



# Course Specification

## (Bachelor)

**Course Title:** Mathematical Physics 1

**Course Code:** PHYS 0171

**Program:** BSc in Physics and BSc in Physics of Renewable Energy and Environment

**Department:** Physics

**College:** Science

**Institution:** Majmaah University

**Version:** 2024

**Last Revision Date:** 16-1-2024



## Table of Contents

<b>A. General information about the course:</b> .....	3
<b>B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods</b> .....	4
<b>C. Course Content</b> .....	5
<b>D. Students Assessment Activities</b> .....	6
<b>E. Learning Resources and Facilities</b> .....	6
<b>F. Assessment of Course Quality</b> .....	7
<b>G. Specification Approval</b> .....	7



## A. General information about the course:

### 1. Course Identification

1. Credit hours: 3 (3,0,0)

#### 2. Course type

A.  University  College  Department  Track  Others  
 B.  Required  Elective

3. Level/year at which this course is offered: ( Level 2, First Year )

#### 4. Course General Description:

4. Course general Description

This course intends to provide the student of the fundamental mathematical methods that will have significant application in physics. It is a continuation course for previously given mathematical skills.

#### 5. Pre-requirements for this course (if any):

MATH 0113 Calculus

#### 6. Co-requisites for this course (if any):

none

#### 7. Course Main Objective(s):

- The aim of this course is to provide a base for students for their future research and study.
- After successful completion of this course student will be able to understand Fundamentals of Mathematical Methods of Physics and some basics way of its application

### 2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> <li>• Traditional classroom</li> <li>• E-learning</li> </ul>		





No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

### 3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
<b>Total</b>		<b>45</b>

## B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and understanding</b>			
1.1	State the Fundamental Concepts of Determinants, Matrices Vector Algebra.	K2, K3	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group Discussion</li> <li>Exercises</li> </ul>	<ul style="list-style-type: none"> <li>Mid Exams</li> <li>Bb discussions &amp; participations</li> <li>Final Homework</li> <li>Exam</li> <li></li> </ul>
1.2	Outline Gradient, Divergence, Curl and Laplace operator			
1.3	Describe Line, Surface, and Volume Integrals and know its Physics meaning.			
1.4	<ul style="list-style-type: none"> <li>Tell the differences between Gauss theorem, Stock's theorem and Green's theorem</li> </ul>			
1.5	Describe Spherical polar coordinates,			





Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
	Cylindrical coordinates and Dirac delta function			
<b>2.0</b>	<b>Skills</b>			
2.1	Can correlate and understand the problem solving techniques.	S2 S2	<ul style="list-style-type: none"> <li>• Problem solving</li> <li>• Class discussion</li> </ul>	<ul style="list-style-type: none"> <li>• - Final Exam</li> <li>• Homework</li> <li>• Quizzes</li> </ul>
2.2	<ul style="list-style-type: none"> <li>• Interpret/operate differential equations, integrations, and Matrices.</li> </ul>			
2.3	Rise questions during the lecture, work in groups, and communicate with class fellows and with instructor electronically and periodically and visit the web sites he recommends.	<b>S3</b>		
2.4	Students use information technology in the classroom.	<b>S4</b>		
<b>3.0</b>	<b>Values, autonomy, and responsibility</b>			
3.1	Work in a group and learn time management.	<b>V3</b>	<ul style="list-style-type: none"> <li>• Discussion with students</li> <li>Making students aware about time management in completing their assignments</li> </ul>	<ul style="list-style-type: none"> <li>-Presentation</li> <li>-Discussion and Homework</li> </ul>
3.2	Present a short report in a written form and orally using appropriate scientific methods and take care about its ethical value.	<b>V1</b>		
...				

### C. Course Content

No	List of Topics	Contact Hours
----	----------------	---------------





1.	Determinants, Matrices, Solving linear equations and differential equations by matrices.	9
2.	Application on the motion of the rotation of the rigid body.	6
3	Vector Algebra: Vector products, Position, Displacement, Vector transformation.	6
4	Gradient, The Divergence, The Curl, Laplace operator	9
5	Line, Surface, and Volume Integrals, Gauss theorem, Stock's theorem, Green's theorem	6
6	Spherical polar coordinates, Cylindrical coordinates, The Dirac delta function	9
<b>Total</b>		<b>45</b>

#### D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First exam	WEEK 6	20%
2.	Second exam	WEEK 12	20%
3.	Presentation	Four time/semester	10%
4.	Quiz	Every week	5%
5.	Homework	End of the semester	5%
6.	Final exam		40%

\*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

#### E. Learning Resources and Facilities

##### 1. References and Learning Resources

<b>Essential References</b>	Advanced Engineering Mathematics • ISBN-10: 9780470458365- Erwin Kreyszing
<b>Supportive References</b>	Introduction to Linear Algebra ISBN-10: 0980232775- Gilbert Strang
<b>Electronic Materials</b>	
<b>Other Learning Materials</b>	

##### 2. Required Facilities and equipment

Items	Resources
<b>facilities</b>	Lecture room with at least 25 seats.





Items	Resources
(Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	
<b>Technology equipment</b> (projector, smart board, software)	Auditorium of a capacity of not less than 100 seats for large lecture format classes.
<b>Other equipment</b> (depending on the nature of the specialty)	A smart board to write on and computer.

## F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Program	Indirect
Effectiveness of Students assessment	Students	Direct
Quality of learning resources	Program	Direct
The extent to which CLOs have been achieved	Course coordinator	Direct
Other		

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify))

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval

<b>COUNCIL /COMMITTEE</b>	<b>DEPARTMENT COUNCIL</b>
<b>REFERENCE NO.</b>	<b>16</b>
<b>DATE</b>	<b>30/12/2025</b>

