



المركز الوطني للتقويم والاعتماد الأكاديمي
National Center for Academic Accreditation and Evaluation

ATTACHMENT 5.

T6. COURSE SPECIFICATIONS **(MATRIX ALGEBRA (MATH 012))**

Course Specifications

| | |
|---|--|
| Institution: <i>King Khalid University</i> | Date of Report : <i>September 2019</i> |
| College/Department :Faculty of science, department of mathematics | |

A. Course Identification and General Information

| | | |
|---|-------------------------------------|--|
| 1. Course title and code: <i>MATRIX ALGEBRA (MATH 012)</i> | | |
| 2. Credit hours : 3 | | |
| 3. Program(s) in which the course is offered. Mathematics,physics (If general elective available in many programs indicate this rather than list programs) <i>Faculty of computer Science</i> | | |
| 4. Name of faculty member responsible for the course : | | |
| 5. Level/year at which this course is offered : <i>1st level / 1st Academic Year</i> | | |
| 6. Pre-requisites for this course (if any) : <i>001 math</i> | | |
| 7. Co-requisites for this course (if any) : <i>None</i> | | |
| 8. Location if not on main campus <i>Academic Campus at Mahala</i> | | |
| 9. Mode of Instruction (mark all that apply) | | |
| a. Traditional classroom | <input checked="" type="checkbox"/> | What percentage? <input type="text" value="70 %"/> |
| b. Blended (traditional and online) | <input checked="" type="checkbox"/> | What percentage? <input type="text" value="15 %"/> |
| c. e-learning | <input checked="" type="checkbox"/> | What percentage? <input type="text" value="15 %"/> |
| d. Correspondence | <input type="checkbox"/> | What percentage? <input type="text"/> |
| f. Other | <input type="checkbox"/> | What percentage? <input type="text"/> |
| Comments: | | |

B Objectives

| |
|---|
| 1. What is the main purpose for this course? |
| By the completion of this course the students will able to |
| 1- Acquired knowledge, skills about the basis and theories of the basic fundamental of mathematics. |
| 2- Apply the basic fundamental of Matrices Algebra in solving problems. |
| 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) |
| 1- increasing student skills in IT |
| 2- interact with the students through homepage |
| 3- train students in small projects |

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 | | |
|--|-------------|---------------|
| Topics | No of Weeks | Contact hours |
| Introduction to the system of linear equations. Augmented matrices, Elementary row operations | 2 | 6 |
| Gaussian Elimination Reduced row-Echelon form, Gauss-Jordan elimination, Back-Substitution Homogeneous linear system of equations. | 3 | 9 |
| Matrices and Matrix operations. Matrix form of a liner system. Transpose and Trace of a matrix | 1 | 3 |
| Properties of matrix operations, Properties of inverses and transpose | 1 | 3 |
| A method for finding the inverse of a matrix , Further results on systems of equations and inevitability. | 1 | 3 |
| Diagonal, triangular and symmetric matrices. | 1 | 3 |
| The determinant function - Evaluating determinants by row reduction | 1 | 3 |
| Properties of the determinant function | 1 | 3 |
| Cofactor expansion-Cramer's rule-Inverse of a matrix using its adjoint. | 1 | 3 |

| | | |
|---|---|---|
| Vector space, Linear dependent and linear independent , Eigen values and Eigen vectors | 2 | 6 |
| Basis and Dimensional of vector space | 1 | 3 |

2. Course components (total contact hours and credits per semester):

| | Lecture | Tutorial | Laboratory or Studio | Practical | Other: | Total |
|------------------|---------|----------|-------------------------|-----------|--------|-------|
| Contact Hours | 45 | -- | -- | -- | -- | 45 |
| Credit | 3 | -- | -- | -- | -- | 3 |

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

2-4 hrs/wk

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

Course Learning Outcomes, Assessment Methods, and Teaching Strategy work together and are aligned. They are joined together as one, coherent, unity that collectively articulate a consistent agreement between student learning, assessment, and teaching.

The *National Qualification Framework* provides five learning domains. Course learning outcomes are required. Normally a course has should not exceed eight learning outcomes which align with one or more of the five learning domains. Some courses have one or more program learning outcomes integrated into the course learning outcomes to demonstrate program learning outcome alignment. The program learning outcome matrix map identifies which program learning outcomes are incorporated into specific courses.

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. **Fourth**, if any program learning outcomes are included in the course learning outcomes, place the @ symbol next to it.

Every course is not required to include learning outcomes from each domain.

| | NQF Learning Domains And Course Learning Outcomes | Course Teaching Strategies | Course Assessment Methods |
|------------|--|---|---|
| 1.0 | Knowledge | | |
| 1.1 | Understand and know the scientific background of Matrices Algebra. | Lectures, problem solving, small project assignments. | In-class quizzes , In-class tests, coursework reports, homework assignments |
| 1.2 | Know the processes and methods of classifying the Matrices. | Lectures, problem solving, small project assignments. | Quizzes , In-class tests, coursework reports, homework assignments |
| 1.3 | Understand in depth the theoretical basis of Matrices Algebra | Lectures, problem solving, small project assignments, Internet research work and independent study. | In-class quizzes , In-class tests, coursework reports, homework assignments |
| 1.4 | Demonstrate knowledge of different approaches that can be used for Matrices Algebra. | Lectures, problem solving, small project assignments, Internet research work and independent study. | In-class quizzes , In-class tests, coursework reports, homework assignments |
| 1.5 | Familiar to quantities methods appropriate Matrices Algebra. | Lectures, problem solving, small project assignments, Internet research work and independent study. | In-class quizzes , In-class tests, coursework reports, Regular class MCQ's |
| 1.6 | Practical understanding of techniques and procedures used in the application of Matrices Algebra | Lectures, problem solving, small project assignments, Internet research work and independent study. | In-class quizzes , In-class tests, coursework reports, Regular class MCQ's |
| 2.0 | Cognitive Skills | | |
| 2.1 | Understand and know the scientific background of Matrices Algebra | Through a range of lectures, tutorials, home assignment and exercises. | In-class quizzes , In-class tests, coursework reports, homework assignments |
| 2.2 | Understand in depth the theoretical basis of Matrices Algebra | Through a range of lectures, tutorials, home assignment and exercises. | Quizzes , In-class tests, coursework reports, homework assignments |
| 2.3 | Demonstrate knowledge of different approaches that can be used for Matrices Algebra | Through a range of lectures, tutorials, home assignment and exercises. | Quizzes , In-class tests, coursework reports, homework assignments |
| 2.4 | Familiar to quantities methods appropriate to Matrices Algebra | Analysis and solution of scientific problems through small group discussion and class work | Quizzes , In-class tests, coursework reports, homework assignments |
| 2.5 | Practical understanding of techniques and procedures used in the application of Matrices Algebra | Analysis and solution of scientific problems through small group discussion and class work | Quizzes , In-class tests, coursework reports, homework assignments |

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|------------|--|---|--|
| 3.0 | Interpersonal Skills & Responsibility | | |
| 3.1 | Act in responsible ethical manners | Engage students in carrying out internet search | Oral examinations |
| 3.2 | Develop the necessary skills for self-managed and lifelong learning | Engage students in small projects | Observation of student's ethical and moral behavior |
| 3.3 | Act responsibly in personal and professional relationships | Engage students in small projects | Observation of student's ethical and moral behavior |
| 3.4 | Develop the necessary skills for self-managed and lifelong learning | Engage students in carrying out internet search | Oral examinations |
| 3.5 | Time management skills | Engage students in carrying out internet search | Oral examinations |
| 4.0 | Communication, Information Technology, Numerical | | |
| 4.1 | Communicate effectively in English in both oral and written form | Teaching and learning in English | Discussions, Oral and written examinations all in English |
| 4.2 | Use IT and communication technology in gathering and interpreting information and ideas. | Application of simple computer programs to improve student IT skills | IT duties and presentations Discussions and written examinations |
| 4.3 | Acquiring skills in searching for scientific literature relevant to a specific topic | Student involvement in seminars, Internet search. | Seminars, discussions, Oral examinations, Part of the grades are given to good report and presentation |
| 4.4 | Recognize and respect the views and scientific opinions of others | Internet search. | Discussions, seminars and examinations Part of the grades are given to good report and presentation |
| 5.0 | Psychomotor | | |
| 5.1 | Analysis data using appropriate mathematical techniques | Developed through the study skills for mathematical and numerical approaches | Practical professional skills are assessed through home works, coursework tasks exams |
| 5.2 | Use approaches and concepts of analysis in solving organization problems | Developed through engagement of students in analysis and evaluation of results and data | Practical professional skills are assessed through home works, coursework tasks exams |
| 5.3 | Demonstrate the necessary skills to work competently in professional situations | Developed through the study skills for mathematical and numerical approaches | Practical professional skills are assessed through home works, coursework tasks exams |
| 5.4 | Ability to carryout research work and writing professional reports | Developed through engagement of students in analysis and evaluation of results and data | Practical professional skills are assessed through home works, coursework tasks exams |

5. Map course LOs with the program LOs. (Place course LO #s in the left column and program LO #s across the top.)

| Course LOs # | Program Learning Outcomes (Use Program LO Code #s provided in the Program Specifications) | | | | | | | | | | | | | | | | | | | | |
|-----------------|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 1. 1 | 1. 2 | 1. 3 | 1. 4 | 1. 5 | 2. 1 | 2. 2 | 2. 3 | 2. 4 | 2. 5 | 2. 6 | 3. 1 | 3. 2 | 3. 3 | 3. 4 | 3. 5 | 3. 6 | 4. 1 | 4. 2 | 4. 3 | 4. 4 |
| | | | | | | | | | | | | | | | | | | | | | |
| 1.1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | | |
| 2.1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | | | |
| 2.2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | | | |
| 2.3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | | |
| 2.4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 3.1 | | | | | | | | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4.1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4.2 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4.3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4.4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

6. Schedule of Assessment Tasks for Students During the Semester

| | Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.) | Week Due | Proportion of Total Assessment |
|---|---|-----------|--------------------------------|
| 1 | First exam | 7 | 15% |
| 2 | Second exam | 10 | 15% |
| 3 | Final exam. | 15 | 60% |
| 4 | homework | Each week | 0.5% |
| 5 | group project | | 2.0% |
| 6 | speech, oral presentation | | 1.0% |

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)

Contact students during office hours
academic advisement

E. Learning Resources

1. List Required Textbooks

2. List Essential References Materials (Journals, Reports, etc.)

Howard Anton, Elementary Linear Algebra, 8th Edition, John Wiley & Sons, Inc 2005.

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)

"Matrix Algebra: An Introduction" by Krishnan Namboodiri.

4. List Electronic Materials (eg. Web Sites, Social Media, Blackboard, etc.)

- <http://www.sosmath.com/matrix/matrix.html>
- <http://stattrek.com/tutorials/matrix-algebra-tutorial.aspx>

5. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)

2. Computing resources (AV, data show, Smart Board, software, etc.)

- increase internet points
- Preparing E- courses

3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

Labs including visual lab

G. Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

Student questionnaire

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| Student Evaluations on education gate site |
| <p>2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor</p> <p>Annual review of course report Head of department reports</p> |
| <p>3 Processes for Improvement of Teaching</p> <p>Prepare power point presentations Prepare electronic course</p> |
| <p>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)</p> <p>Examination committee</p> |
| <p>5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.</p> <p>1- Prepare the lecture notes as a power point presentation. 2- Use up-to-date visual aids in learning and teaching.</p> |

Name of Instructor: **Dr. Ahmed Elwan**

Signature: _____ Date Report Completed: **September 6, 2019**

Program Coordinator:

Signature: _____ Date Received: _____