Fizik Bölümü / PHYSICS /

Course Code	Course Name	Teorical	Practice	Laboratory	Credits	ECTS
FZK-4042	Computational Physics	3.00	0.00	0.00	3.00	6.00

Course Detail

Course Language	:	Turkish
Qualification Degree	:	Bachelor
Course Type	:	Optional
Preconditions	:	Not
Objectives of the Course	:	We focus on dealing with physics problems using computer code, to solve and interpret physics problems effectively with the help of current coding programs, to perform computational physics applications using their own codes.
Course Contents	:	Using programming languages such as Fortran, Python, and Mathematica to solve model physics problems
Recommended or Required Reading	:	- Fortran ve Python ile sayısal fizik, Prof. Dr. Bekir KARAOĞLU, Seçkin Yay. (2. basım) 2013. -Computational Physics: Problem Solving with Python, 3rd Edition, Rubin H. Landau, Manuel J Páez, Cristian C. Bordeianu, Wiley, 2015. -Computational Problems for Physics With Guided Solutions Using Python, Rubin H. Landau, Manuel José Páez, CRC press, 2018 -An Introduction to Computational Physics Second Edition, Tao Pang, Cambridge University Press, 2006.
Planned Learning Activities and Teaching Methods	:	Computer, lecture, homework
Recommended Optional Programme Components	:	Current research topics for students
Instructors	:	Assoc. Prof. Dr. Murat Ertürk
Instructor's Assistants	:	Assoc. Prof. Dr. Murat ERTÜRK
Presentation Of Course	:	Face to face

Course Outcomes

Upon the completion of this course a student :

1 Understanding of how coding is used to solve basic physical problems

2 Understands how to perform the basic modern physics problems using fast computer code

3 The students work on physics problems that are to be solved numerically using computer code. They hand in a report each week, and afterwards they also present their solution in class.

4 can critically evaluate results and errors

Preconditions

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Weekly Contents

	Teorical	Practice	Laboratory	Preparation Info	Teaching Methods
1.Week	*Number presentation in a computer: Fortran and Python languages				
2.Week	*Error in numerical computation				
3.Week	*Applications for symbolic and numerical computation				
4.Week		*Numerical integration and derivative			
5.Week		*Numerical derivative and integration in basic physics problems and their applications			
6.Week	*Finding root, Newton-Raphson methods and their application				
7.Week	*Differential equations and initial value problems				
8.Week		*Midterm exam			
9.Week	*Eigenvalue and eigenvector calculations				
10.Week	*Special functions and their use in physics				
11.Week		*Special functions in symbolic programing			
12.Week	*Fortran and Python languages: Special functions				
13.Week		*Fortran and Python languages: applications to atomic and molecular systems			
14.Week		*Fortran and Python languages : project works			

Assesment Methods %

1 Mid Term Exam 1 : 25.000

2 Research&Project : 15.000

3 Final : 60.000

ECTS Workload

Activities	Count	Time(Hour)	Sum of Workload
Vize	1	2.00	2.00
Proje	2	12.00	24.00
Preparation for final	1	12.00	12.00
Research presentation	2	20.00	40.00
Final Exam	1	8.00	8.00
Further Study	8	2.00	16.00
Presentation/Seminar	2	10.00	20.00
Attending lectures	14	3.00	42.00
Individual study before lecture	14	2.00	28.00
		Total :	192.00
		Sum of Workload / 30 (Hour) :	6
		ECTS :	6.00

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	4	4	5	4	5	5	2	3	5	3	4	3	5	4	3	3	3	3	3	4	4	4	4
L.O. 2	4	5	5	5	5	4	4	3	4	5	4	5	3	5	5	4	3	3	0	0	0	0	0	0
L.O. 3	5	5	4	4	5	4	4	3	4	4	4	5	4	5	5	4	3	3	0	0	0	0	0	0
L.O. 4	5	5	5	5	5	4	4	3	5	5	5	5	5	5	5	4	3	3	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
5	5	5	5	5	5	4	3	4	5	4	5	4	5	5	3	3	0	0	0	0	0	0	0	0