Form: Course Syllabus	Form Number	EXC-01-02-02A
	Issue Number and Date	2/3/24/2022/2963 05/12/2022
	Number and Date of Revision or Modification	
	Deans Council Approval Decision Number	2/3/24/2023
	The Date of the Deans Council Approval Decision	23/01/2023
	Number of Pages	06

1.	Course Title	Minerals and Vitamins in Animal Nutrition
2.	Course Number	632792
3.	Credit Hours (Theory, Practical)	3 Credits Theoretical
	Contact Hours (Theory, Practical)	(3,0)
4.	Prerequisites/ Corequisites	None
5.	Program Title	Animal Production
6.	Program Code	602
7.	School/ Center	School of Agriculture
8.	Department	Animal Production
9.	Course Level	Graduate Levels (Masters)
10.	Year of Study and Semester (s)	First Semester 2025-2026
11.	Program Degree	
12.	Other Department(s) Involved in Teaching the Course	None
13.	Learning Language	English
14.	Learning Types	☒Face to face learning ☐Blended ☐Fully online
15.	Online Platforms(s)	☐Moodle ☒Microsoft Teams
16	Issuing Date	25/9/2024
17.	Revision Date	30/9/2025

18. Course Coordinator:

Name: **Dr. Mohammad Jalal**

Contact hours: **Sun, Tus, Thu (11:30 – 14:30)**

Mon, Wed (09:30 – 14:30)

Office number: **154**

Phone number: **Ext. 22381**

Email: mohjalal1@ju.edu.jo

19. Other Instructors:

Name:
Office number:
Phone number:
Email:
Contact hours:
Name:
Office number:
Phone number:
Email:
Contact hours:

20. Course Description:

Students will learn about vitamins, quasi-vitamins and their chemical composition, functions, deficiency, absorption, and role in metabolism in both poultry and ruminants. Course covers mineral requirements of farm animals of macro- and micro minerals, mineral toxicity, mineral functions and deficiency, heavy metals, methods for determination of mineral content in organs, animal tissues, and animal products. Active learning methodology will be applied.

21. Program Intended Learning Outcomes: (To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

1. Demonstrate knowledge in various pathways related to animal production, such as animal nutrition, animal physiology, farm animal management, animal breeding, and animal health, to apply acquired knowledge in practical fields.
2. Develop research skills and demonstrate knowledge in research methods and decision-making processes.
3. Apply acquired agricultural concepts when working in the public or private sectors, research institutes, or local and international agricultural organizations.
4. Utilize critical thinking to analyze and address challenges encountered in the livestock sector, formulate strategies, and develop action plans to solve these issues while improving efficiency and farm animal production.
5. Evaluate the laws, regulations, and policies governing the animal production sector in Jordan.
6. Interact with stakeholders, such as livestock producers, at the local level to provide appropriate extension services.
7. Articulate ideas and enhance communication skills, particularly those that promote collaboration, problem-solving, mutual understanding, and teamwork.

8. Identify and assess individual values, knowledge, skills, and abilities to set and achieve lifelong personal, educational, and professional goals.
9. Practice decision-making that fosters self-awareness, enhances self-reliance, and nurtures physical, mental, and social well-being.

PLO's	10. *National Qualifications Framework Descriptors*		
	Competency (C)	Skills (B)	Knowledge (A)
1.	☐	☐	☒
2.	☐	☒	☐
3.	☐	☒	☐
4.	☒	☐	☐
5.	☒	☐	☐
6.	☒	☐	☐
7.	☐	☐	☒
8.	☒	☐	☐
9.	☐	☒	☐

* Choose only one descriptor for each learning outcome of the program, whether knowledge, skill, or competency.

22. Course Intended Learning Outcomes: (Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

1. Understand how vitamins and minerals functions in the animal body at the molecular and cellular level.
2. Understand the physiological effects of vitamins and minerals, including mechanisms of deficiency and toxicity.
3. Obtain current knowledge regarding the role and vitamins and minerals in health and disease.
4. Learn the principles for establishing dietary requirements for vitamins and minerals.
5. Evaluate and apply new research concepts and theories in the vitamin and mineral research area to enhance nutrition research.

Course ILOs #	The learning levels to be achieved						Competencies
	Remember	Understand	Apply	Analyse	Evaluate	Create	
1.	X	X					A
2.	X	X					A
3.	X	X					A
4.		X	X	X			B

5.		**X**	**X**	**X**	**X**		**C**

23. The matrix linking the intended learning outcomes of the course -CLO's with the intended learning outcomes of the program -PLOs:

PLO's * / CLO's	1	2	3	4	5	Descriptors**		
						A	B	C
1	**X**		**X**		**X**	√		√
2					**X**			√
3								
4	**X**	**X**	**X**			√		
5	**X**		**X**		**X**	√		√
6	**X**		**X**	**X**		√	√	
7								
8					**X**			√
9					**X**			√

***Linking each course learning outcome (CLO) to only one program outcome (PLO) as specified in the course matrix.**

****Descriptors are determined according to the program learning outcome (PLO) that was chosen and according to what was specified in the program learning outcomes matrix in clause (21).**

24. Topic Outline and Schedule:

Course Content

Week	Lecture	Topic	ILO/s Linked to the Topic	Learning Types (Face to Face/ Blended/ Fully Online)	Evaluation Methods	Learning Resources
1	1.1 1.2 1.3	**Overview of Vitamins and their Classification** ✓ Lipid-Soluble Vitamins ✓ Water-Soluble Vitamins	**1**	**Face to Face Lectures**	**Exams, Homework, Assignments, and Discussion**	- **Lecture Notes, References Provided, Student Presentations, and Journal Articles**
2	2.1 2.2 2.3	**Vitamin A and Carotenoids**	**1, 2, 3, 4, 5**	**Face to Face Lectures**	**Exams, Homework, Assignments and Discussion**	- **Lecture Notes, References Provided, Student Presentations, and Journal Articles**
3	3.1 3.2 3.3	**Vitamin D (Cholecalciferol)**	**1, 2, 3, 4, 5**	**Face to Face Lectures**	**Exams, Homework Assignments, and Discussion**	- **Lecture Notes, References Provided, Student Presentations, and Journal Articles**
4	4.1 4.2 4.3	**Vitamin E (Tocopherol)**	**1, 2, 3, 4, 5**	**Face to Face Lectures**	**Exams, Homework Assignments, and Discussion**	- **Lecture Notes, References Provided, Student Presentations, and Journal Articles**
5	5.1 5.2 5.3	**Vitamin K, B-Complex Vitamins (B1, B2, B3, B5, B7, B9, B12)**	**1, 2, 3, 4, 5**	**Face to Face Lectures**	**Exams, Homework Assignments, and Discussion**	- **Lecture Notes, References Provided, Student Presentations, and Journal Articles**
6	6.1 6.2 6.3	**B-Complex Vitamins (B1, B2, B3, B5, B7, B9, B12), Ascorbic Acid (Vitamin C)**	**1, 2, 3, 4, 5**	**Face to Face Lectures**	**Exams, Homework Assignments, and Discussion**	- **Lecture Notes, References Provided, Student Presentations, and Journal Articles**
7	7.1			**Face to Face**	**Exams, Homework**	

	7.2 7.3	**Quasi-Vitamins (Choline, Betaine, Carnitine, *para*-Aminobenzoic Acid)**	**1, 2, 3, 4, 5**	**Lectures**	**Assignments, and Discussion**	- **Lecture Notes, References Provided, Student Presentations, and Journal Articles**
8	8.1 8.2 8.3	**Overview of Minerals** ✓ Macrominerals ✓ Microminerals (Trace Minerals)	**1, 2, 3,**	**Face to Face** **Lectures**	**Exams, Homework Assignments, and Discussion**	- **Lecture Notes, References Provided, Student Presentations, and Journal Articles**
9	9.1 9.2 9.3	**Macrominerals:** **Calcium and Phosphorus,**	**1, 2, 3, 4. 5**	Face to Face Lectures	**Exams, Homework Assignments, and Discussion**	- **Lecture Notes, References Provided, Student Presentations, and Journal Articles**
10	10.1 10.2 10.3	**Magnesium, Sodium, Chlorine, Potassium, Sulfur**				
11	11.1 11.2 11.3	**Microminerals (Trace Minerals):** **Iron, Copper, Molybdenum, Manganese, Zinc, Cobalt, Selenium, Iodine**	**1, 2, 3, 4, 5**	**Face to Face** **Lectures**	**Exams, Homework Assignments, and Discussion**	- **Lecture Notes, References Provided, Student Presentations, and Journal Articles**
12	12.1 12.2 12.3					
13	13.1 13.2 13.3	**Ultra-trace Minerals:** **Fluorine, Chromium, Silicon, Vanadium, Bromine**		**Face to Face** **Lectures**	**Exams, Homework Assignments, and Discussion**	- **Lecture Notes, References Provided, Student Presentations, and Journal Articles**
14	14.1 14.2 14.3	**Toxic Minerals or Heavy Metals:** **Cadmium, Lead, Arsenic, Mercury, Nickel**				

25. Evaluation Methods:

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

Evaluation Activity	*Mark wt.	CLO's				
		1	2	3	4	5
Midterm Exam	30%	X	X	X	X	
Final Exam	40%	X	X	X	X	
**Class work	10%	X	X	X	X	X
Projects/reports						
Research working papers	20%	X	X	X	X	X
Field visits						
Practical and clinical						
Performance Completion file						
Presentation/ exhibition						
Any other approved works						
Total 100%						

*** According to the instructions for granting a Bachelor's degree.**

****According to the principles of organizing semester work, tests, examinations, and grades for the bachelor's degree.**

Mid-term exam specifications table (15/12/2025)

No. of questions/ cognitive level						No. of questions per CLO	Total exam mark (120)	Question No.	CLO/ Weight	CLO no.
Create %10	Evaluate %10	analyse %10	Apply %20	Understand %20	Remember %30					
				√	√	All	30%	1	100% CLO1	1
				√	√	1 question per CLO	30%	2	33% CLO1, 33% CLO2, 33% CLO3	1, 2, 3
				√	√	1 question per CLO	30%	3	33% CLO1, 33% CLO2, 33% CLO3	1, 2, 3

		√		√	√	**All**	**30%**	**4**	**100 % CLO1**	**1**

Final exam specifications table (18/1/2026)

No. of questions/ cognitive level						**No. of questions per CLO**	**Total exam mark (100%)**	**Question Number**	**CLO Weight**	**CLO no.**
Create %10	**Evaluate %10**	**analyse %10**	**Apply %20**	**Understand %20**	**Remember %30**					
				√	√	**All**	**18%**	**1**	**100% CLO3**	**3**
		√		√	√	**All**	**18%**	**2**	**100% CLO3**	**3**
		√	√	√		**1 section CLO2, 2 sections CLO3**	**22%**	**3**	**30% CLO2, 70% CLO3**	**2, 3**
		√		√	√	**All**	**12%**	**4**	**100% CLO3**	**3**
				√	√	**All**	**12%**	**5**	**100% CLO2**	**2**
				√	√	**All**	**10%**	**6**	**100% CLO2**	**2**
				√	√	**All**	**10%**	**7**	**100% CLO1**	**1**

26. Course Requirements:

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

27. Course Policies:

A- Attendance policies:

Each student is expected to take their own notes (part from the exam) and to attend class and be prepared when giving presentations. Absence from lectures shall not exceed **15%**. Students are expected to attend all lectures but if a student is absent from class, it is his/her 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 **long essay 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, homework assignment, or term paper

E- Grading policy:

Homework Assignments	10%
Presentations	5%
Term Paper	15%
Midterm Exam	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.

28. References:

A- Required book(s), assigned reading and audio-visuals:

No Specific textbook is required for this course, however, a number books and review articles from referred journals will be provided for students as references during the course of the semester

B- Recommended books, materials, and media:

1. Mineral Nutrition of Livestock, N. F. Suttle, 5th edition, 2022, CAB International, UK.
2. Minerals in Animal Nutrition, L. R. McDowell, 2nd edition, 2003. Iowa State University Press, USA.
3. Vitamins in Animal and Human Nutrition, L. R. McDowell, 2nd edition, 2000. Iowa State University Press, USA.
4. Principles of Animal Nutrition, G. Wu, 2nd edition, 2025, CRC Press Group, Florida, USA.

29. Additional information:

This is an updated course syllabus from last academic year

Name of the Instructor or the Course Coordinator: **Dr. Mohammad Jalal**	Signature:	Date: **30/9/2025**
Name of the Head of Quality Assurance Committee/ Department	Signature:	Date:
……	……..……	……..……
Name of the Head of Department	Signature:	Date:
……	……..……	……..……
Name of the Head of Quality Assurance Committee/ School or Center	Signature:	Date:
……	……..……	……..……
Name of the Dean or the Director	Signature:	Date:
……	……..……	……..……