

Course Code	Course Name	Teorical	Practice	Laboratory	Credits	ECTS
FZK-4045	Nuclear Energy and Enviroment	2.00	2.00	0.00	3.00	7.00
Course Detail						
<b>Course Language</b>	: Turkish					
<b>Qualification Degree</b>	: Bachelor					
<b>Course Type</b>	: Optional					
<b>Preconditions</b>	: Not					
<b>Objectives of the Course</b>	: The aim of this course is to enable students to comprehend the philosophies of nuclear energy and the environment, to learn the basic concepts and models of the atom, to learn about radioactivity and isotopes, to learn about radioactivity measurement devices, to learn the fields of use of nuclear energy in industry and medicine, to know natural radioactivity and its sources, To provide information about the behavior of radioactive isotopes in natural environments, the relationship between nuclear energy and the environment, and the benefits and harms of radioactivity.					
<b>Course Contents</b>	: Nuclear and radiation principles. Radiation-matter interactions. Effects of nuclear energy on humans and the environment. Methods of protecting the environment from radiation. Sources and radioactive series of environmental radioactivity. Nuclear reactor fuel. Management of processed fuel. Behavior of radioactive isotopes in natural environments. Natural disasters. Radiation detection. Environmental pollution.					
<b>Recommended or Required Reading</b>	: 1. Chopin, G., Rydberg, J., Liljenzin J. O. The radiochemistry and Nuclear Chemistry, 2002. 2. Kathren, R. L., Radyoactivity in the Environment: Sources, Distribution, and surveillance, 1986. 3. Michael F. L'Annunziata, Handbook of Radioactivity Analysis, ACADEMIC PRESS, USA, 1998. 4. Radojevic, M., Bashkin, V. M., Practical Environmental Analysis, 1999. 5. Puiseux, L., Crépuscule Des Atomes, Translated to Persian by Alevi, S. A., 2001. 5. Raymond L. Muray, Keith E. Holbert. Nükleer Enerji, Nobel Akademik Yayıncılık, 2015. 6. Ahmet Ege, Nükleer Enerji - Atomdan Elektriğe Sağlıktan Silaha, Hece Yayınları, 2019. 7. Lamarsh, Anthony J. Baratta, 2001. Introduction to Nuclear Engineering, 3rd edition. Prentice Hall USA.					
<b>Planned Learning Activities and Teaching Methods</b>	: Lecture Discussion Report Preparation and/or Presentation.					
<b>Recommended Optional Programme Components</b>	: --					
<b>Course Instructors</b>	: Prof. Dr. Emine Dilara Atalay					
<b>Instructor's Assistants</b>	: --					
<b>Presentation Of Course</b>	: Face to face / Online					

## Course Outcomes

## Upon the completion of this course a student :

- 1 To be able to establish a relationship between environment-human and energy, to learn the concept of energy, related definitions, units and energy conversion methods.
- 2 Gaining the habit of solving problems related to energy units and showing the differences of nuclear energy.
- 3 To learn what nuclear energy is and how it is produced and to comprehend the basic concepts and principles of radioactive waste management of nuclear energy.
- 4 To learn the concepts of radiation and radioactivity and to be able to calculate the activity.
- 5 To learn about the main components and common types of nuclear reactors.
- 6 To recognize the processes in the nuclear fuel cycle and to learn their purposes.
- 7 Demonstrate the advantages of nuclear techniques for environmental monitoring.
- 8 To be able to seek an answer to the question of whether nuclear energy is beneficial and environmentally friendly.

## Preconditions

Course Code	Course Name	Teorical	Practice	Laboratory	Credits	ECTS
-------------	-------------	----------	----------	------------	---------	------

Weekly Contents					
	Teoretical	Practice	Laboratory	Preparation Info	Teaching Methods
1.Week	*Basic principles of nuclear energy, atomic nuclei and isotopes	*Basic principles of nuclear energy, atomic nuclei and isotopes			
2.Week	*Sources and types of radioactivity.	*Sources and types of radioactivity.			
3.Week	*Splitting of atomic nuclei, fission of slow and fast neutrons, chain reaction in fission.	*Splitting of atomic nuclei, fission of slow and fast neutrons, chain reaction in fission.			
4.Week	*Nuclear reactors, reactor control, nuclear waste management.	*Nuclear reactors, reactor control, nuclear waste management.			
5.Week	*Radiation-matter interactions.	*Radiation-matter interactions.			
6.Week	*Radiation protection and basic safety conditions, radiation dose and units, effects of radiation on humans.	*Radiation protection and basic safety conditions, radiation dose and units, effects of radiation on humans.			
7.Week	*Nuclear accidents, types of nuclear accidents.	*Nuclear accidents, types of nuclear accidents.			
8.Week	*Radioactive Fallout.	*Radioactive Fallout.			
9.Week	*Environmental pollution and its main causes, types of pollution.	*Environmental pollution and its main causes, types of pollution.			
10.Week	*Air pollution, water pollution.	*Air pollution, water pollution.			
11.Week	*Pollution of surface and underground water resources.	*Pollution of surface and underground water resources.			
12.Week	*Soil pollution.	*Soil pollution.			
13.Week	*Side effects of radiation environmental pollution, food and human.	*Side effects of radiation environmental pollution, food and human.			
14.Week	*Overview.	*Overview.			

Assesment Methods %
1 Final : 50.000
2 Ödev : 10.000
3 Presentation/Seminar : 40.000

ECTS Workload			
Activities	Count	Time(Hour)	Sum of Workload
Ödev	4	3.00	12.00
Final	1	3.00	3.00
Individual study before lecture	4	5.00	20.00
Preparation for final	14	2.00	28.00
Preliminary Study	14	3.00	42.00
Further Study	14	3.00	42.00
Presentation/Seminar	4	2.00	8.00
Class Hours (14 weeks)	14	4.00	56.00
Total :			211.00
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	2	2	3	2	1	2	1	4	2	3	3	4	2	3	3	1	4	1	3	3	2	3	2	4
L.O. 2	2	2	3	2	1	2	1	4	2	3	3	4	2	3	3	1	4	1	3	3	2	3	2	4
L.O. 3	2	2	3	2	1	2	1	4	2	3	3	4	2	3	3	1	4	1	3	3	2	3	2	4
L.O. 4	2	2	3	2	1	2	1	4	2	3	3	4	2	3	3	1	4	1	3	3	2	3	2	4
L.O. 5	2	2	3	2	1	2	1	4	2	3	3	4	2	3	3	1	4	1	3	3	2	3	2	4
L.O. 6	2	2	3	2	1	2	1	4	2	3	3	4	2	3	3	1	4	1	3	3	2	3	2	4
L.O. 7	2	2	3	2	1	2	1	4	2	3	3	4	2	3	3	1	4	1	3	3	2	3	2	4
L.O. 8	2	2	3	2	1	2	1	4	2	3	3	4	2	3	3	1	4	1	3	3	2	3	2	4

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
2	2	3	2	1	2	1	4	2	3	3	4	2	3	3	1	4	1	3	3	2	3	2	4	3