

Course Syllabus

1	Course title	MATHEMATICAL PHYSICS 1				
2	Course number	0302281				
3	Credit hours	3				
5	Contact hours (theory, practical)	(3,0)				
4	Prerequisites/corequisites	0302102				
5	Program title	B.Sc.				
6	Program code					
7	Awarding institution	The University of Jordan				
8	School	School of Science				
9	Department	Department of Physics				
10	Course level	2 nd year -Bachelor				
11	Year of study and semester(s)	Summer semester 2022/2023				
12	Other department(s) involved in teaching the course	-				
13	Main teaching language	English				
14	Delivery method	□ Face to face learning □ Blended □ Fully online				
15	Online platforms(s)	\square Moodle \square Microsoft Teams \square Skype \square Zoom				
15	Chine plattor his(5)	□Others				
16	6 Issuing/Revision Date 10/7/2023					

مركز الاعتماد وضمان الجودة Name: Dr. Walaa Al Tamimi Office number: 3rd Floor-physics building Email: w.tamimi@ju.edu.jo

Contact hours: S,M, T,W, Th : 8:30 - 9:45

Phone number: 22047

18 Other instructors:

None

19 Course Description:

As stated in the approved study plan.

Complex numbers; linear equations; vectors(Vectors algebra and vector calculus); matrices and determinants; Infinite series Power series; partial differentiations; Curvilinear Coordinates; multiple integrals; vector analysis; Fourier series; Differential Equations (ODE's)

20 Course aims and outcomes:

A- Aims:

The main goal of the course is to provide the Student the mathematical methods and techniques needed in the different courses

B- Students Learning Outcomes (SLOs):

For purposes of mapping the course SLOs to the physics program SLOs, at the successful completion of the physics program, graduates are expected to be able to:

SLO (1) Master professionally a broad set of knowledge concerning the fundamentals in the basic areas of physics: Quantum Mechanics, Classical Mechanics, Electrostatics and Magnetism, Thermal Physics, Optics, Theory of Special Relativity, Mathematical Physics, Electronics.

SLO (2) Apply knowledge of mathematics and fundamental concepts in the basic areas of physics to identify and solve physics related problems.

SLO (3) Utilize computers and available software in both data collections and data analysis.

SLO (4) Utilize standard laboratory equipment, modern instrumentation, and classical techniques to design and conduct experiments as well as to analyze and interpret data.

SLO (5) Develop a recognition of the need and ability to engage in life-long learning.

SLO (6) Demonstrate ability to use techniques, skills, and modern scientific tools necessary for professional practice.

SLO (7) Communicate clearly and effectively in both written and oral forms.

SLO (8) Apply proficiently team-work skills and employ team-based learning strategies.

SLO (9) Apply professional and ethical responsibility to society.

Upon successful completion of this course, students will be able to:

	Program SLOs		SLO							
	Course SLOs	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	 Top understand the Definition, Properties, then to use it in Addition, Subtraction, Multiplication of Rotation of Axes. 		~							
	2 ^{II} Use to calculate Derivation and Integration, Gradient and Divergence, Gauss's Divergence Theorem, Stokes' Theorem, Potential Theory.	~	~							
	3. Calculate Complex Numbers: Definition and representation of complex numbers, Properties of complex numbers, Functions of a complex variable, Powers and roots of a complex number, Applications.	V	V							
	4. To understand and Solve Matrices & Determinants: Laws and properties of matrices, Special matrices, Matrix inversion, Orthogonal matrices, Eigenvalues and Eigenvectors, Hermitian and Unitary matrix. Properties of determinants, Solution of a set of homogeneous and nonhomogeneous equations	V	•							
	 Differentiate and solve Ordinary Differential Equations (ODE's): First Order and Second Order Differential Equations 	~	~							
	6. Calculate Fourier Series: Fourier coefficients, General and complex Form of Fourier Series, Properties of Fourier Series.	~	~							
	 To use and calculate Curvilinear Coordinates: Orthogonal curvilinear coordinates, Cartesian and spherical coordinates, Cylindrical coordinates, Separation of variables. 	~	~							
	8. Study infinite series and power series with simple applications in physics	~	~							

21. Topic Outline and Schedule:



Week	Lecture	Торіс	Intended Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1-5	Vectors Vectors analysis Vector calculus	1+2	Face to Face	Lecture Room	Synchrono us	Assignm ents + Written Exams	Chapter 6 (Boas) Chapter 1(Nabil)
2	6-10	Complex numbers	Complex numbers3Face to FaceLecture Room3Curvilinear Coordinates7Face to FaceLecture Room		Lecture Room	Synchrono us	Assignm ents + Written Exams	Chapter 2 (Boas) Chapter 2(Nabil)
3	11-15	Curvilinear Coordinates			Lecture Room	Synchrono us	Assignm ents + Written Exams	Chapter 5 (Boas) Chapter 3(Nabil)
4	16-20	Linear Equations: Matrices and Determinants	4	Face to Face	Lecture Room	Synchrono us	Assignm ents + Written Exams	Chapter 3 (Boas) Chapter 4(Nabil) + Chapter 5(Nabil)

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5	21-25	Series and sequences	8	Face to Face	Lecture Room	Synchrono us	Assignm ents + Written Exams	Chapter 1 (Boas)
6	26-30	Ordinary Differential Equations (ODE's)	5	Face to Face	Lecture Room	Synchrono us	Assignm ents + Written Exams	Chapter 5 (Boas) Chapter 6(Nabil)
7	31-35	Fourier series	6	Face to Face	Lecture Room	Synchrono us	Assignm ents+Writ ten Exams	Chapter 7 (Boas) Chapter 7(Nabil)



22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
Assignments (1-7)	10	Each chapter has one assignment except chapter 1has two named 1 and 2		every Week	Elearning
First exam	20	Vectors Complex numbers		2-8-2023	On campus
Second exam	20	Matrices and Determinants Power series		20-8-2023	On campus
Final Exam 50 A		All required chapters		31-8-2023	On campus

23 Course Requirements

Students are directed and encouraged to use all possible resources:

- a) use the internet as a learning source.
- b) a series of short movies is promoted

c) students are encouraged to learn a suitable software package as a learning tool.

24 Course Policies:

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A- Attendance policies:

No more than 15% of classes can be missed under any circumstances. The students are supposed to be on time for each session and will not be admitted after 10 minutes from the starting time.

B- Absences from exams and submitting assignments on time:

Assignments are only taken if submitted on time and no make ups for short quizzes.

C- Health and safety procedures:

The lectures are located in proper locations for best lecturing conditions.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

Any act of cheating or plagiarism is not tolerated and the students are clearly required to submit their own work.

E- Grading policy:

The grading for this course is divided into: Assignments 10%, First Exam: 20%, Second Exam: 20%, Final Exam: 50%.

F- Available university services that support achievement in the course:

Textbook, computer, and internet access

25 References:

A- Required book(s), assigned reading and audio-visuals:

Mathematical Methods in the Physical Sciences, 3rd Edition Author: Mary L. Boas Publisher: Wiley International Edition, 2006.

B- Recommended books, materials, and media:

- References: any introductory book on a level comparable to our textbook.
- Introduction to Mathematical Physics,2nd Edition Nabil Laham and Nabil Ayoub, 2004, إربد – ارشيدات شفيق شارع – البهجة مطبعة

