Kingdom of Saudi Arabia

The National Commission for Academic Accreditation
&
Assessment

Course Specification

Institution: **University of Dammam**

College/Department: **Collegeof Sciences /Department of Mathematics**

A. Course Identification and General Information

1. Course title and code:**linear algebra, Math 233N**
2. Credit hours: **3**
3. Program(s) in which the course is offered: **Mathematics program**
4. Name of faculty member responsible for the course: **A specific team from the mathematics department**
5. Level/year at which this course is offered: **3th level/2th year**
6. Pre-requisites for this course (if any): **calculus1 – calculus2**
7. Co-requisites for this course (if any): N/A
8. Location if not on main campus: College of Sciences – Girls Campus – Rayan City

9. Mode of Instruction (mark all that apply)

a. traditional classroom   X   What percentag   75%

b. blended (traditional and online)   What percentage

c. e-learning   X   What percentage?   25%

d. correspondence   What percentage

f. other   What percentage?

Comments:The e-learning concerns the use of blackboard, flip teaching, online assessment, ect.

B Objectives

1. **What is the main purpose for this course?**

On successful completion of this course students will be
able to: Solving linear systems by using Gauss
elimination method, Matrix operations and inverse,
Euclidean spaces ,subspaces, spanning sets, linear
indepensets,basis and dimension, rank and nullity of matrix,
coordinates
Orthogonality ,scalar product, orthonormal basis Gram-Schmidt process
,orthogonal projections,
The determinant and its properties , cramers rule,

Linear transformation , kernel and range , one to one and
onto,matrix representaions. The geometry of linear
transformation
Eigenvalues and eigenvectors , characteristic polynomials, similarity and
symmetry.

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)**

- Create, improve and complete (beamer or power point) presentations.

- Update the course by comparing to the contents at other universities.

- Follow up on the latest books to select the most appropriate to update the
contents.

- **Create a question bank.**

- **Find web sites related to the topic.**

C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description:

1. Topics to be Covered		
List of Topics	**No. of Weeks**	**Contact hours**
Elementary row operations , REF, RREF, PIVOT, gauss elimination method	2	3
Matrices and operations on matrices, product of matrices,transpose ,inverse of matrix by Gauss method	2	3
Determinant by laplace expansions, properties of determinant, the adjoint and cramers rule	2	3
Euclidean spaces,subspaces, spanning sets , linear independence , basis and dimensions , rank and nullty , coordinates	2	3
Orthogonality ,scalar product ,orthonormal basis , Gram- Schmidt process , orthogonal projections ,	2	3
Review session on solving linear system and matrices operations Mid-term 1	1	3
Linear transformations , Properties , kenel and range , one to one and onto , matrix representaions , operations on linear transformations	2	3
Eigenvalues and eigenvectors ,the characteristic polynomials	1	3
Fundamental spaces of matrix ,row and column space , the null space	1	3

	1	3
	1	3
	1	3

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

	Lecture	Tutorial	Laboratory or Studio	Practical	Other: Office hours	Total
Contact Hours	2*15= 30	0	0	2*15=30	4*15= 60	120
Credit	2*15	0	0	1*15	0	45

3. Additional private study/learning hours expected for students per week.
60

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment
M e t h o d s
a   n   d
T e a c h i n g
Strategy

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. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	Knowledge		

	Solving system of linear equations Find the inverse of matrix by gauss method Find the 4 spaces of matrix. Find the determinant of matrix Find the kernel and the range of linear transf Find the eigenvalues and eigenvectors	Interactive learning process through questions and answers in class. Worked examples through a sequential delivery of surveying lectures. Homework consisting in solving selected exercises.	Exams and homework are used to assess the acquired knowledge on the subject.
2.0	**Cognitive Skills**		
	To discuss linear system when it has no solution, unique solution, infinitely many solutions To find the inverse of matrix. To find the determinant of matrix To test wether the vectors are L.I OR LD. TO FIND the null and the rank of matrix To find the kenl and the range of LT To find the eigenvalues and eigenvectors To find orthonormal basis by Gram – Schmidt To find the inverse and the product of matrices To find the inverse of linear transformation To find the span of the set	Lectures are covered by different worked examples. Engage students in discussions with questions and answers. Homework consisting in solving selected exercises. Encourage and develop self education.	Homework include problems, solution of which requires scientific thinking, and applications of essential theorems and results of the course Oral and written tests. Explain and communicate the corrected answers of the exams and quizzes. Research projects.
3.0	**Interpersonal Skills & Responsibility**		
	Punctual attendance of classes is required. Students should demonstrate their sense of	Discussion.	Class attendance of students at the

	responsibility for learning by completing both reading and writing assignments in due time.

Students learn to manage their

time. Accustom students to take

responsibility of self learning

Students should act responsibly and ethically in carrying out individual as well as group projects. | Explanation.

Guidance and supervision of the group assignments for research projects.

Assignments are given to the students at regular intervals for them to solve and submit on time. | beginning of the lecture is recoded. Recording of submission of assignment

Observations, interviews, and peer evaluations. |
| **4.0** | **Communication, Information Technology, Numerical** | | |
| | Ability to communicate in written and in oral.

Ability to write reports in English

Ability to explain each step in the problem solving process.

Ability to apply course concepts to mathematical problem solving model.

Ability to use information technology in communication and research projects.

Interact with life problems using different methods of thinking and problem solving. | Research

projects. Oral

presentations. | Periodic written and oral tests.

Discussion.

Observation. |
| **5.0** | **Psychomotor** | | |
| | N/A | N/A | N/A |

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)**						
	System of linear equations	**Gauss elemination method**	**Euclidean spaces**	**Gram-Schmidt process**	**Fundamental spaces of matrix**	**Kernel and image**	**Inverse and product**
Knowledge	Recall	Recall	Recall	Remembe	Remember	Recall	Recall

				r			
Comprehension	Discuss	Discuss	Discuss	Summarize	Summarize	Discuss	Explain

Applicati on	Assess	Assess	Assess	Use	Use	Assess	Utilize
Analysis	Concl ude	Concl ude	Concl ude	Concl ude	Conclu de	Concl ude	Conclud e
Synthesis	Categ oriz e	Categ oriz e	Categ oriz e	Valida te	Validate	Categ oriz e	Categori ze
Evaluati on	Judge	Judge	Judge	Judge	Judge	Judge	Judge

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	Quizz1	4	5%
2	Mid-term1	6	15%
3	Quizz2	8	5%
4	Mid-term2	11	15%
5	Homework	Every week	5%
6	Research project	15	5%
7	Final exam	As schedul ed	50%

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)

4 hrs/week for students' consultation and academic advice.

E Learning Resources

1. List Required Textbooks
Linear algebra and its applications :Harcout , Brace ,Janovich,1988
P.R.HALMOS :FINITE DIMENSIONAL VECTOR SPACES
2. List Essential References Materials (Journals, Reports, etc.)

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)
4. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
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.)

**Lecture room
with 20 seats.
Smart class.**

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

**Computer room with at least 10 systems
Computer room with 20 seats**

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

G   Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching **Student course evaluation at the conclusion of the course. Sample of assignments and tests.** **Observations and discussions during the semester.**
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department **Faculty assessment of the course and effectiveness of teaching delivery. Periodic self-assessment of the program.**
3 Processes for Improvement of Teaching **Participate to workshops on evaluation approaches and effective teaching methods to enable instructors to improve their teaching skill.** **Teaching method will focus on students' learning and on course learning outcomes.**

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)

A Committee reviews samples of student work in this course to check on the standard of grades and achievements.
An external faculty member evaluates the course material and the students' work to compare the standard of grades and achievements with those at his university.

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

Carry out Self- assessment at every two years and external assessment invited faculty members every four years. The feedback received from these assessments will be used to

plan for further improvement in the course syllabus, teaching method, and delivery of course materials.