PHYSICAL MATHEMATICS II

1	Course Title:	PHYSICAL MATHEMATICS II
2	Course Code:	FZK2004
3	Type of Course:	Compulsory
4	Level of Course:	First Cycle
5	Year of Study:	2
6	Semester:	4
7	ECTS Credits Allocated:	8.00
8	Theoretical (hour/week):	5.00
9	Practice (hour/week):	0.00
10	Laboratory (hour/week):	0
11	Prerequisites:	no
12	Language:	Turkish
13	Mode of Delivery:	Face to face
14	Course Coordinator:	Prof. Dr. İLHAN TAPAN
15	Course Lecturers:	Prof. Dr. Emin N. Özmutlu
16	Contact information of the Course Coordinator:	ilhan@uludag.edu.tr, 0 224 29 41 698, UÜ Fen Edebiyat Fakültesi, Fizik Bölümü 16059 Görükle Kampüsü Bursa
17	Website:	
18	Objective of the Course:	1. To teach the method of mathematical physics 2. To teach special mathematical methods used in physics 3. To give the ability of practical solution to the problems 4. To show the application of the mathematics to the current physics problems.
19	Contribution of the Course to Professional Development:	
20	Learning Outcomes:	

	1	Learns mathematical physics.
	2	Learns the application of mathematics problems in physics
	3	Gains practical thinking capability
	4	Learns methods of approach.
	5	Learns Taylor series and binomial theorem
	6	Learns Fourier series and transforms
	7	Learns indexed operations
	8	Learns the Dirac-delta function.
	9	Learns the four vector formulation.
	10	Learns the complex numbers.

21	Course Content:
	Course Content:

Week	Theoretical	Practice
1	Applications of derivative. Physical and mathematical form of the derivative. The average speed.	
2	Slope of the function, meaning of increase and decrease of the slope, determination of the maximum and minimum points of the function.	

3	Examples of bisection and Newton methods, comparison between the methods. The root of a function is found within the error limits using these methods.	
4	The concept of series expansions is given. Taylor and Maclaurin series expansions are explained. Series expansions of exponential and trigonometric functions are given.	
5	Binomial theorem is given. Application of Taylor and Maclaurin series expansions are given.	
6	Fourier series, Trigonometric Fourier series, harmonics, sine and cosine functions. The calculation of Fourier coefficients for the functions of 2L. Fourier transformations. First exam	
7	Complex form of Fourier series. The complex Fourier transforms. The Laplace transform.	
8	Dirac-delta function. Properties of the Dirac-delta function. Step functions . Step functions of Dirac-delta function.	
9	Indexed calculations. Expression of vector in a three-dimensional space. Kronecker delta and Levi Civita. Scalar and vector products of two vectors. Index applications.	
10	Tensor is given. Dyad and its properties are described. The matrix form of a tensor is given. Tensors with index expression is given. Scalar multiplication of tensors is given.	
11	Concepts of mass and center of gravity is given by using index operations. Center of mass problems are solved by using both index operations and integrals. Cartesian, polar, spherical and cylindrical coordinates are used in integral solution.	
12	Definition of torque and moment of inertia is done with indexed operations. Second exam	
13	Galilean and Lorentz transformations are given. Minkowski space is mentioned. Orthogonal tensor transformation is given. Covariant and contravariant metric tensor is given. Forms of the four vectors are defined.	
14	Complex numbers and their properties are given. The geometric representation of complex numbers are given. Complex numbers are given in polar form. Expression of De Moivre Formula is given.	
22	Textbooks, References and/or Other Materials:	1. İleri Analiz, Prof Dr. Saffet Süray, Güven Kitabevi, 1978 2. Fizikçiler ve Mühendisler için kısmi diferansiyel denklemler, Yaşar Pala, Ahmet Cengiz, Mürsel Alper, Uludağ Üniv. Basımevi, 2000 3. Fizik ve Mühendislikte Matematik Yöntemler, Emine Öztürk, Seçkin Yayıncılık, 2011 4. Fen ve Mühendislik Bilimlerinde Matematik yöntemler, Selçuk Bayın, Ders Kitapları AŞ, 2004
23	Assesment	

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
Midterm Exam	2	50.00
Quiz	0	0.00
Home work-project	0	0.00
Final Exam	1	50.00
Total	3	100.00
Contribution of Term (Year) Learning Activities to Success Grade		50.00
Contribution of Final Exam to Success Grade		50.00
Total		100.00
Measurement and Evaluation Techniques Used in the Course		

24 ECTS / WORK LOAD TABLE

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	5.00	70.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	14	5.00	70.00
Homeworks	14	5.00	70.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	2	2.00	4.00
Others	14	2.00	28.00
Final Exams	1	2.00	2.00
Total Work Load			244.00
Total work load/ 30 hr			8.13
ECTS Credit of the Course			8.00

25 CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS

	PQ1	PQ2	PQ3	PQ4	PQ5	PQ6	PQ7	PQ8	PQ9	PQ10	PQ11	PQ12	PQ13	PQ14	PQ15	PQ16
ÖK1	2	4	5	0	2	2	4	1	3	4	2	2	0	0	0	0
ÖK2	3	5	5	0	2	2	3	1	4	3	2	2	0	0	0	0
ÖK3	2	5	4	0	2	2	4	1	3	5	3	1	0	0	0	0
ÖK4	3	4	5	0	2	2	4	1	3	4	2	2	0	0	0	0
ÖK5	3	4	5	0	2	2	4	1	3	4	2	2	0	0	0	0
ÖK6	3	4	5	0	2	2	4	1	3	4	2	2	0	0	0	0
ÖK7	3	4	5	0	2	2	4	1	3	4	2	2	0	0	0	0
ÖK8	3	4	5	0	2	2	4	1	3	4	2	2	0	0	0	0

ÖK9	3	4	5	0	2	2	4	1	3	4	2	2	0	0	0	0
ÖK10	3	4	5	0	2	2	4	1	3	4	2	2	0	0	0	0

LO: Learning Objectives PQ: Program Qualifications

Contribution Level:	**1 very low**	**2 low**	**3 Medium**	**4 High**	**5 Very High**