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| **1** | **Course title** | Environment and the Production of Farm Animals |
| **2** | **Course number** | 632713 |
| **3** | **Credit hours** | 3 |
| **Contact hours (theory, practical)** | (3,0) |
| **4** | **Prerequisites/corequisites** |  |
| **5** | **Program title** | MSc. in Animal Production / Thesis Track |
| **6** | **Program code** |  |
| **7** | **Awarding institution**  | The University of Jordan  |
| **8** | **School** | **Agriculture** |
| **9** | **Department** | **Animal Production** |
| **10** | **Level of course**  | **Graduate course** |
| **11** | **Year of study and semester (s)** | **Second semester 2020/2021** |
| **12** | **Final Qualification** |  |
| **13** | **Other department (s) involved in teaching the course** | **None** |
| **14** | **Language of Instruction** | **English**  |
| **15** | **Date of production/revision** | **February 2021** |

**16. Coordinator/ Lecturer:**

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| **Prof. Dr. Abdur-Rahman Al-Fataftah****Office numbers**: 031**Office hours:** Students can reach me via my email (a.fataftah@ju.edu.jo) to schedule a meeting. **Email address:** a.fataftah@ju.edu.jo |

**17 Other instructors:**

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| Name:Office number:Phone number:Emal: |

**18 Course Description:**

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| The goals of this course are to provide the students with an enough knowledge to define, understand, and manage the climatic change mainly heat stress, and to increase the scientific and practical skills of the students in order to successfully conduct research related to heat stress and its management and to write scientific in a professional way as well. |

**19. Course aims and outcomes:**

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| **A- Aims:**1. To let the students gain the required knowledge needed to better define and understand the climate change specially heat stress.
2. To familiarize the students with the effects of heat stress on blood bioenergetics, inflammatory biomarkers, and gut integrity.
3. Develop the students’ ability to review the literature, write in a scientific way, and orally present their work.

**B- Intended Learning Outcomes (ILOs):** Successful completion of the course should lead to the following outcomes:**A- Knowledge and Understanding: Student is expected to**A.1- Understanding the environmental factors that affect farm animals’ health, welfare, behavior and performance.A.2- Understanding the physiological, behavioral, and morphological, responses of farm animals to cope with changes in the environment.A.3- Knowledge of types of stress with emphasis on heat stress and its effects on farm animals’ productivity, health, well-being, and quality of products.A.4- Be aware of the various methods and strategies to alleviate effects of heat stress.A.5- Familiarize the students with the immune system responses under environmental stressors.A.6- Understand the interaction between the immune system, the central nervous system, and the endocrine system.  |

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|  **B. Intellectual, Analytical and Cognitive Skills: Student is expected to**B.1- The students should be able to identify and describe the environmental factors affecting farm animals’ performance and products quality. B.2- Be able to take necessary measures to avoid environmental stressors, and find solutions to reduce their effects in case it occurs.B.3- Be able to manage farm animals under various environmental conditions.B.4- Be able to analyze environmental data and its magnitude impacts and to provide the optimum environment needs for various classes and types of farm animals, namely cattle, sheep, goats, and poultry to achieve maximum production and profits.**C. Subject- Specific Skills: Student is expected to**C.1- The students will have sufficient skills, knowledge, techniques and methods to increase productivity and profitability of farm animals in hot climates.C.2- Be able to design and implement professionally scientific research in the field of applied animal-environment interaction.C.3- The students will be qualified to give recommendations and consultancy to farmers and others concerned on the impacts of environment on farm animals’ performance and how to manage it.C.4- The students’ presentation skills, scientific discussion and communication will be developed as well as their writing through reports and proposals. C.5- Will be able to explain the changes of the immune system under stress and its interaction with the other systems.**D. Transferable Key Skills: Student is expected to**D.1- The students should have enough skills to decrease the direct and indirect economic losses due to environmental stressors specially heat stress.D.2- Be able to efficiently manage farm animals organic and non-organic farms in hot climates.D.3- The students will have the necessary knowledge and skills to establish and prepare farm animals in different climates mainly in hot regions.D.4- Equipped with sufficient knowledge about the global warming effects on animal production, and the role of farm animals during this phenomena. |

**20. Topic Outline and Schedule:**

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| **Week** | **Lecture** | **Topic** | **Teaching Methods\*/platform** | **Evaluation Methods\*\*** | **References** |
| 1 | 23/2/2021 Tue | **Introduction** * Climate change
* Heat stress Weather conditions in Jordan
 | **Microsoft Teams, Moodle** | Exams, discussion, term-papers, and presentations | **Sejian et al., 2015**Collier et al., 2012 |
| 2 & 3 | 2/3/2021 Tue | **Farm animal responses, behavior and thermoregulation** | **Microsoft Teams, Moodle** | Exams, discussion, term-papers, and presentations | **Sejian et al., 2015**Collier et al., 2012 |
| 9/3/2021 Tue |
| 4 | 16/3/2021 Tue | **Effects of heat stress on livestock productivity.*** Milk
* Meat
* Eggs
 | **Microsoft Teams, Moodle** | Exams, discussion, term-papers, and presentations | **Sejian et al., 2015**Collier et al., 2012 |
| 5 | 23/3/2021 Tue | **Effects of heat stress on livestock reproduction**  | **Microsoft Teams, Moodle** | Exams, discussion, term-papers, and presentations | **Sejian et al., 2015**Collier et al., 2012 |
| 6 | 30/3/2021 Tue | **Pathophysiology of heat stress.** * Blood bioenergetics
* Inflammatory biomarkers
* Hormonal changes
 | **Microsoft Teams, Moodle** | Exams, discussion, term-papers, and presentations | **Sejian et al., 2015**Collier et al., 2012 |
| 7 | 6/4/2021 Tue | **Morphological changes in the GIT under heat stress conditions.** * Tight junctions
* Measurements of intestinal permeability
* Endotoxin (LPS)
 | **Microsoft Teams, Moodle** | Exams, discussion, term-papers, and presentations | **Sejian et al., 2015**Collier et al., 2012 |
| 8 | 13/4/2021 Tue | **Immunological responses to heat stress.** | **Microsoft Teams, Moodle** | Exams, discussion, term-papers, and presentations | **Sejian et al., 2015**Collier et al., 2012 |
| 9 | 20/4/2021 Tue | **First Hour Exam** |  | Exams, discussion, term-papers, and presentations | **Sejian et al., 2015**Collier et al., 2012 |
| 10 | 27/4/2021 Tue | **Neuroendocrine responses to stress** | **Microsoft Teams, Moodle** | Exams, discussion, term-papers, and presentations | **Sejian et al., 2015**Collier et al., 2012 |
| 11 | 4/5/2021 Tue | **Nutrient metabolism and partitioning in heat stress*** Carbohydrates
* Proteins
* Fats
 | **Microsoft Teams, Moodle** | Exams, discussion, term-papers, and presentations | **Sejian et al., 2015**Collier et al., 2012 |
| 12, 13, 14, 15 | 11/5/2021 Tue | **Management of heat stress*** **Building design**
* **Genetics**
* **Nutritional modification and feed additives.**
 | **Microsoft Teams, Moodle** | Exams, discussion, term-papers, and presentations | **Sejian et al., 2015**Collier et al., 2012 |
| 18/5/2021 Tue |
| 25/5/2021 Tue |
| 1/6/2021 Tue |
| 16 |  | **Final Exam** |  |  |  |

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

**21 Evaluation Methods:**

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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** | **Learning Methods** | **Evaluation Methods** |
| **A**. Knowledge and Understanding  (**A1-A5**) | Online Lectures and Discussions | Exams, discussion, term-papers, and presentations |
| **B**. Intellectual Analytical and Cognitive Skills  (**B1-B3**) | Online Lectures and Discussions | Exams, discussion, term-papers, and presentations |
| **C**. Subject Specific Skills  (**C1-C4**) | Online Lectures and Discussions | Exams, discussion, term-papers, and presentations |
| **D. T**ransferable Key Skills  (**D1-D7**) | Online Assignments, Lectures and Discussions. | Exams, discussion, term-papers, and presentations |

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**22 Course Requirements (e.g: students should have a computer, internet connection, webcam, account on a specific software/platform…etc):**

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

**23 Course Policies:**

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| A- Attendance policies: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. B- Absences from exams and submitting assignments on time:Make-up exams will be given to students with an acceptable excuses-- all effort must be made to contact the instructor if a student will not make an exam time.  Exams must be made up within 3 days of the scheduled exam. An acceptable excuse will be reviewed on a case by case basis. Students that do not show up for a test without previous discussion with the instructor will receive a zero for that test- the instructor will not try to contact the student—it is the students job to know when the exams are and show up for the exams and also reschedule with the instructor prior to the exam if necessary.  Students that reschedule a test that have received approval from the instructor and do not appear for the rescheduled time will receive a zero.  Extreme cases will be reviewed on a case by case basis.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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| Mid-exam (To be determined) | 30% |
| Oral presentations, participation, reports | 30% |
| Final Exam | 40%  |
| 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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**25 References:**

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| **A- Required book(s), assigned reading and audio-visuals:****Sejian**, V., J. **Gaughan**, L.  **Baumgard**, and C. **Prasad**. 2015. Climate Change Impact on Livestock: Adaptation and Mitigation. Springer India. IndiaCollier, R. J., and J. L. Collier. 2012. Environmental Physiology of Livestock. Wiley-Blackwell. USA**Sejian**, V., S. M. K. **Naqvi**, T. **Ezeji**, J. **Lakritz**, and R. **Lal**. 2012. Environmental Stress and Amelioration in Livestock Production. Springer-Verlag Berlin Heidelberg. Germany**B- Recommended books, materials and media:*** Recently published papers
* Poultry and livestock internet websites
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**25 Additional information:**

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| None |

Name of Course Coordinator: -----------------------------------Signature: ------------------ Date: ------------

Head of Curriculum Committee/Department: ---------------------------- Signature: --------------------------

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

Head of Curriculum Committee/Faculty: ---------------------------------------- Signature: -------------------

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