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| Study Plan Ph.D. Program | Form Number | EXC-01-03-05A |
| | Issue Number and Date | 2963/2022/24/3/2 5/12/2022 |
| | Number and Date of Revision or Modification | 2/(10/12/2023) |
| | Deans Council Approval Decision Number | 50/2023 |
| | The Date of the Deans Council Approval Decision | 26/12/2023 |
| | Number of Pages | 8 |

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| 1. | School | Agriculture |
| 2. | Department | Animal Production |
| 3. | Program title (Arabic) | دكتوراه في الإنتاج الحيواني |
| 4. | Program title (English) | PhD in Animal Production |
| 5. | Track | Thesis Track |

| | Specialization # | Degree | Dep # | Faculty # | Year | Track |
|-------------|------------------|--------|-------|-----------|------|--------------|
| Plan Number | 02 | 9 | 02 | 06 | 2024 | Dissertation |

First: General Rules & Conditions:

1. This plan conforms to valid regulations of the programs of graduate studies.

2. Specialties of Admission:

- The First Priority: MSc in Animal Production, MSc in Poultry, MSc in Aquaculture
- The Second Priority: MSc in Agricultural Sciences, MSc in Veterinary Medicine, MSc in Biology.
- The Third Priority: MSc in Biotechnologies, MSc in Medical Analysis, MSc in Genetic Engineering.

Second: Special Conditions:

1. None.

Third: Study Plan: Studying (54) Credit Hours as following:

1. Obligatory Courses (21) credit hours:

| Course Number | Course Name | Credit Hours | Theory | Practice | Pre-requisite |
|---------------|--|--------------|--------|----------|---------------|
| 0601930 | Experimental Design and Data Analysis-Advanced | 3 | 3 | - | - |
| 0602901 | Biotechnology in Animal Production | 3 | 3 | - | - |
| 0602951 | Endocrinology | 3 | 3 | - | - |
| 0602981 | Nutritional Biochemistry | 3 | 3 | - | - |
| 0602982 | Nutrient Metabolism in Farm Animals | 3 | 3 | - | - |
| 0602920 | Advanced Animal Physiology | 3 | 3 | - | - |
| 0602921 | Contemporary Topics in Animal Production | 3 | 3 | - | - |

2. Elective Courses: Studying (15) Credit hours from the following:

| Course Number | Course Name | Credit Hours | Theory | Practice | Pre-requisite |
|---------------|--|--------------|--------|----------|---------------|
| 0602913 | Organic Animal Production. | 3 | 3 | - | - |
| 0602914 | Incubation & Hatchery Management | 3 | 3 | - | - |
| 0602915 | Integrated Management of Poultry Enterprises | 3 | 3 | - | - |
| 0602916 | Growth & Development of Farm Animals | 3 | 3 | - | - |
| 0602952 | Poultry Reproduction | 3 | 3 | - | - |
| 0602961 | Recent advances in Genetic Improvements | 3 | 3 | - | - |
| 0602926 | Feed evaluation | 3 | 3 | - | - |
| 0602922 | Stress and Welfare in Farm Animals | 3 | 3 | - | - |
| 0602923 | Biosecurity and Zoonotic Disease | 3 | 3 | - | - |
| 0602924 | Ethics in Animal Research | 3 | 3 | - | - |
| 0602925 | Feed Manufacturing | 3 | 3 | - | - |

2. Pass the Comprehensive exam (0602998).

3. Dissertation: (18) Credit hours (0602999).

Course Description

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| Course Number (0601930) | Course Name: Experimental Design and Data Analysis-Advanced | (3 Credit Hours) |
| Prerequisite:- | | |
| This course covers comparison of statistical designs and models and their analyses such as complete and incomplete block design, confounding design, repeated measure design, fractional factorial designs, response surface design, and other designs of interest to students. This course also covers computer applications. | | |
| Course Number (0602901) | Course Name: Biotechnology in Animal Production | (3 Credit Hours) |
| Prerequisite:- | | |
| Students will learn the details on animal biotechnology i.e. the applications of tools of molecular biology and biotechnology for the improved production and protection of animals, animal products. The course material will include the definitions of biotechnology, animal biotechnology and various branches of animal biotechnology have been explained, biotechnological techniques like embryo transfer, in vitro fertilization, transgenic animal, and animal cloning have been explained. Active learning methodology will be applied. | | |
| Course Number (0602951) | Course Name: Endocrinology | (3 Credit Hours) |
| Prerequisite:- | | |
| This course provides PhD students with an in-depth understanding of the function and structure of the endocrine glands, with a focus on the mechanisms of hormone action, regulation, and their impact on various body functions. The course also covers endocrine-related diseases and disorders, modern research methods, and clinical applications of endocrinology. After a general introduction, the lectures will focus on each gland, the hormones it produces, and how its function can be integrated at the systemic, cellular, and molecular levels. Active learning methodology will be applied. | | |
| Course Number (0602981) | Course Name: Nutritional Biochemistry | (3 Credit Hours) |
| Prerequisite:- | | |
| Students will learn about the energy of metabolism, the structure and metabolism of proteins, carbohydrates and lipids and the integration of metabolic systems, enzymes, kinetics and mechanism | | |

of action. Also discuss bioenergetics, biochemistry of extracellular and intracellular communication and homeostasis. Active learning methodology will be applied.

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| Course Number (0602982) | Course Name: Nutrient Metabolism in Farm Animals | (3 Credit Hours) |
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Prerequisite:-

Students will learn the basic concepts and recent developments in nutrients metabolism, with a focus on the biochemical, physiological and nutritional implications as well as hormonal regulation. This course also emphasis nutritional aspects comparison between different types of farm animals, determine their feed requirements, discuss the energy and digestible protein and the operations of construction and demolition within the body. Furthermore, advanced understanding the metabolism of proteins and energy and other feed ingredients. Active learning methodology will be applied.

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| Course Number (0602920) | Course Name: Advanced Animal Physiology | (3 Credit Hours) |
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Prerequisite:-

This advanced course provides a comprehensive study of the detailed anatomy and function of animal organs and systems, such as the digestive, reproductive, respiratory, nervous, and muscular systems, with a focus on their mechanisms of action, regulation, and impact on productivity and reproduction. The course examines these systems at the molecular, cellular, and whole-body levels. The course aims to provide students with a strong foundation for future studies by focusing on the cellular and molecular functions essential for body functions such as movement, communication, gas exchange, and maintaining a stable internal environment.

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| Course Number (0602921) | Course Name: Contemporary Topics in Animal Production | (3 Credit Hours) |
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Prerequisite:-

Enables students to develop knowledge and skills related to the sustainable use of resources, and the production. generate proposals to address animal production challenges. collect evidence from students' own or others' investigations, evaluate solutions and processes, and communicate findings. Investigate issues, needs and opportunities related to animal production challenges. This course is designed to give the graduate students an opportunity to explore topics of current interest in animal production. Students may select topics in line with their intended research and prepare presentations for faculty. Students will receive feedback from the faculty members attending the

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| seminar. Active learning methodology will be applied. | | |
| Course Number (0602913) | Course Name: Organic Animal Production | (3 Credit Hours) |
| Prerequisite:- | | |
| Students will learn the historical development of organic livestock farming; differences between organic and other forms of animal production; principles and characteristics of organic animal production; management systems: conversion period, breeding, nutrition and feeding, housing, transport and slaughtering; nutritional value of organic meat and potential human health response; and challenges to organic livestock industry. Active learning methodology will be applied. | | |
| Course Number (0602914) | Course Name: Incubation & Hatchery Management | (3 Credit Hours) |
| Prerequisite:- | | |
| Students will learn the embryonic development of bird eggs under commercial and experimental incubation conditions; developmental processes are evaluated relative to various environment and genetic parameters; students will learn factors that affect hatchability of flocks, types of incubation, and hatchery management. Active learning methodology will be applied. | | |
| Course Number (0602915) | Course Name: Integrated Management of Poultry Enterprises | (3 Credit Hours) |
| Prerequisite:- | | |
| Students will study the modern systems of integrated management of poultry enterprises at large scales. There will be a focus on different poultry production systems and their integration into other agricultural operations. House designs, construction materials, and proposed layouts for future systems will be discussed. The full integration of different poultry management practices in the whole production cycle with special emphasis on the advanced technology will be discussed. Active learning methodology will be applied. | | |
| Course Number (0602916) | Course Name: Growth & Development of Farm Animals | (3 Credit Hours) |
| Prerequisite:- | | |
| Students will learn the growth and development of livestock animals with emphasis on the | | |

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| <p>prenatal and postnatal differentiation and development of skeletal muscle, bone, and adipose tissue; organ growth discussed, course discusses as well as classical concepts of animal growth along with the genetic, hormonal, and nutritional factors that affect growth. Active learning methodology will be applied.</p> | | |
| Course Number (0602952) | Course Name: Poultry Reproduction | (3 Credit Hours) |
| Prerequisite:- | | |
| <p>Students will gain the the knowledge of reproductive physiology of poultry and its relation to nutritional and lighting management programs directed towards maximizing reproductive efficiency; discuss topics such as semen collection and evaluation, artificial insemination of poultry, and fertility and hatchability in breeding flocks. Active learning methodology will be applied.</p> | | |
| Course Number (0602961) | Course Name: Recent advances in Genetic Improvements | (3 Credit Hours) |
| Prerequisite:- | | |
| <p>Recent advances in quantitative genetics related to genetic theory of breeding problems; genetic variance components, paternal and maternal effect, genetic and environmental interaction and selection index; designing selection experiments.</p> | | |
| Course Number (0602926) | Course Name: Feed evaluation | (3 Credit Hours) |
| Prerequisite:- | | |
| <p>This course offers a comprehensive overview of the complex dynamics in animal nutrition, moving beyond a basic reliance on chemical analyses. It includes a detailed study of the interrelated factors that influence how animals benefit from feeds. Students will learn through modern techniques and advanced laboratory methods to analyse feeds, focusing on both direct and indirect methods for measuring digestive efficiency. The course addresses major challenges, such as the impact of toxic or deleterious materials found in some feed sources or resulting from improper storage or the processing of agricultural by-products, which can affect the nutritional value of feeds. The goal of the course is to equip students with the analytical and practical skills necessary to identify and effectively tackle these issues, preparing them to make a significant impact in the field of animal nutrition and ensure the quality of feed.</p> | | |
| Course Number (0602922) | Course Name: Stress and Welfare in Farm Animals | (3 Credit Hours) |

Prerequisite:-

The purpose of this course is to help students develop a deeper understanding of stress, stress and stress axes, neural, physiological and behavioural responses to stress its impact on behaviour and health, and evidence-based strategies and interventions changing how we relate to stress in order to respond more effectively to stress. Course topics include the nature of stress, the neuro-physiology of stress response, and various psychological and relaxation strategies for reducing or preventing stress. Strategies for increasing animal welfare.

Course Number (0602923)**Course Name:** Biosecurity and Zoonotic Disease**(3 Credit Hours)****Prerequisite:-**

Students will study the effective strategies for health management of livestock animals, disease prevention and control through application of biosecurity programs that based on knowing the nature of threat (causes of diseases), risk assessment of importing animals from different resources, application of epidemiological principles that support disease monitoring with the using of isolation, quarantine and eradication principles, designing of an effective biosecurity programs for all sectors of animal production, evaluation of the biological, economic and social impact for the success or failure of biosecurity programs, and the using of modern biotechnologies in animal health management. By the end of this course, the student will acquire the knowledge and skills needed to protect himself as well as maintain human health through prevention and control of zoonotic diseases transmitted from animals or animal products to man. Active learning methodology will be applied.

Course Number (0602924)**Course Name:** Ethics in Animal Research**(3 Credit Hours)****Prerequisite:-**

This course is designed to introduce a number of ethics principles that apply to research on farm animals and to introduce the concepts of animal ethics inside the context of ethical and humane use of animals in research, both in the laboratory and in their natural environment. These include informed consent from participants, ensuring their right to withdraw, protecting their welfare and evaluating the costs and benefits of the study. Students also learn about the humane and ethical treatment of animals in research; how it is strictly governed and monitored by legislation, regulations and guidelines, as well as care and ethics committees. Access to the rules and regulations of the European Union and the United States of America regarding animal experiments.

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| Course Number (0602925) | Course Name: Feed Manufacturing | (3 Credit Hours) |
| Prerequisite:- | | |
| <p>It gives students information on the effect of feed processing on animal nutrition and also gives the opportunity to increase their knowledge about feed manufacturing including grain storage, particle size reduction, batching and mixing, extrusion, drying and cooling, pelleting, cooling and crumbling, The course also covers topics on plant design, plant management, materials handling and storage, manufacturing operations, specialty feeds, feed and ingredient handling, feed plant design, energy conservation in the feed mill, steam generation systems, computer applications, quality assurance, sanitation and pest management, safety, energy requirements, and environmental concerns as well as molds and mycotoxins.</p> | | |