**Kingdom of Saudi Arabia**
**National Commission for**
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الـهيئـــة الوطنيـــة للتقـويــم
والاعـتـمـاد الأكـاديـمـي

**ATTACHMENT 2 (e)**
**Course Specifications**

# Kingdom of Saudi Arabia
# The National Commission for Academic Accreditation & Assessment

# Course Specifications
# (Linear Algebra (1) Math. 4042402-4)

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## Course Specifications

| Institution: Umm Alqura University, Makkah      Date of Report: 07 December 2015 |
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| College/Department:  College of  Applied Science, Mathematical Science Department |
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## A. Course Identification and General Information

| 1.  Course title and code: **Linear Algebra (1) Math. 4042402-4** |
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| 2.  Credit hours: **4 Credit hours.** |
| 3.  Program(s) in which the course is offered:<br>(If general elective available in many programs indicate this rather than list programs)<br>**BSc. Mathematics** |
| 4.  Name of faculty member responsible for the course<br>**Dr. Ahmad  Mohammed Ahmad Alghamdi** |
| 5.  Level/year at which this course is offered: **2th Year/ Level 3/ Semester 1** |
| 6.  Pre-requisites for this course (if any)<br>**None** |
| 7.  Co-requisites for this course (if any)<br>**(Discrete Mathematics Math. 404-354-3)+ (Introduction of Rings theory Math. 404-342-3)** |
| 8.  Locations:  **Main campus + Girls Sections** |

9. Mode of Instruction (mark all that apply)

| | | | | |
|---|---|---|---|---|
| a. Traditional classroom | ✓ | What percentage? | 100 |
| b. Blended (traditional and online) | | What percentage? | |
| c.  e-learning | | What percentage? | |
| d. Correspondence | | What percentage? | |
| f.  Other | | What percentage? | |

Comments: Mainly traditional classroom will dominant the mode on instruction. There is a need to apply some modes in some situations.

## B  Objectives

| 1.  What is the main purpose for this course?<br>The main purpose of this course are:<br>1-Linear equations in linear algebra: systems of linear equations, consistent and inconsistent systems of linear equations, examples<br>2-Elementary row operations, row reduction and echelon forms: examples<br>3-Matrix Algebra: Matrix operations,  Properties of matrix multiplication,<br>the inverse of a matrix (invertible matrix theorem), elementary matrices, column space and null space of a matrix: examples |
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4-Determinants: Recursive definition of a determent, properties of determinants.  Applications: Cramer's rule and volume.
5-Vector spaces: Definition, examples, substructures, and linear transformations of vector spaces examples
6-Linearly independence and basis of a vector space: examples
7-Eigen values and Eigenvectors of matrices , Orthogonality and least Squares.

| 2.  Briefly describe any plans for developing and improving the course that are being implemented.  (e.g. increased use of IT or web based reference material,  changes in content as a result of new research in the field) |
|---|
| - Solving and proving basic facts using mathematical reasoning and proofs. |
| - Learning many problems in mathematical logic, set theory and binary operations. |
| - Encouraging students to collect and to use  text books and tutorial to develop and solve problems. |
| - Encouraging students to collect and to use  the web  to develop and solve  problems. |

## C.  Course Description (Note:  General description in the form to be used for the Bulletin or handbook should be attached)

| 1. Topics to be Covered | | |
|---|---|---|
| List of Topics | No. of Weeks | Contact Hours |
| Linear equations in linear algebra: systems of linear equations, consistent and inconsistent systems of linear equations, examples | 2 | 8 |
| Elementary row operations, row reduction and echelon forms: examples | 2 | 8 |
| Matrix Algebra: Matrix operations,  Properties of matrix multiplication, the inverse of a matrix (invertible matrix theorem), elementary matrices, column space and null space of a matrix: examples | 3 | 12 |
| Determinants: Recursive definition of a determent, properties of determinants.  Applications: Cramer's rule and volume. | 2 | 8 |
| Vector spaces: Definition, examples, substructures, and linear transformations of vector spaces examples | 2 | 8 |
| Linearly independence and basis of a vector space: examples | 2 | 8 |
| Eigen values and Eigenvectors of matrices , Orthogonality and least Squares | 2 | 8 |

| 2.  Course components (total contact hours and credits per semester): | | | | | | |
|---|---|---|---|---|---|---|
| | Lecture | Tutorial | Laboratory | Practical | Other | Total |
| Contact Hours | 45 | 15 | -- | N/A | N/A | 60 |
| Credit | 4 | | | | | 4 |

| 3. Additional private study/learning hours expected for students per week. | 1 |
|---|---|

| 4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy |
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| NQF Learning Domains And Course Learning Outcomes | | Course Teaching Strategies | Course Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge** | | |
| 1.1 | 1-To name and label Linear equations in linear algebra: systems of linear equations, consistent and inconsistent systems of linear equations, examples 2- To recognize Elementary row operations, row reduction and echelon forms: examples 3- To list Matrix Algebra: Matrix operations, Properties of matrix multiplication, the inverse of a matrix (invertible matrix theorem), elementary matrices, column space and null space of a matrix: examples 4- To define Determinants: Recursive definition of a determent, properties of determinants. Applications: Cramer's rule and volume. 5-To define Vector spaces: Definition, examples, substructures, and linear transformations of vector spaces examples 6-To recognize Linearly independence and basis of a vector space: examples 7-to describe Eigen values and Eigenvectors of matrices , Orthogonality and least Squares. | Lectures, tutorials and exams | Written Exams |
| 1.2 | 4- To define Determinants: Recursive definition of a determent, properties of determinants. Applications: Cramer's rule and volume. 5-To define Vector spaces: Definition, examples, substructures, and linear transformations of vector spaces examples 6-To recognize Linearly independence and basis of a vector space: examples 7-to describe Eigen values and Eigenvectors of matrices , Orthogonality and least Squares. | Lectures, tutorials, and exams | Written exams |
| **2.0** | **Cognitive Skills** | | |
| 2.1 | 1-To solve and explain Linear equations in linear algebra: systems of linear equations, consistent and inconsistent systems of linear equations, examples 2- To explain Elementary row operations, row reduction and echelon forms: examples 3- To use Matrix Algebra: Matrix operations, Properties of matrix multiplication, the inverse of a matrix (invertible matrix theorem), elementary matrices, column space and null space of a matrix: examples | Lectures and Tutorials **Brainstorming:** A Method of solving problems in which all members of a group suggest ideas and then discuss them. | Mid-term exams |
| 2.2 | 4- To explain and to use Determinants: Recursive definition of a determent, properties of determinants. Applications: Cramer's rule and volume. 5-To explain Vector spaces: Definition, examples, substructures, and linear transformations of vector spaces examples 6-To interpret Linearly independence and basis of a | Lectures, tutorials and exams **Brainstorming:** A Method of solving problems in which all members of a group suggest ideas and then discuss them. | Mid-term exams |

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|---|---|---|---|---|
| | vector space: examples<br>7-to interpret and compute  Eigen values and Eigenvectors of matrices , Orthogonality and least Squares. | | | |
| **3.0** | **Interpersonal Skills & Responsibility** | | | |
| 3.1 | Demonstrate communication skills with the teacher and other students in the class. | Working together | Group study to do homework | |
| 3.2 | Reading and solving basic facts of linear algebra structures. | Working together | Group study to do homework | |
| **4.0** | **Communication, Information Technology, Numerical** | | | |
| 4.1 | Demonstrate communication skills with the teacher and other students in the class. Show ability to do mental mathematics | Working together<br>**Brainstorming:** A Method of solving problems in which all members of a group suggest ideas and then discuss them. | Group study to do homework | |
| 4.2 | Reading and solving basic facts of linear algebra structures. | Working together | Group study to do homework | |
| **5.0** | **Psychomotor** | | | |
| 5.1 | Demonstrate an ability to build mathematical sense and establish linear algebra structures. | An interview  assignments where a specific time limit is given to the student | Students will be evaluated for different assignments By and interview | |
| 5.2 | Construct algebraic structures and evaluate matrix operations | **Brainstorming:** A Method of solving problems in which all members of a group suggest ideas and then discuss them. | | |

### 5. Schedule of Assessment Tasks for Students During the Semester

| No. | Assessment task (eg. essay, test, group project, examination etc.) | Week due | Proportion of Final Assessment |
|---|---|---|---|
| 1 | Midterm Test (1) | 7th  week | 20% |
| 2 | Midterm Test (2) | 12th  week | 20% |
| 4 | Homework + Reports + Quizzes | During the semester | 20% |
| 5 | Final Examination | End of semester | 40% |

**D. Student Academic Counseling and Support**

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)
-Each group of students is assigned to a particular faculty where he or she will provide academic advising during specific academic hours. Each staff will provide at least one session/week.
-There will be an academic advisor how will be a responsible for helping the student by doing the general supervision .
- The people in the library will support the students during the time of the course.

**E. Learning Resources**

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| 1. List Required Textbooks<br>1- **The book: Linear Algebra and Its Applications,(4th Edition)**<br>**Publisher: Pearson; 4 edition (December 26, 2011)**<br>**Language: English ISBN-10: 0321836146 ISBN-13: 978-0321836144**<br>2- Linear Algebra (2nd Edition) by Kenneth M Hoffman, Ray Kunze;<br>Publisher: Pearson; 2 edition (April 25, 1971)<br>Language: English ISBN-10: 0135367972 ISBN-13: 978-0135367971 |
| 2. List Essential References Materials (Journals, Reports, etc.)<br>- |
| 3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)<br>-  **Schaum's Outline of Linear Algebra, 5th Edition: 612 Solved Problems + 25 Videos (Schaum's**<br>**Outlines) :Publisher: McGraw-Hill Education; 5 edition (December 11, 2012)**<br>**Language: English ISBN-10: 0071794565 ISBN-13: 978-0071794565** |
| 4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.)<br>-    https://en.wikipedia.org/wiki/Linear_algebra<br>-    http://mathworld.wolfram.com/topics/LinearAlgebra.html |
| 5. Other learning material such as computer-based programs/CD, professional standards or regulations and<br>software.<br>-Mathematica<br>-Magma<br>-Gap<br>-Matlab<br>-Maple |

## F. Facilities Required

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| Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in<br>classrooms and laboratories, extent of computer access etc.) |
| Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)<br>- Lecture classroom which can accommodate 30 students for lectures and tutorials (normal and classical<br>classroom) |

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| 2. Computing resources (AV, data show, Smart Board, software, etc.)<br>Data Show (projector):  sometimes shall be used. |
| 3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach<br>list)<br>This course is a basic and fundamental course in mathematical reasoning and mathematical proofs ans<br>well as basic course for building algebraic structures and the main source is thinking even we just use<br>chalk and the board. |

## G   Course Evaluation and Improvement Processes

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| 1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching<br>Following completion of the prescribed course study in Pediatrics module, an evaluation should be<br>conducted through the following:<br>-    A student questionnaire feedback should be carried out on the<br>quality & effectiveness of teaching and evaluation |
| 2  Other Strategies for Evaluation of Teaching by the Program/Department Instructor<br>-    A staff questionnaire feedback about course |

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| 3  Processes for Improvement of Teaching<br>-        Submission of a final evaluation report at the end of the course<br>-        A review of the recommended teaching strategies should be submitted after evaluation. |
| 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 sample of assignments with staff at another institution)<br>- Compare the standards of students  achievements' with standards archived elsewhere (inside KSA or students from outside the kingdom) by checking the marking of a sample of some student work : tests, course work<br>- Assignment by an independent member of teaching staff either from the UQU or other universities |

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|---|
| 5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.<br>- Reviewing feedback on the quality of course report from staff members, other university' staffs.<br>- Looking for strengthen and weak points gathered at the end of the course and working on it.<br>- Plan to introduce updating material and technology that could improve the quality |

**Faculty or Teaching Staff: ___Dr. Ahmad Mohammed Ahmad Alghamdi**
_____

**Signature: ___Ahmad Alghamdi_____ Date Report Completed: 07 December 2015**
_____

**Received by: _____        Dean/Department Head**
**Signature: _____        Date: _____**