ADVANCED NUCLEAR PHYSICS II (NUKLEER FIZ.A.B.D. IÇIN)

1	Course Title:	ADVANCED NUCLEAR PHYSICS II (NUKLEER FIZ.A.B.D. IÇIN)	
2	Course Code:	FZK6501	
3	Type of Course:	Compulsory	
4	Level of Course:	Third Cycle	
5	Year of Study:	1	
6	Semester:	1	
7	ECTS Credits Allocated:	6.00	
8	Theoretical (hour/week):	3.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:		
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Prof. Dr. AHMET CENGİZ	
15	Course Lecturers:	Prof. Dr. Orhan GÜRLER Prof. Dr. Nil KÜÇÜK Doç. Dr. Ayşegül KAHRAMAN Doç. Dr. Ürkiye TARIM AKAR	
16	Contact information of the Course Coordinator:	Prof. Dr. Ahmet Cengiz B. U. Ü. Fen-Edebiyat Fakültesi Fizik Bölümü 16059 Görükle Bursa email: acengiz@uludag.edu.tr Tel: 0224 2941695	
17	Website:		
18	Objective of the Course:	Understanding of the structures of the nucleus and the nuclear particles and learning of the application fields of nuclear physics	
19	Contribution of the Course to Professional Development:	Knows the structure and properties of the nucleus.	
20	Learning Outcomes:		
		1	Learns the interaction of neutrons with matter
		2	Learns nuclear fission and fusion
		3	Learns the structure of accelerators
		4	Learns the mesons and its properties
		5	Learns the structure and properties of the particles
		6	Gets knowledge about the creation of the universe
		7	Learns stellar nucleosynthesis
		8	Gets knowledge about the applications of the nuclear physics
		9	Learns the applications of Alpha Decay
		10	Learns Nuclear Medicine applications in diagnosis and treatment
21	Course Content:		
	Course Content:		
Week	Theoretical	Practice	

1	1. Neutron Physics 1.1 Neutron Sources 1.2 Absorption and Moderation of Neutrons 1.3 Neutron Detectors 1.4 Neutron Reactions and Cross Sections 1.5 Neutron Capture 1.6 Interference and Diffraction with Neutrons	
2	2. Nuclear Fission 2.1 Why Nuclei Fission? 2.2 Characteristics of Fission 2.3 Energy in Fission 2.4 Fission and Nuclear Structure 2.5 Controlled Fission Reactions	
3	2.6 Fission Reactors 2.7 Radioactive Fission Products 2.8 A Natural Fission Reactor 2.9 Fission Explosives	
4	3. Nuclear Fusion 3.1 Basic Fusion Processes 3.2 Characteristics of Fusion 3.3 Solar Fusion 3.4 Controlled Fusion Reactors 3.5 Thermonuclear Weapons	
5	4. Accelerators 4.1 Electrostatic Accelerators 4.2 Cyclotron Accelerators 4.3 Synchronrons 4.4 Linear Accelerators 4.5 Colliding-Beam Accelerators	
6	5.3 Hyperfine Structure 5.4 Measuring Nuclear Moments	
7	6.1 Yukawa Hypothesis 6.2 Properties of Pi Mesons	
8	6.4 Meson Resonances 6.5 Strange Mesons and Baryons	
9	7. Particle Physics 7.2 Symmetry and Conservation Laws 7.3 The Quark Model	
10	7.5 Reactions and Decays in the Quarks Model	
	7.7 Quark Dynamics 7.8 Grand Unified Theories	
11	8. Nuclear Astrophysics 8.1 The Hot Big Bang Cosmology 8.2 Particle and Nuclear Interactions in the Early Universe 8.3 Primordial Nucleosynthesis	
12	8.4 Stellar Nucleosynthesis (A ? 60) 8.5 Stellar Nucleosynthesis (A > 60) 8.6 Nuclear Cosmochronology	
13	9. Applications of Nuclear Physics 9.1 Trace Element Analysis 9.2 Mass Spectrometry with Accelerators	
14	9.3 Alpha Decay Applications 9.4 Diagnostic Nuclear Medicine 9.5 Therapeutic Nuclear Medicine	

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	0	0.00	0.00
Self study and preperation	14	3.00	42.00
Homeworks	14	4.00	56.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	0	0.00	0.00
Others	14	3.00	42.00
Final Exams	1	2.00	2.00
Total Work Load			184.00
Total work load/ 30 hr			6.13
ECTS Credit of the Course			6.00

22	Textbooks, References and/or Other Materials:	1. K. S. Krane, Introductory Nuclear Physics, John Wiley & Sons, New York, 1987. 2. W. N. Cottingham, D. A. Greenwood, An Introduction to Nuclear Physics, Cambridge University Press, 1986.
23	Assesment	

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	0	0.00
Quiz	0	0.00
Home work-project	0	0.00
Final Exam	1	100.00
Total	1	100.00
Contribution of Term (Year) Learning Activities to Success Grade		0.00
Contribution of Final Exam to Success Grade		100.00
Total		100.00
Measurement and Evaluation Techniques Used in the Course		The system of relative evaluation is applied.

24 ECTS / WORK LOAD TABLE

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	3	2	2	0	2	2	4	2	3	3	2	2	0	0	0	0
ÖK2	3	3	2	0	2	3	3	3	2	3	0	2	0	0	0	0
ÖK3	5	5	4	3	2	5	3	0	3	3	0	2	0	0	0	0
ÖK4	5	5	5	3	2	5	3	0	3	4	0	2	0	0	0	0
ÖK5	5	5	5	3	2	5	3	0	3	4	0	2	0	0	0	0
ÖK6	5	5	5	4	2	4	0	3	2	0	0	3	0	0	0	0
ÖK7	5	5	5	3	2	3	3	0	2	3	0	3	0	0	0	0
ÖK8	4	4	4	3	2	2	2	0	2	3	0	0	0	0	0	0
ÖK9	4	4	4	3	2	3	3	2	2	4	0	0	0	0	0	0
ÖK10	4	4	4	2	2	4	3	0	0	3	0	0	0	0	0	0

LO: Learning Objectives PQ: Program Qualifications

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