



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	07

1.	Course Title	Linear Algebra II
2.	Course Number	0301441
3.	Credit Hours (Theory, Practical)	3
	Contact Hours (Theory, Practical)	3
4.	Prerequisites/ Corequisites	0301241
5.	Program Title	BSc. Mathematics
6.	Program Code	
7.	School/ Center	Science
8.	Department	Mathematics
9.	Course Level	Compulsory Specialization Requirement
10.	Year of Study and Semester (s)	3 rd or 4 th year, 1 st and 2 nd or summer semester
11.	Other Department(s) Involved in Teaching the Course	None
12.	Main Learning Language	English
13.	Learning Types	<input checked="" type="checkbox"/> Face to face learning <input type="checkbox"/> Blended <input type="checkbox"/> Fully online
14.	Online Platforms(s)	<input checked="" type="checkbox"/> Moodle <input checked="" type="checkbox"/> Microsoft Teams
15.	Issuing Date	2-10- 2024
16.	Revision Date	

17. Course Coordinator:

Name: Prof. Emad Abuosba	Contact hours: 1:30 – 2:30, (Su, Tue, Thu)
Office number: Math 308	Phone number: 22088
Email: eabuosba@ju.edu.jo	



18. Other Instructors:

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

19. Course Description:

As stated in the approved study plan.

Vector spaces; subspaces; quotient spaces; linear independence and bases; dual spaces; inner product spaces; orthonormal bases; linear transformations; eigenvalues, eigenvectors and determinants of linear transformations; matrix representation; change of basis and similarity; invariant subspaces; canonical forms of linear transformations; diagonal form; triangular form; nilpotent transformations; Jordan form; companion matrices; commutators; the trace functional and Jacobson's lemma; normal transformations and the spectral theorem.

20. Program Student Outcomes (SO's):

(To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

- 7. Utilize research methods, critical and creative thinking skills to assess and analyze information to solve problems properly, then draw valid reasoning and logical conclusions leading to true consequences



21. Course Intended Learning Outcomes (CLO's):

(Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

1. Write and read proofs in linear algebra
2. Find basis and dimension for vector spaces
3. Find the kernel and range of a linear transform
4. Find Jordan form for given matrices
5. Make mathematical thinking and reasoning, find patterns, generalize, and ask/answer relevant questions

Course CLOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analysing	evaluating	Creating
1		•		•		
2			•			
3			•			
4			•			
5				•	•	•

22. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:

Course CLO's	Program SO's							
	SO (1)	SO (2)	SO (3)	SO (4)	SO (5)	SO (6)	SO (7)	SO (8)
CLO (1)							•	
CLO (2)							•	
CLO (3)							•	
CLO (4)							•	
CLO (5)							•	



23. Topic Outline and Schedule:

Week	Lecture	Topic	CLO/s Linked to the Topic	Learning Types (Face to Face (FF)/ Blended/ Fully Online)	Platform Used	Synchronous (S) / Asynchronous Lecturing	Evaluation Methods	Learning Resources
1	1.1	Definition and properties of vector spaces	1	FF	Teams	S	Quiz	Text Book
	1.2	Subspaces	1	FF	Teams	S	Quiz	Text Book
	1.3	Subspaces	1	FF	Teams	S	Quiz	Text Book
2	2.1	Direct sums, Quotient spaces	1	FF	Teams	S	Quiz	Text Book
	2.2	Direct sums, Quotient spaces	1	FF	Teams	S	Quiz	Text Book
	2.3	Exercises: 3, 5, 8, 9, 10, 11, 13, 14, 15.		FF	Teams	S	Quiz	Text Book
3	3.1	Span, Linear independence	2	FF	Teams	S	Quiz	Text Book
	3.2	Span, Linear independence	2	FF	Teams	S	Quiz	Text Book
	3.3	Bases	2	FF	Teams	S	Quiz	Text Book
4	4.1	Bases, Dimension	2	FF	Teams	S	Quiz	Text Book
	4.2	Bases, Dimension	2	FF	Teams	S	Quiz	Text Book
	4.3	Exercise: 1, 2, 3, 8 – 14.		FF	Teams	S	Quiz	Text Book
5	5.1	Quiz 1		FF	Teams	S		Text Book
	5.2	Null space, Range	3	FF	Teams	S	Midterm	Text Book
	5.3	Null space, Range	3	FF	Teams	S	Midterm	Text Book
6	6.1	Matrix of linear transformation	3	FF	Teams	S	Midterm	Text Book
	6.2	Inevitability, Change of bases, Similarity	3	FF	Teams	S	Midterm	Text Book
	6.3	Exercises: 5, 6, 7, 9, 10, 12, 13, 15, 19, 22, 23, 24.		FF	Teams	S	Midterm	Text Book
7	7.1	Eigenvalues and Eigenvectors	5	FF	Teams	S	Midterm	Text Book
	7.2	Eigenvalues and Eigenvectors	5	FF	Teams	S	Midterm	Text Book
	7.3	Invariant subspace,	5	FF	Teams	S	Midterm	Text Book
8	8.1	Midterm	5	FF	Teams	S	Midterm	
	8.2	Triangular and Diagonal Matrices	5	FF	Teams	S	Quiz	Text Book
	8.3	Triangular and Diagonal Matrices		FF	Teams	S	Quiz	Text Book
9	9.1	Exercises: 1 - 5, 10, 11, 14, 18, 19, 21.	5	FF	Teams	S	Quiz	Text Book
	9.2	Inner Product	5	FF	Teams	S	Quiz	Text Book



	9.3	Norm, Orthonormal bases	5	FF	Teams	S	Quiz	Text Book
10	10.1	Norm, Orthonormal bases	5	FF	Teams	S	Quiz	Text Book
	10.2	Projection,	5	FF	Teams	S	Quiz	Text Book
	10.3	Adjoint Operators.		FF	Teams	S	Quiz	Text Book
11	11.1	Exercises: 2, 4, 5, 6, 7, 10, 11, 13, 15, 17, 18, 27, 28, 29, 30, 31.		FF	Teams	S	Quiz	Text Book
	11.2	Quiz 2 + Self Adjoint Operators	5	FF	Teams	S	Quiz	Text Book
	11.3	Normal Operators	5	FF	Teams	S	Quiz	Text Book
12	12.1	Spectral Theorem	5	FF	Teams	S	Quiz	Text Book
	12.2	Spectral Theorem	5	FF	Teams	S	Quiz	Text Book
	12.3	Exercises: 1, 2, 3, 4, 6.		FF	Teams	S	Quiz	Text Book
13	13.1	Generalized Eigenvector, Characteristic polynomial	5	FF	Teams	S	Quiz	Text Book
	13.2	Minimal polynomial, Nilpotent transformation, Jordan form.	4	FF	Teams	S	Quiz	Text Book
	13.3	Exercises: 1, 2, 5, 6, 21, 22.		FF	Teams	S	Quiz	Text Book
14	14.1	Trace of Linear Transformation	4	FF	Teams	S	Quiz	Text Book
	14.2	Trace of Linear Transformation	4	FF	Teams	S	Quiz	Text Book
	14.3	Determinants of Linear transformation	4	FF	Teams	S	Quiz	Text Book
15	15.1	Determinants of Linear transformation	4	FF	Teams	S	Quiz	Text Book
	15.2	Determinants of Linear transformation	4	FF	Teams	S	Quiz	Text Book
	15.3	Exercises: 1, 4, 7, 10, 12, 16, 18, 21, 24.		FF	Teams	S	Quiz	Text Book

24. Evaluation Methods:

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

Evaluation Activity	Mark	Topic(s)	CLO/s Linked to the Evaluation activity	Period (Week)	Platform
Quiz #1	10	Ch. 1 +2	1+2	5	On Campus
Midterm	30	Ch.1 – Ch. 5	1+2+3+5	8	On Campus
Quiz #2	10	Ch. 6+7	5	11	On Campus
Final Exam	50				On Campus



25. Course Requirements:

Each student must have:

- Account on Microsoft Teams

26. Course Policies:

1. Attendance is absolutely essential to succeed in this course. You are expected to attend every class; please notify your instructor if you know you are going to be absent. All exams must be taken at the scheduled time. Exceptions will be made only in extreme circumstances, by prior arrangement with the instructor.
2. If a student is absent for more than 10% of lectures without an excuse of sickness or due to other insurmountable difficulty, then he/she shall be barred from the final examination also he/she will get a failing grade in this course.
3. Medical certificates shall be given to the University Physician to be authorized by him. They should be presented to the Dean of the Faculty within two weeks of the student's ceasing to attend classes.
4. Test papers shall be returned to students after correction. His/her mark is considered final after a lapse of one week following their return.
5. Cheating is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats in exams or on home works.

27. References:

A- Required book (s), assigned reading and audio-visuals:
Linear Algebra Done Right by Sheldon Axler , 2nd Edition.

B- Recommended books, materials, and media:

- 1) P. Halmos, Finite Dimensional vector spaces.
- 2) N. Herstein, Topics in Algebra.
- 3) G. Strang, Linear Algebra and Application.



28. Additional information:

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Name of the Instructor or the Course Coordinator: Prof. Emad A. Abuosba	Signature:	Date: 2 – 10 – 2024
Name of the Head of Quality Assurance Committee/ Department: Prof. Manal Ghanem	Signature:	Date:
Name of the Head of Department Prof. Baha Alzalg	Signature:	Date:
Name of the Head of Quality Assurance Committee/ School of Science: Prof. Emad A. Abuosba	Signature:	Date:
Name of the Dean or the Director Prof. Mahmoud I. Jaghoub	Signature:	Date: