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	8

1.	**Course Title**	Mathematical Programming for Agribusiness
2.	**Course Number**	0605751
3.	**Credit Hours (Theory, Practical)**	3 hours
	Contact Hours (Theory, Practical)	3 hours per week (Theory)
4.	**Prerequisites/ Corequisites**	
5.	**Program Title**	Agricultural Economics & Agribusiness
6.	**Program Code**	
7.	**School/ Center**	Faculty of Agriculture
8.	**Department**	Agricultural Economics & Agribusiness
9.	**Course Level**	Graduate
10.	**Year of Study and Semester (s)**	First Semester (2025–2026)
11.	**Program Degree**	Master in Agricultural Economics & Agribusiness
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)**	Microsoft Teams
16	**Issuing Date**	2025
17.	**Revision Date**	2025

18. Course Coordinator:

Name: Prof. Dr. Amer Salman Contact hours: 3 Hours

Office number:167 Phone number:22503

Email: asalman@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:

This course introduces the foundations, tools, and applications of Operations Research (OR) with emphasis on agricultural and agribusiness decision-making. Topics include linear programming, the simplex method, duality, sensitivity analysis, transportation and assignment models, and applications in agricultural resource allocation (land, water, labor, capital), production planning, and marketing. Students learn practical modeling, interpretation, and software-based solution techniques using management science tools.

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)

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

* 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)

Course ILOs #	The learning levels to be achieved						Competencies
	Remember	Understand	Apply	Analyse	Evaluate	Create	
CLO1: Critically assess mathematical programming techniques	☒	☒	☐	☒	☐	☐	
CLO2: Describe mathematical programming solution procedures	☒	☒	☐	☐	☐	☐	
CLO3: Use mathematical programming techniques to model decision problems	☐	☒	☒	☒	☐	☐	
CLO4: Build and interpret linear programming models	☐	☒	☒	☒	☒	☐	
CLO5: Apply software tools to solve OR models	☐	☐	☒	☐	☒	☐	

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
CLO1	A							
CLO2	A							
CLO3		B	B					
CLO4		B	B	C				
CLO5			B	C				

***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:

Week	Lecture	Topic	ILO/s Linked to the Topic	Learning Types	Platform Used	Synchronous / Asynchronous Lecturing	Evaluation Methods	Learning Resources
WEEK 1 — Linear Programming: Graphical Method	1.1	Introduction to LP, objective function, constraints, feasible region	A1, B1	Face-to-face	Microsoft Teams	Sync	Participation	Main textbook
	1.2	Graphical solution for maximization & minimization	A1, B1	Face-to-face	Microsoft Teams	Sync	Participation	Main textbook
WEEK 2 — Graphical LP (Advanced)	2.1	Extreme points, optimality, slack & surplus variables	A1, B1	Face-to-face	Microsoft Teams	Sync	Participation	Main textbook
	2.2	Detecting infeasibility & unboundedness graphically	A2, B1	Face-to-face	Microsoft Teams	Sync	Participation	Main textbook
WEEK 3 — Special Cases	3.1	Alternate optima, unbounded models, infeasible models	A2	Face-to-face	Microsoft Teams	Sync	Quiz	Main textbook
	3.2	Intro to sensitivity analysis (graphical)	A2	Face-to-	Microsoft Teams	Sync	Quiz	Main textbook

				face				
WEEK 4 — Sensitivity Analysis	4.1	Objective function changes (graphical sensitivity)	A2	Face-to-face	Microsoft Teams	Sync	Participation	Main textbook
	4.2	RHS changes and impact on optimal solutions	A2	Face-to-face	Microsoft Teams	Sync	Participation	Main textbook
WEEK 5 — Simplex Method (Principles)	5.1	Algebraic foundation of simplex, BFS	C1, C2	Face-to-face	Microsoft Teams	Sync	Homework	Main textbook
	5.2	Constructing initial simplex tableau	C1, C2	Face-to-face	Microsoft Teams	Sync	Homework	Main textbook
WEEK 6 — Simplex Method (Solution Process)	6.1	Pivoting rules & improvement steps	B2, C2	Face-to-face	Microsoft Teams	Sync	Quiz	Main textbook
	6.2	Interpreting final tableau	B2, C2	Face-to-face	Microsoft Teams	Sync	Quiz	Main textbook
WEEK 7 — Simplex Variants	7.1	≥ constraints and artificial variables	A1, B2	Face-to-face	Microsoft Teams	Sync	Participation	Main textbook
	7.2	Negative RHS & Big M method overview	A1, B2	Face-to-face	Microsoft Teams	Sync	Participation	Main textbook
WEEK 8 — Special Cases in Simplex	8.1	Degeneracy & cycling	A3, B3	Face-to-face	Microsoft Teams	Sync	Quiz	Main textbook
	8.2	Unboundedness & infeasibility in simplex tableau	A3, B3	Face-to-face	Microsoft Teams	Sync	Quiz	Main textbook
WEEK 9 — Sensitivity Analysis (Simplex Tableau)	9.1	Reduced costs & allowable ranges	A3, B3	Face-to-face	Microsoft Teams	Sync	Homework	Main textbook
	9.2	Shadow prices and economic meaning	A3, B3, D1	Face-to-face	Microsoft Teams	Sync	Homework	Main textbook
WEEK 10 — Duality	10.1	Dual formation & primal–dual relations	A3	Face-to-face	Microsoft Teams	Sync	Quiz	Main textbook
	10.2	Economic interpretation of dual solutions	A3, C3	Face-to-face	Microsoft Teams	Sync	Quiz	Main textbook
WEEK 11 — OR Applications in Agriculture	11.1	Land & labor allocation models	C4, D1	Face-to-face	Microsoft Teams	Sync	Participation	Main textbook
	11.2	Production planning models	C4, D2	Face-to-face	Microsoft Teams	Sync	Participation	Main textbook
WEEK 12 — Software	12.1	Introduction to Management Scientist software	D2	Face-to-face	Microsoft Teams	Sync	Homework	Software guide

Applications	12.2	Solving LP models using software	D2, D3	Face-to-face	Microsoft Teams	Sync	Homework	Software guide
WEEK 13 — Transportation & Assignment Models	13.1	Transportation model formulation & solution	C3	Face-to-face	Microsoft Teams	Sync	Participation	Main textbook
	13.2	Assignment problem & Hungarian method	C3	Face-to-face	Microsoft Teams	Sync	Participation	Main textbook
WEEK 14 — Group Project Work	14.1	Group consultations & model building	D4, D5	Face-to-face	Microsoft Teams	Sync	Project	Project materials
	14.2	Model refinement and interpretation	D4–D6	Face-to-face	Microsoft Teams	Sync	Project	Project materials
WEEK 15 — Final Presentations	15.1	Group project presentations	All CLOs	Face-to-face	Microsoft Teams	Sync	Project evaluation	Project
	15.2	Course wrap-up & revision	All CLOs	Face-to-face	Microsoft Teams	Sync	Participation	All resources

25. Evaluation Methods:

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

Activity	**Mark Weight**	**CLOs**
Midterm Exam	30%	CLO1–CLO3
Project & Presentation	20%	CLO4–CLO5
Final Exam	50%	CLO1–CLO5
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*

No. of questions/ cognitive level						No. of questions per CLO	Total exam mark	Total no. of questions	CLO/ Weight	CLO no.
Create **%10**	Evaluate **%10**	analyse **%10**	Apply %20	Understand **%20**	Remember %30					
1	1	1	4	2	1	10	100	100	10%	1

Final exam specifications table

No. of questions/ cognitive level						No. of questions per CLO	Total exam mark	Total no. of questions	CLO Weight	CLO no.
Create **%10**	Evaluate **%10**	analyse **%10**	Apply %20	Understand **%20**	Remember %30					
										1
										2
										3
										4
										5

26. Course Requirements:

- Computer with internet access
- Access to *Management Scientist* or equivalent OR software
- Microsoft Teams account

27. Course Policies:

Attendance: Mandatory per University regulations.

Exams: Absences require official excuse approved by the Dean.

Academic Integrity: Cheating and plagiarism result in disciplinary action.

Safety: Follow university rules in labs and classrooms.

Grading: Based on exams, project, and semester work.

28. References:

A—Required Textbook

1. Anderson, D., Sweeney, D., & Williams, T. (2000). *An Introduction to Management Science*. USA.

B—Recommended References

1. Anderson, D., Sweeney, D., & Williams, T. (1995). *Quantitative Methods for Business*.
2. Pannell, D. (1997). *Introduction to Practical Linear Programming*.
3. Jordan Department of Statistics
4. Ministry of Water and Irrigation
5. Ministry of Agriculture

29. Additional information:

To be provided by instructor during the semester.

Name of the Instructor or the Course Coordinator: ……	Signature: ……...……	Date: ……..……
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: ……..……