Jordan University of Science and Technology

Faculty of Science & Arts

Physics Department

PHY301 Mathematical Physics (2)

First Semester 2017-2018

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	**Dr. Abdalla Obeidat**
Office Location	PH3 L1
Office Hours	Sun : 10:30 - 11:30 Mon : 13:30 - 14:30 Tue : 12:30 - 13:30 Wed : 14:30 - 16:00 Thu : 14:30 - 16:00
Email	aobeidat@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Mon, Wed : 11:30 - 13:00 Room: NF27

Prerequisites		
Line Number	**Course Name**	**Prequisite Type**
922010	PHY201 Mathematical Physics(1)	Prerequisite / Study

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 Objectives to Program Student Outcomes[1]	Assessment method
1.1. Learn general method of solving 2nd ODE. [2(a), 1(c), 1(e), 1(k)]	
2.1. Learn the concepts behind the most general 2nd ODE, and how to write it as a self-adjoint equation, and determine if it is Hermition or not, and generate an orthonormal functions. [2(a), 1(c), 1(e), 1(k)]	
3.1. Learn how to solve the Laplacian in cylindrical and spherical coordinates, and take advantage of Bessel and Legendre functions. [2(a), 1(c), 1(e), 1(k)]	

Relationship to Program Student Outcomes (Out of 100%)										
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
40		20		20						20

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