Fizik Bölümü / PHYSICS /

Course Code	Course Name	Teorical	Practice	Laboratory	Credits	ECTS
FZK-2006	Mathematical Pyhisics II	3.00	2.00	0.00	4.00	7.00

Course Detail

Course Language	:	Turkish
Qualification Degree	:	Bachelor
Course Type	:	Compulsory
Preconditions	:	Not
Objectives of the Course	:	To create the necessary infrastructure for physics students to have basic mathematical knowledge.
Course Contents	:	matrices; equation system solutions using matrices; eigenvalue problem; coordinate systems; operators; partial differential equations; laplace equation; heat diffusion equation; wave equation.
Recommended or Required Reading	:	1) Fizikte Matematik Yöntemler,Coşkun Önem,Birsen Yayınevi(1982) 2) Mathematical Methods for Physicists (fifth edition), by G.B. Arfken and H.J. Weber (Harcourt Academic Press, 2001) 3) Complex Variables and Applications, by R.V. Churchill, J.W. Brown, and R.F. Verhey (McGraw-Hill, 1974) 4) Mathematical Methods of Physics, by J. Matthews and R.L. Walker (Benjamin, 1970) 5) Numerical Recipes, by W.H. Press, B.P. Flannery, S.A. Teukolsky, and W.T. Vetterling (Cambridge University Press)
Planned Learning Activities and Teaching Methods	:	1) To use matrices, properties and matrix algebra. 2) To analyze the equation systems, the unknowns in physical problems with the help of matrices and to make the eigenvalue-eigenvector calculations in physical systems. 3) Recognizing the operators, to use and apply operator algebra. 4) To know partial differential equations, to solve partial differential equations encountered in physics. 5) To recognize coordinate systems, to convert the physical quantities between the coordinate systems.
Recommended Optional Programme Components	:	It is recommended that the student make regular repetitions by using the given sources.
Instructors	:	Assoc. Prof. Dr. Melis Ulu Doğru
Instructor's Assistants	:	Research Assistant Dr. Caglar Püsküllü
Presentation Of Course	:	Oral and written presentation, Lecture, Homework, Discussion Practice

Course Outcomes

Upon the completion of this course a student :

1 Using matrices, properties and matrix algebra.

2 To solve equation systems, physical problems with the help of matrices and to make the eigenvalue-eigenvector calculations in physical systems.

3 Using operators algebra to recognize and implement operators.

4 To recognize partial differential equations, to solve partial differential equations encountered in physics.

5 To recognize coordinate systems, to convert physical quantities between coordinate systems.

Preconditions

Course Code	Course Name	Teorical	Practice	Laboratory	Credits	ECTS

Weekly Contents

	Teorical	Practice	Laboratory	Preparation Info	Teaching Methods
1.Week	*What is a matrix, operations with matrices	*What is a matrix, operations with matrices	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice
2.Week	*properties of matrices, determinant, cofactor, adjoint, inverse of matrix	*properties of matrices, determinant, cofactor, adjoint, inverse of matrix	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice
3.Week	*Solutions of equations by using matrices, cramer method	*Solutions of equations by using matrices, cramer method	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice
4.Week	*Eigenvalues and eigenvalues, eigenvalue-eigenvector calculus	*Eigenvalues and eigenvalues, eigenvalue-eigenvector calculus	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice
5.Week	*Operators, hilbert spaces, linear and hermitian operators, dirac notation,	*Operators, hilbert spaces, linear and hermitian operators, dirac notation,	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice
6.Week	* Operators used in physics, gradient, divergence, rotation, laplasian operators	* Operators used in physics, gradient, divergence, rotation, laplasian operators	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice
7.Week	*Coordinate systems, vertical and curved coordinate systems.	*Coordinate systems, vertical and curved coordinate systems.	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice
8.Week	*Coordinate transformations, midterm	*Coordinate transformations, midterm	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice
9.Week	* Physical operators in orthogonal and curvilinear coordinates	*Physical operators in orthogonal and curvilinear coordinates	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice
10.Week	*Partial differential equations and their solution methods	*Partial differential equations and their solution methods	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice
11.Week	*Laplace equation and solution method and physical applications	*Laplace equation and solution method and physical applications	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice
12.Week	*Heat dissipation system, solution methods and physical applications	*Heat dissipation system, solution methods and physical applications	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice
13.Week	*Wave equation, solution methods and physical applications	*Wave equation, solution methods and physical applications	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice
14.Week	*overview	*overview	*There is no laboratory in the course.	*Preliminary work can be done from the recommended sources.	*Lecture, Homework, Discussion Practice

Assesment Methods %

ECTS Workload

Activities	Count	Time(Hour)	Sum of Workload
Vize	1	2.00	2.00
Ödev	7	2.00	14.00
Final	1	2.00	2.00
Attending lectures	14	3.00	42.00
Application / Practice	14	2.00	28.00
Individual study before lecture	14	1.00	14.00
Individual study after lecture	14	2.00	28.00
Preparation for midterm	1	15.00	15.00
Preparation for final	1	25.00	25.00
Further Study	14	2.00	28.00
		Total :	198.00
		Sum of Workload / 30 (Hour) :	7
		ECTS :	7.00

Program And OutcomeRelation

	P.O. 1	P.O. 2	P.O. 3	P.O. 4	P.O. 5	P.O. 6	P.O. 7	P.O. 8	P.O. 9	P.O. 10	P.O. 11	P.O. 12	P.O. 13	P.O. 14	P.O. 15	P.O. 16	P.O. 17	P.O. 18	P.O. 19	P.O. 20	P.O. 21	P.O. 22	P.O. 23	P.O. 24
L.O. 1	4	5	4	4	5	3	3	3	4	4	4	5	3	5	4	4	0	0	0	0	0	0	0	0
L.O. 2	4	5	4	4	5	3	3	3	4	4	4	5	3	5	3	4	0	0	0	0	0	0	0	0
L.O. 3	4	5	4	4	5	3	3	3	4	4	4	5	3	5	4	5	0	0	0	0	0	0	0	0
L.O. 4	4	5	4	4	5	3	3	3	4	4	4	5	3	5	3	5	0	0	0	0	0	0	0	0
L.O. 5	4	5	4	4	5	3	3	3	4	4	4	5	3	5	4	5	0	0	0	0	0	0	0	0

Ders/Program Çıktıları İlişkisi

P.O. 1	P.O. 2	P.O. 3	P.O. 4	P.O. 5	P.O. 6	P.O. 7	P.O. 8	P.O. 9	P.O. 10	P.O. 11	P.O. 12	P.O. 13	P.O. 14	P.O. 15	P.O. 16	P.O. 17	P.O. 18	P.O. 19	P.O. 20	P.O. 21	P.O. 22	P.O. 23	P.O. 24	P.O. 2
4	4	3	5	4	3	5	4	3	5	3	4	3	4	4	3	0	0	0	0	0	0	0	0	0