine control of spermatogenesis
* Transport of spermatozoa in the ducts
* Ejaculation
 | **(**11th week**)** |  | * + Chapter 4 and 6, Bearden and Fuquay, Applied Animal Reproduction, 2004.
 | A1, A2 |
| **Semen and its components*** Semen formation
* Composition of sperm cell
* Morphology of spermatozoa
 | **(**12th week**)** |  | * + Chapter 12, Bearden and Fuquay, Applied Animal Reproduction, 2004.
 | A1, A2, A4 |
| **Physiology of spermatozoa in the female reproductive tract*** Site of semen deposition
* Transport of spermatozoa in the female reproductive tract
* Interaction between semen and female reproductive tract
 | **(**13th week**)** |  | * + Chapter 6 and 7, Bearden and Fuquay, Applied Animal Reproduction, 2004.
	+ Animal reproduction and reproductive biotechnologies internet sites.
 | A1, A2 |
| **Semen collection and evaluation*** Methods of semen collection
* Gross examination of the semen
* Semen quality
* Morphology of sperm cells
* Concentration of sperm cells
* Motility of spermatozoa
* Staining of live and dead spermatozoa
 | **(**13th + 14th week**)** |  | * + Chapter 14 and 15, Bearden and Fuquay, Applied Animal Reproduction, 2004.
	+ Animal reproduction and reproductive biotechnologies internet sites.
 | A1, A2, A3, A4, B1, B2, C2 |
| **Extenders and extension of semen*** Principles of sperm preservation
* Extenders for refrigerated semen
* Extenders for storage at ambient temperature
* Extension procedures and rates
 | **(**14th week**)** |  | * + Chapter 16, Bearden and Fuquay, Applied Animal Reproduction, 2004.
	+ Animal reproduction and reproductive biotechnologies internet sites.
 | A1, A2, A3, B2, C2 |
| **Freezing spermatozoa*** Aspects of freezing and thawing
* Extenders for freezing
* Variation in semen quality
 | **(**15th week**)** |  | * + Chapter 16, Bearden and Fuquay, Applied Animal Reproduction, 2004.
 | A1, A2, A3, A4, B2, C2 |
| **Insemination of the cow*** Techniques of insemination
* Site of insemination
* Optimum time for insemination
 | **(**15th week**)** |  | * + Chapter 17, Bearden and Fuquay, Applied Animal Reproduction, 2004.
	+ Animal reproduction and reproductive biotechnologies internet sites.
 | A1, A2, A3, A4, B2, C2, C3, D1, D2 |
| **Conception rate and factors affecting it*** Sterility and reduced fertility
* Measures of reproductive efficiency
* Physiological causes of reduced fertility
 | **(**16th week**)** |  | * + Chapter 19, 21 and 22, Bearden and Fuquay, Applied Animal Reproduction, 2004.
	+ Animal reproduction and reproductive biotechnologies internet sites.
 | A1, A2, A4, B1, C1, D1, D2 |

* Teaching methods include: Synchronous online lecturing/meeting; Evaluation methods include: Homework, Quiz, Exam, assignments…etc

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| **Date** | **Subject**  | **Place**  |
| 28-2-2021 |

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| Estrus  |

 | Online |
| 7-3-2021 | Female Reproductive Tract Anatomy Estrus and Estrus Detection Aids | Lab |
| 14-3-2021 | -Artificial Insemination in Dairy Cows -Sire Selection in Dairy Farms  | Lab |
| 21-3-2021 | -Pregnancy Diagnosis using the US-Embryo Transfer Technology in Dairy Cows  | Lab |
| 28-3-2021 | Artificial Control of Estrous Cycle  | Online |
| 4-4-2021 | Key Performance Indicators of Fertility  | Lab |
| 11-4-2021 | Male Reproductive Tract Anatomy  | Lab |
| 18-4-2021 | Semen Evaluation in Farm Animals  | Lab |
| 25-4-2021 | Processing of Bull Semen  | Lab |
| 2-5-2021 | Semen Collection  | Online |

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**21. Teaching Methods and Assignments:**

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| Development of ILOs is promoted through the following teaching and learning methods:

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| **ILO/s** | **Learning Methods** |
| **A. Knowledge and Understanding** **(A1-A4)** | Lectures, lab works and discussions  |
| **B. Intellectual Analytical and Cognitive Skills****(B1-B2)** | Lectures, lab works, discussions and laboratory trainings. |
| **C. Subject Specific Skills****(C1-C3)** | Lectures, discussions, and laboratory trainings.  |
| **D.Transferable Key Skills****(D1-D2)**  | Lectures, lab works, Exam , quizzes and laboratory trainings |

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**22. Evaluation Methods and Course Requirements:**

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| Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

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| **ILO/s** | **Evaluation Methods** |
| **A. Knowledge and Understanding** **(A1-A4)** | Exam, HW, case study and quizzes |
| **B. Intellectual Analytical and Cognitive Skills****(B1-B2)** | Exam, HW, and quizzes |
| **C. Subject Specific Skills****(C1-C3)** | Exam, HW, and quizzes. |
| **D.Transferable Key Skills****(D1-D2)**  | Exam, HW, case study and quizzes. |

Students should have a computer, and internet connection. Students should activate their JU accounts on the Microsoft teams |

**23. Course Policies:**

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| A- Attendance policies:Each student is expected to take their own notes (part from the exam) and to attend class. Absence from lectures shall not exceed 15%. Students are expected to attend all lectures but if a student is absent from class, it is their responsibility to get the material that was missed. You must get any handouts or notes from your classmates.B- Absences from exams and submitting assignments on time:Exams will consist of **multiple choice, true/false, matching, and/or fill-in-the-blank questions**. Exams will cover all material presented for each section. Make-up exams will only be provided for students with an excused absence AND supporting documentation. The questions and/or format of any make-up exam may differ from that of the original exam. Scheduling of a make-up exam will vary depending upon available dates/times but **MUST** occur before the next-scheduled exam date.C- Health and safety procedures:Students should follow the Jordanian government guide. D- Honesty policy regarding cheating, plagiarism, misbehavior:Academic dishonesty will NOT be tolerated. This includes cheating, fabrication or falsification, plagiarism, abuse of academic materials, complicity in academic dishonesty, falsifying grade reports, and misrepresentation to avoid academic work. For this course, evidence of any form of academic dishonesty will result in all involved students receiving zero points for any associated exam, or assignmentE- Grading policy:

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| Exams | 35 % |
| Weekly Assignments (Selected video+ Case scenarios or report + Homework Posted on Moodle weekly) | 15 % |
| Final Exam | 50%  |
| Total Points | 100% |

F- Available university services that support achievement in the course:Students account on E-learning, and Microsoft teams  |

**24. Required equipment: (** Facilities, Tools, Labs, Training….)

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| We need reproductive tract to allow students to apply the AI |

**25. References:**

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| A- Main Reference * Joe Bearden, H and Fuquay, J.W. Applied Animal Reproduction. Fourth Edition. Asimon and Schuster Company. New Jersey. 2004.

B- Recommended books, materials and media:* Barth, A.D and OKO, R. J. Abnormal Morphology of Bovine Spermatozoa Insemination First Edition. Iowa State University. 1989.
* Hafez, B and Hafez, E.S.E. Reproduction in Farm Animals. 7th Edition. Lea and Febiger, Phyladelphia. 2000.
* Senger PL. Pathways to pregnancy and parturition. 1st edition. Pullman, WA: Current Conceptions, Inc.; 2003.
* Ball PJH, and Peters AR. Reproduction in Cattle. Third Edition. Blackwell Publishing; 2004.
 |

**26. Additional information:**

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| **Study Questions** *(Extra Credit)*: Extra credit points can be earned by submitting quiz/exam-type questions related to the lecture material, including the associated answer. Questions will be sent to E-learning to serve as a study aid for all students. ***Questions are due at 10:30 AM on Sunday.*** Each question needs to be written for the course content that has been presented since the most recent quiz/exam content. The instructor will notify the class each week (in class and/or via email through E-learning) of the specific content that must be addressed. Approved question types include multiple choice. Students can earn up to 0.5 bonus point each week in which a question is submitted. No points will be awarded for late submissions. Students that have an excused absence covering multiple days in a week may contact the instructor to discuss possible accommodations. **At the end, every student can earn 2 points extra.****Guidelines for Answering** **Short Answer**Read the questions CAREFULLY! Ask yourself, what are they specifically asking? Overall, give a specific, clear, to the point explanation*How to do that:*1. Get right to the point. Don’t rewrite the question!
2. Answer in specific terms, not in general. A good way to do this is to use examples (e.g. from the readings or class discussions).
3. When using examples, make sure that it is clear why you are using that particular example to answer the question. Make sure that all examples are scientifically sound and are explained using appropriate scientific terms.
4. When making general statements, such as “with proper information, parks can be greatly improved,” be sure to follow them up with answers to questions such as who, what, why, and how.
5. Avoid making all-encompassing statements, such as using the words “all,” “every,” “no one,” etc…unless they are true.
6. Be prepared to defend every statement you make with recognized facts. For example, if you make a statement, follow it up with information from the text, lecture notes, or other recognized authority or a specific example

**True and False**True or False—If it is False then change the sentence to make it true**Multiple Choice**Note that multiple choice questions can actually be very difficult and are in this course!*Studying for a Multiple Choice Test:*1. Make sure that you identify and understand thoroughly everything that your instructor emphasized in class.
2. Pay particular attention to fundamental terms and concepts that describe important events or features, or that tie related ideas and observations together. These are the items that most commonly appear on multiple choice exams.
3. As you study your class notes and your assigned readings, make lists and tables. Concentrate on understanding multi-step processes, and on ideas, events, or objects that form natural sequences or groupings. Look for similarities and differences that might be used to distinguish correct choices from distracters on an exam.
4. If your textbook highlights new vocabulary or key definitions, be sure that you understand them. Sometimes new words and concepts are collected at the end of a chapter. Check to be sure that you have not left any out by mistake.
5. Brainstorm possible questions with several other students who are also taking the course. Practice on sample questions provided at the ends of each chapter in your book

*Answering Multiple Choice Questions*: The most important thing to remember when answering multiple choice questions is that you are looking for the ***BEST ANSWER, NOT ONLY A CORRECT ANSWER***, and not one which must be true all of the time, in all cases, and without exception. There are many strategies for maximizing your success on multiple choice exams. The best way to improve your chances, of course, is to study carefully before the exam. There is no good substitute for knowing the right answer. Even a well-prepared student can make silly mistakes on a multiple choice exam, however, or can fall prey to distracters that look very similar to the correct answer.  *Tips*1. Always cover up the possible responses with a piece of paper or with your hand while you read the *stem*, or body of the question. Try to anticipate the correct response before you are distracted by seeing the options that your instructor has provided. Then, uncover the responses*.*
2. If you see the response that you anticipated, circle it and then check to be sure that none of the other responses is better.
3. If you do not see a response that you expected, then consider some of the following strategies to eliminate responses that are probably wrong.

*None of these strategies is infallible. A smart instructor will avoid writing questions for which these strategies work, but you can always hope for a lapse of attention.* 1. Responses that use absolute words, such as "always" or "never" are less likely to be correct than ones that use conditional words like "usually" or "probably."
2. "Funny" responses are usually wrong.
3. "All of the above" is often a correct response. If you can verify that more than one of the other responses is probably correct, then choose "all of the above."
4. "None of the above" is usually an incorrect response, but this is less reliable than the "all of the above" rule. Be very careful not to be trapped by double negatives.
5. Look for grammatical clues. If the stem ends with the indefinite article "an," for example, then the correct response probably begins with a vowel.
6. The longest response is often the correct one, because the instructor tends to load it with qualifying adjectives or phrases.
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**Name of Course Coordinator**:Dr. Mohamed Abedal-Majed **Signature:** M.ayoub **Date:** 20-2-2021

Head of curriculum committee/Department: ----------------------------- Signature: ---------------------------

Head of Department: ------------------------------------------------------------ Signature: -----------------------

Head of curriculum committee/Faculty: ----------------------------------------- Signature: --------------------

Dean: --------------------------------------------------------- -Signature: -------------------------------------------