MT132 Module Specification

1. Factual information			
Module title	**MT132 : Linear Algebra**	**Level**	**1**
Module tutor	**Ms. Amal Al Sayed**	**Credit value**	**15**
Module type	**Taught**	**Notional learning hours**	**4**

2. Rationale for the module and its links with other modules

The course introduces a range of ideas concerning matrices and its applications, matrix operations that are widely used in data structure, programming, data communication, digital signal processing and in scientific research. The course shows algorithmic method to solve systems of linear equations. Moreover, it includes concept of vector spaces and subspace that are used to construct algebraic codes. Also, it introduces the meaning of basis and dimension of a subspace the vector space R^n. The concept of linear transformation between two vector spaces together with null space and rank are also included. Finally, the course introduce the idea of characteristic values/vectors and diagonalization.

3. Aims of the module

The course aims to:

- Extend the students' basic mathematical awareness and skills in matrices and matrix operations.
- Give the study skills necessary for students to be able to solve system of linear equations.
- Provide a range of useful ideas such as linear combinations and linear independence.
- Present some important mathematical terms such as span, basis and dimensions.
- Upgrade the concept of linear transformation necessary for other compulsory technology and communication modules.
- Give a feeling for the mathematical approach to the study of computer science.

4. Pre-requisite modules or specified entry requirements

EL111

5. Intended learning outcomes	
A. Knowledge and understanding	**Learning and teaching strategy**
Student will be able to: A.1. Define and classify type of matrices and perform matrix operations. A.2. Solve problems in information systems and communication using matrix techniques. A.3. Use and apply linear algebra knowledge and concepts to information technologies and computing. A.4. Be familiar with different terminologies in linear algebra and matrix transformation. A.5. Acquire technical material, effectively present it and objectively evaluate other technical materials in linear algebra.	• Knowledge and understanding are acquired from a teaching textbook, reference textbooks, directed reading, multi -media packages computer mediated, web-based resources. • 25% face-to-face tutorial sessions. • TMA work. • Office hours. • Learning from the feedback on the continuous assessment components (TMA work + MTA). • Forums on the LMS.

B. Cognitive skills	Learning and teaching strategy
Students should be able to demonstrate that they can: B.1. Produce descriptions and explanations of the different types of matrices and linear operations. B.2. Apply their understanding of the studied ideas in linear algebra to coding problems, encryption and decryption. B.3. Use knowledge gained from the module to help them to understand new unfamiliar matrix operations.	• 25% face-to-face tutorial sessions. • TMA work. • Course learning booklets and e-learning support material. • Office hours. • Case studies. • Learning from the feedback on the continuous assessment components (TMA work + MTA). • Forums on the LMS.

C. Practical and professional skills	Learning and teaching strategy
Students should be able to: C.1. Communicate effectively in English and Arabic in a variety of contexts and media. C.2. Analyze a mass of information and carry out an appropriate analysis of the problem material.	• 25% face-to-face tutorial sessions. • TMA work. • Course learning booklets and e-learning support material. • Case studies. • Office hours.

C. Practical and professional skills	Learning and teaching strategy
C.3. Express a problem in mathematical terms and carry out an appropriate analysis. C.4. Reason critically and interpret information in a manner that can be communicated effectively. C.5. Integrate and link information across course components.	• Learning from the feedback on the continuous assessment components (TMA work + MTA). • Forums on the LMS.

D. Key transferable skills	Learning and teaching strategy
Students should be able to demonstrate that they can: D.1. Communicate complex information, arguments and ideas effectively and without plagiarism on a range of topics relating to linear operations. D.2. Perform calculations to find inverse of a matrix, use and manipulate simple algebraic calculations to solve linear system of equations. D.3. Use technology to find a span and a basis for a vector space. D.4. Enhance existing numerical ability. D.5. Work effectively as part of a group in solving any complicated mathematical problems.	• 25% face-to-face tutorial sessions. • TMA work. • Course learning booklets and e-learning support material. • Case studies. • Office hours. • Learning from the feedback on the continuous assessment components (TMA work + MTA). • Forums on the LMS.

6. Indicative content
a) Systems of linear equations and matrices: • Solving systems of linear equations • Matrix algebra • Inverse of a matrix • Matrix equations • Determinants b) Vectors in R^n: • n-vectors • Vector operations • Linear combinations • Linear independence c) Vector spaces:

6. Indicative content
• Vector spaces • Subspaces • Spans • Bases and dimensions d) Linear transformations: • Linear transformations • Null spaces and ranges e) Eigenvalues, Eigenvectors and diagonalization

7. Assessment strategy, assessment methods and their relative weightings
TMA Work: 20% MTA: 30% Exam: 50%

8. Mapping of assessment tasks to learning outcomes

Assessment tasks	Learning outcomes																	
	A 1	A 2	A 3	A 4	A 5	B 1	B 2	B 3	C 1	C 2	C 3	C 4	C 5	D 1	D 2	D 3	D 4	D 5
TMA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MTA	✓	✓	✓	✓	✓		✓				✓						✓	
Exam	✓	✓	✓	✓	✓		✓				✓						✓	

9. Teaching staff associated with the module

Tutor's name and contact details	Contact hours
Ms. Amal Al Sayed, asayed@aou.edu.kw	

10. Key reading list

Author	Year	Title	Publisher	Location
J. DeFranza and D. Gagliardi	2009	Introduction to Linear Algebra with Applications	McGraw-Hill	USA
David C. Lay	2012	Linear Algebra and its Applications, 4E	Pearson	USA
Friedberg, Insel & Spence	2003	Linear Algebra, 4/e	Pearson	USA
Steven J. Leon	2010	Linear Algebra with Applications, 8/e	Pearson	USA

10. Key reading list				
Author	Year	Title	Publisher	Location
Bretscher	2009	Linear Algebra with Applications, 4/e	Pearson	USA

11. Other indicative text (e.g. websites)
• http://arabou.edu.kw/ • B. Kolman and D.R. Hill, Introductory Linear Algebra, An Applied First Course, 8th edition, Pearson • 35 Video lectures (http://learnerstv.com/Free-Maths-Video-lectures-ltv023-Page1.htm) • 138 Video lectures (http://learnerstv.com/Free-Maths-Video-lectures-ltv102-Page1.htm) • Professor Strang's (at MIT) Linear Algebra Class Lecture Videos (http://web.mit.edu/18.06/www/Video/video-fall-99.html)

12. Disability Accommodation
Enquiries for academic accommodations by students with a documented disability and /or learning difficulties should be directed to the module tutor.

13. Academic Honesty
All AOU students should be committed to uphold the AOU's Honour Code which states that AOU students should: • accept responsibility for learning • conduct themselves with honour and integrity at all times • not deceive • not plagiarize • not fabricate • not commit professional misconduct • not lie • not cheat • not steal • not personate • not accept the actions of those who plagiarize, cheat, lie, or steel • report violations of the Honour Code Students should know that ignorance of the university rules and regulations will not be accepted as an excuse for violation of the AOU's Honour Code For additional information please visit:

- http://www.arabou.edu.kw
- https://arabou.edu.kw/files/plagiarism_mat.pdf
- http://en.wikipedia.org/wiki/Academic_dishonesty