هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title:	**LINEAR ALGEBRA**
Course Code:	**CS1253**
Program:	**Computer Science**
Department:	Computer Science & Engineering
College:	**Computer Science and information technology**
Institution:	Albaha University
Version:	*Course Specification Version Number*
Last Revision Date:	*Pick Revision Date.*

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	3				
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☒ Elective☐				
3. Level/year at which this course is offered: 4/2nd					
4. Course general Description **Lecture:** This major core course aims at introducing students to the fundamental concepts of linear algebra culminating in abstract vector spaces and linear transformations. The first part covers systems of linear equations, matrices, and some basic concepts of the theory of vector spaces in the concrete setting of real linear n-space, R^n. The second part briefly explores orthogonality, and then goes on to a full discussion of abstract vector spaces over arbitrary fields and of linear transformations. The subject material is important for computer scientists in fields of signal and image processing, computer graphics, robotics, information security … **Lab:** NA					
5. Pre-requirements for this course (if any):					
6. Co- requirements for this course (if any):					
7. Course Main Objective(s) The main purpose for this course is to teach students how to: ● Define operations on matrices and proprieties ● Define the concepts of vector spaces and linear transformations ● Solve systems of equations ● Calculate eigen values and eigen vectors for matrix diagonalization ● Model mathematical problems in matrix environment ● Communicate concepts and techniques in oral presentations ● Interact in groups collaboratively					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	33	100%
2.	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3.	Hybrid ● Traditional classroom ● E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	33
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	33

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Define operations on matrices and proprieties	K3	▪ Lectures ▪ Discussions	● Midterm exam ● Final Exam
1.2	Define the concepts of vector spaces and linear transformations	K3	▪ Lectures ▪ Discussions	● Homework ● Quiz ● Final Exam
2.0	Skills			
2.1	Solve systems of equations	S1	▪ Tutorials ▪ Lectures ▪ Demonstrations ▪ Assignment	● Homework ● Quiz ● Mid-term exam ● Final Exam
2.2	Calculate eigen values and eigen vectors for matrix diagonalization	S1	▪ Tutorials ▪ Lectures Demonstrations	● Homework ● Final Exam
2.3	Model mathematical problems in matrix environment	S1	▪ Tutorials ▪ Lectures ▪ Demonstrations ▪ Group project	● Homework
3.0	Values, autonomy, and responsibility			
3.1	Interact in groups collaboratively	V1	Lab discussion	● Homework

C. Course Content

No	List of Topics	Contact Hours
1.	Topic 1: Matrix Algebra Determinants	4
2.	Topic 2: Systems of linear equations,	9
3	Topic 3: Inverse of a matrix - LU factorization	5
4	Topic 4: Vector spaces and subspaces	3
5	Topic 5: Orthogonality	3
6	Topic 6: Linear transformations	5
7	Topic 7: Diagonalization	4
Total		33

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework	Every two week	15%
2.	Mid-Term exam	Week 6	20%
3.	Quiz	Week 10	15%
.4	Final Exam	Week 12-13	50%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	"Linear Algebra and Its Applications", by David C. Lay, Pearson/Addison-Wesley, 4thEdition, 2011. Linear Algebra: a Modern Introduction, D. Poole, published by Thomson, 3rd edition 2010
Supportive References	• Linear Algebra, J. Fraleigh, published by Addison-Wesley, 3rd edition 1995 • Elementary Linear Algebra, H. Anton, published by Wiley, 5th edition 1987 • Linear Algebra and its Applications, D. Lay, published by Addison-Wesley, 4th edition 2012 • 3000 Solved Problems in Linear Algebra, S. Lipschutz, published by McGraw-Hill, 1988
Electronic Materials	MAA Digital Library "Linear Algebra Toolkit", http://mathdl.maa.org/mathDL/?pa=content&sa=viewDocument&nodeId=2792& pf=1. • Automatically Tuned Linear Algebra Software (ATLAS), http://mathatlas. sourceforge.net/ MathWorld of Wolfram Research - http://mathworld.wolfram.com/
Other Learning Materials	Matlab programming environment

2. Required Facilities and equipment

Items	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• A classroom or lecture hall with whiteboard for 35 students.
Technology Resources (AV, data show, Smart Board, software, etc.)	• A classroom with high speed Internet connection • A digital image projection system in the classroom that is connected to instructor desktop computer • Has connection for laptop plug-in • A computer lab with Matlab, Maple, Mathematica, and/or other Linear Algebra Toolkits installed
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
1. Strategies for Obtaining Student Feedback on Effectiveness of Teaching	Students	NCAAA Surveys(Anonymous student evaluation forms and questionnaires on teaching either distributed during the final week of class or administered via a Web-based evaluation of instruction submitted to the Department during the final week of class).
2. Other Strategies for Evaluation of Teaching	Department	• Self assessment. • Lecture class visits by the chair or a senior member of the department. • Informal review by course coordinator.
3. Processes for Improvement of Teaching	Faculty	• Receiving annual evaluations based on results of student evaluations. • Attending forums on teaching strategies. • Attending faculty workshops on teaching experience. • Review of recommended teaching strategies. Revising the course contents based on needs of the latest curriculum proposed.
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a	Department	• Assessment of a randomly selected student's work by a randomly selected Department faculty. • Reviewing final exams by course group and chairperson to

Assessment Areas/Issues	Assessor	Assessment Methods
sample of assignments with staff at another institution)		ensure quality and standard. • Frequent review of exams and assignments and compare them with internal\external standards.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.	Department	• Review the course specification periodically. • Review similar specifications from other universities • The end of semester surveys and student's feedback is reviewed by the department continuous improvement committee in order to see areas of improvements. • Adapting the best practices by colleagues. Follow up on the latest books and references.

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

Course Coordinator : Dr Amel Ben Slimane

Signature :