## Course Specifications

| Course Title: | Linear Algebra |
| :--- | :--- |
| Course Code: | 284MATH-3 |
| Program: | Computer Science + Information System |
| Department: | Computer Science + Information Systems |
| College: | Computer Science and Information Systems |
| Institution: | Najran University |

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## A. Course Identification


6. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
| :---: | :---: | :---: | :---: |
| 1 | Traditional classroom | 3 | 100\% |
| 2 | Blended | --- | --- |
| 3 | E-learning | --- | --- |
| 4 | Correspondence | --- | --- |
| 5 | Other | --- | --- |

7. Actual Learning Hours (based on academic semester)

| No | Activity | Learning Hours |
| :---: | :---: | :---: |
| Contact Hours |  |  |
| 1 | Lecture | 45 |
| 2 | Laboratory/Studio | --- |
| 3 | Tutorial | --- |
| 4 | Others (specify) | --- |
|  | Total | 48 |
| Other Learning Hours* |  |  |
| 1 | Study | 30 |
| 2 | Assignments | 10 |
| 3 | Library | 15 |
| 4 | Projects/Research Essays/Theses | --- |
| 5 | Office hours | 10 |
|  | Total | 110 |

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times


## B. Course Objectives and Learning Outcomes

## 1. Course Description

This course introduces types of matrices, properties of matrices and algebraic of matrices. Also, it introduces solving of linear systems, computing determinants of matrices, vectors (in the plane and space), linear combination of vectors, spans and linearly dependent and linearly independent of vectors. Finally, it covers linear transformations, similarity and orthogonal, eigenvalues and eigenvectors of matrix.


## 2. Course Main Objective

1. Providing students the scientific facts and concepts about the types of matrices, properties of matrices and algebraic of matrices.
2. Providing students an appropriate amount of information that help to solve linear systems, computing determinants of matrices, know vectors (in the plane and space).
3. Distinguish between linearly dependent and linearly independent of vectors.
4. Training students on how to find eigenvalues and eigenvectors of matrix.
5. Course Learning Outcomes

| CLOs |  | Aligned PLOs |
| :---: | :---: | :---: |
| 1 | Knowledge: |  |
| 1.1 | Describe the types of matrices and their properties and write the linear system in matrix form. |  |
| 1.2 | Recognize between the solutions of linear systems and define concepts of vectors in the plane and space. |  |
|  |  |  |
| 1... |  |  |
| 2 | Skills : |  |
| 2.1 | Evaluate the determinants of the matrices. |  |
| 2.2 | Interpret the eigenvalues as the solutions of the characteristic polynomial. |  |
| 2.3 |  |  |
| 2... |  |  |
| 3 | Competence: |  |
| 3.1 | Operate in the Internet to expand his mind regarding the decision of linear algebra. |  |
| 3.2 | Apply different methods to learn linear algebra. |  |
| 3.3 |  |  |
| 3... |  |  |

## C. Course Content

| No | List of Topics | Contact <br> Hours |
| :---: | :--- | :---: |
| 1 | Matrices and systems of linear equations: types of matrices, properties of matrices, <br> Algebra of matrices and inverse of matrices. | 6 |
| 2 | Solving linear systems AX $=B$ using elimination method, inverse of matrix, REF and <br> RREF. Determinants: the determinants of the matrix, the properties of determinants, <br> Cramer's rule. | 6 |
| 3 | Introduction to Vector space: Vector definition of 2D and 3D Vector, subspaces, the row <br> and column vectors, linear combination, linearly dependent and independent, basis and <br> dimension. | 12 |
| 4 | Introduction to linear transformations: the definition of a linear transformation, and image <br> and kernel of a linear transformation, types of transformations: reflection, translation, <br> rotation, projection. | 9 |
| 5 | Matrix of linear transformations, similarity and orthogonal matrices, eigenvalues and <br> eigenvectors of matrices. | 12 |
| $\ldots$ |  | $\mathbf{4 5}$ |

## D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
| :---: | :---: | :---: | :---: |
| 1.0 | Knowledge: |  |  |
| 1.1 | Describe the types of matrices and their properties and write the linear system in matrix form. | - Lecture <br> - Discussions | - Quiz <br> - Written Exam |
| 1.2 | Recognize between the solutions of linear systems and define concepts of vectors in the plane and space. | - Lecture <br> - Discussions | - Quiz <br> - Written Exam |
| $\ldots$ |  | --- | --- |
| 2.0 |  |  |  |
| 2.1 | Skills : |  | - Lecture <br> - Discussions |
| 2.2 | Evaluate the determinants of the matrices. | - Solve problems involving first and second fundamental forms. | - Lecture <br> - Discussions |
| $\ldots$ | Interpret the eigenvalues as the solutions of the characteristic polynomial. | --- | --- |
| 3.0 |  |  |  |
| 3.1 |  | - Lecture <br> - Discussions | - Oral Exam |
| 3.2 | Competence: | - Lecture <br> - Discussions | - Oral Exam <br> - Rubrics |
| $\ldots$ | --- | --- | --- |

## 2. Assessment Tasks for Students

| \# | Assessment task* | Week Due | Percentage of Total Assessment Score |
| :---: | :---: | :---: | :---: |
| 1 | Exercises, Homework\& Assignments | Open | 10\% |
| 2 | Oral Exam and Rubrics | $14^{\text {it }}$ Week | 5\% |
| 3 | Quizzes | Open | 5\% |
| 4 | Written Test(1) | $7^{\text {th }}$ Week | 15\% |
| 5 | Written Test(2) | $13^{\text {tr }}$ Week | 15\% |
| 6 | Final Exam | End of Semester | 50\% |

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

## Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

lecture of the course.

- Arrangements for availability of teaching staff for individual student consultations and academic advice (include amount of time teaching staff are expected to be available each week).
- Office hours for a teaching staff for one hour weekly.


## F. Learning Resources and Facilities

## 1.Learning Resources

| Required Textbooks | - Elementary Linear Algebra, Bernard Kolman, Macmilan Publishing Inc. <br> - Introduction to Linear Algebra, authored d / Hamid Mustafa Howaidy, <br> Mutanabi Library, 1428 |
| :---: | :---: |
| Essential References Materials | Elementary Linear algebra (7th Edition) By: Howard Anton John Wiley \& sons(1994) <br> - Hawkins, T., Lebesgues Theory of Integration, University of Wisconsin press, Madison, 1970. |
| Electronic Materials | - Matlab Software |
| Other Learning Materials | http://en.wikipedia.org/wiki/Mathematics |

## 2. Facilities Required

| Item | Resources |
| :---: | :---: |
| Accommodation <br> (Classrooms, laboratories, demonstration rooms/labs, etc.) | Lecture Hall by the number of seats $=30$ seat approximately . |
| Technology Resources (AV, data show, Smart Board, software, etc.) | - Datashow <br> - Smart Board <br> - Wi Fi |
| Other Resources <br> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | - None |

## G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
| :---: | :---: | :---: |
| Student course evaluation survey at the end of semester. | Students | Questionnaire (Indirect) |
| Effectiveness of teaching and assessment | Peer Reviewer | Rubrics (Indirect) |
| ---- | --- | ---- |
| ---- | --- | ---- |
| --- |  | --- |
| --- |  | ----- |


| Evaluation <br> Areas/Issues | Evaluators | Evaluation Methods |
| :---: | :---: | :---: |
| $---\quad--\quad$ | $--\quad$ |  |

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

## H. Specification Approval Data

| Council / Committee | Department Council |
| :--- | :--- |
| Reference No. | Session No. $10(441-38-43300)$ |
| Date | $17 / 02 / 2020$ |



