Jordan University of Science and Technology
Faculty of Science & Arts
Physics Department

PHY301 Mathematical Physics (2)
First Semester 2022-2023

Course Catalog
3 Credit Hours. Second order differential equation, Frobenious method, Dirac delta function. Gamma and Beta functions, generalized factorials, Euler constant and Weistrass formula. Sturm-Liouville problem, Bessel inequality, Gram-Schmidt orthonormalization, Hermitian operators. Bessel functions, Neuman functions, Hankel functions, spherical Bessel functions. Legendre functions, Rodrigues formula, generating function, spherical harmonic, addition theorem.

Text Book	
Title	Special Functions for Scientists and Engineers
Author(s)	Nabil L. Laham & Asad K. Abdalla
Edition	3rd Edition
Short Name	1
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
2	Mathematical methods in the physical science	Mary L. Boas.	2nd Edition	

Instructor	
Name	**Khaled Al-Shurman**
Office Location	-
Office Hours	
Email	kmshurman@just.edu.jo

Class Schedule & Room

Section 1:
 Lecture Time: Mon, Wed : 08:30 - 10:00
 Room: N4206

Prerequisites		
Line Number	**Course Name**	**Prerequisite Type**
922512	PHY251 Modern Physics	Prerequisite / Pass

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
Week 1	Frobenious method of solving 2nd ODE	**Ch2** From **1**
Week 2	Dirac delta function	**Ch2** From **1**
Week 3	Gamma functions	**Ch3** From **1**
Week 4	Beta Functions	**Ch3** From **1**
Week 5	Sturm-Liouville problem	**Ch4** From **1**
Week 6	Bessel equation and Bessel function, Bessel function as an integral formula	**Ch5** From **1**
Week 7	Neuman functions and Wronskian	**Ch5** From **1**
Week 8	Spherical Bessel function, Application of Bessel functions to heat equation	**Ch5** From **1**
Week 9	Legendre equation and Legendre functions	**Ch6** From **1**
Week 10	Generating function and Rodregues formula	**Ch6** From **1**
Week 11	Associated Legendre polynomials	**Ch6** From **1**
Week 12	Spherical harmonics, Applications to heat equation	**Ch6** From **1**
Week 13	Addition theorm	**Ch6** From **1**
Week 14	Other special functions	**Ch7** From **1**

Mapping of Course Outcomes to Program Student Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
2. Understanding the properties of Hermitian operators, and how to build an orthonormal set [31]	33%	
3. Learn how to solve Laplace's equation in cylindrical and in spherical coordinates using Bessel and Legendre functions. [31]	33%	

Relationship to Program Student Outcomes (Out of 100%)					
1	2	3	4	5	6
66					

Evaluation	
Assessment Tool	**Weight**
First Exam	25%
Final	40%
HW	10%
Second Exam	25%

Date Printed: 2023-05-29