اعتماد
NCAAA

T4

2020

Course Specifications

Course Title:	Vector Calculus
Course Code:	**MTH204**
Program:	**B.Sc. Mathematics**
Department:	**Mathematics**
College:	**College of Science in Al-Zulfi**
Institution:	**Majmaah University**

Table of Contents

A. Course Identification

1. Credit hours:	

2. Course type

a. University ☐ College ☐ Department ■ Others ☐

b. Required ■ Elective ☐

3. Level/year at which this course is offered:

4. Pre-requisites for this course (if any)**:**
Calculus 1

5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	٤٥	٧٥%
2	**Blended**	١٥	٢٥%
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	45
2	**Laboratory/Studio**	
3	**Tutorial**	30
4	**Others** (specify)	
	Total	75

B. Course Objectives and Learning Outcomes

1. Course Description

- Basic concepts: Vectors fields in two-three dimensions.
- Algebraic operations on vectors: Definitions of gradient- divergence- curl on the vectors.
- Provide the basic elements of analytical geometry- plans and lines in three dimensional spaces and surfaces- Equation of tangent and rectum governing on the surface.
- Calculating the dimensional derivatives -Vector functions - functions on one variable.
- Curvilinear: curvilinear coordinates - orthogonal curvilinear coordinates - line integral surface integral- volume integral.

Relationship between line integral- surface integral- volume integral and theorems Gausses- Green- Stokes

2. Course Main Objective

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	**De**fine the fundamental in vectors calculus, equation of lines, plane, the vector differential Del, the gradient, divergence and curl. Vector integration, line integral, surface integral, volume integral, Curvilinear coordinates, orthogonal curvilinear coordinates, cylindrical, spherical coordinates.	K1
1.2		
1.3		
1...		
2	**Skills :**	
2.1	Outline the logical thinking.	S4
2.2	Enable students to analyses the mathematical problems.	S4
2.3		
2...		
3	**Values:**	
3.1	State the Physical problems by mathematical method.	C4
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Vectors calculus in 2-3 dimensional and algebraic operations on them and solve some problems on it.	٨
2	The equation of lines, plane and applied their properties and solve some problems.	١٢
3	The vector differential operator Del. The gradient-divergence-curl and solve some problems on it.	١٠
4	Vector Integration-Line integrals, surface integrals, volume integrals-and take some theorems as applications on it. Solve also some problems on it.	١٢
5	Curvilinear coordinates and transformation of coordinates and The gradient, divergence and curl in these coordinates. Solve some problems on it.	١٠
...	Special orthogonal coordinate system- Cylindrical, spherical coordinates, .some applications on these and solve some problems on it.	٨
Total		٦٠

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 and Understanding**		
1.1	**D**e**fine** the fundamental in vectors calculus**,** equation of lines, plane, the vector differential Del, the gradient, divergence and curl**.** Vector integration, line integral, surface integral, volume integral**,** Curvilinear coordinates, orthogonal curvilinear coordinates, cylindrical, spherical coordinates.	Start each lecture by general ideas and its benefits.	• Homework • Quiz • Midterms • Final Exams • E-exam •
1.2			
…			
2.0	**Skills**		
2.1	Outline the logical thinking.	Provide main ways to deal with exercises.	Homework More exercise
2.2	Enable students to analyses the mathematical problems	Ask the student to attend lectures for practice solving problem.	Homework More exercise
…			
3.0	**Values**		
3.1	State the Physical problems by mathematical method	Solve some examples in the lecture.	State the Physical problems by mathematical method
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quizzes	During the semester	٥
2	Homework	During the semester	٥
3	Midterm ١	٧	٢٠
4	Midterm٢	١٢	٢٠
5	E-exam	١٤	١٠
6	Final exam	١٦	٤٠
7			
8	Total		١٠٠

*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 :

1. The contact with students by e-mail and website.
2. Activation of the virtual classrooms and academic guidance via Black Board **LMS**.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Susan Colley, Vector Calculus, fourth EDITION. Pearson Education, Inc., 2012. Michael Corral, Vector Calculus, Schoolcraft college, 2008.
Essential References Materials	
Electronic Materials	http://mathforum.org/advanced/numerical.html/ http://faculty.mu.edu.sa/skhafagy/VC
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	
Technology Resources (AV, data show, Smart Board, software, etc.)	
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods

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	Mathematics Department
Reference No.	27
Date	8/8/1442 H -21/3/2021 G

Head of Department

Dr. Muqrin Almuqrin