SAMPLINGTECHNIQUES IN NUCLEARPHYSICS I

1	Course Title:	SAMPLINGTECHNIQUES IN NUCLEARPHYSICS I
2	Course Code:	FZK5509
3	Type of Course:	Optional
4	Level of Course:	Second 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. Mürsel Alper
15	Course Lecturers:	Prof. Dr. Ahmet CENGİZ Prof. Dr. Gökay KAYNAK
16	Contact information of the Course Coordinator:	acengiz@uludag.edu.tr, 0 224 29 41695, U. Ü. Fen Edebiyat Fakültesi, Fizik Bölümü 16059 Görükle Bursa.
17	Website:	
18	Objective of the Course:	Understanding of the nucleus structure
19	Contribution of the Course to Professional Development:	
20	Learning Outcomes:	
	1	Learns the properties of the nucleus.
	2	Learns the nucleus forces and their properties.
	3	Learns models of the nucleus.
	4	Learns radiation measurement units .
	5	Learns nuclear radiation detection.
	6	Learns alpha, beta and gamma decays and their the properties.
	7	Learns alpha, beta and gamma spectroscopy.
	8	Learns the types of nuclear reaction.
	9	Learns the isospin.
	10	Learns nuclear scattering and optical model.
21	Course Content:	

Course Content:

Week	Theoretical	Practice
1	1.Nuclear Properties 1.The Nuclear Radius 2.Mass and Abundance Ratio of Nuclides	
2	3.Nuclear Binding Energy 4.Nuclear Angular Momentum and Parity 5.Nuclear Electromagnetic Moments 6.Nuclear Excited States	

3	2.The Force between Nucleons 1.The Deuteron 2.Nucleon-Nucleon Scattering 3.Proton-Proton and Neutron-Neutron Interactions 4.Properties of Nuclear Force 5.The Exchange Force Model	
4	3.Nuclear Models 1.Shell Model 2.Even-Even Nucleus and Collective Structure 3.The More Realistic Nuclear Models	
5	4.Radioactive Decay 1.Radioactive Decay Law 2.Quantum Theory of Radiative Decays 3.Production and Decay of Radioactivity 4.Growth of Daughter Activities 5.Types of Decay 6.Natural Radioactivity 7.Radioactive Dating 8.Radiation Measurement Units	
6	5.Detecting Nuclear Radiation 1.Interactions of Charged Particles with Matter Inelastic Moments Range Distributions of Protons and Similar Particles and Electrons 2.Interaction of Gamma Rays with Matter	

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	7.00	98.00
Homeworks	14	3.00	42.00
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			226.00
Total work load/ 30 hr			7.53
ECTS Credit of the Course			6.00

	Rules 5.Comparative Half-Lives and Forbidden Transitions	
10	6.Neutrino Physics 7.Double-Beta Decay 8.Beta-Delayed Nucleon Emission 9.Nonconservation of Parity 10.Beta Spectroscopy	
11	8.Gamma Decay 1.Energetics of Gamma Decay 2.Classical Electromagnetic Radiation 3.Transmission to Quantum Mechanics 4.Angular Momentum and Parity Selection Rules 5.Angular Distribution and Polarization Measurements	

12	6.Internal Conversion 7.Lifetimes for Gamma Emission 8.Gamma Ray Spectroscopy 9.Nuclear Resonance Fluorescence and the Mössbauer Effect	
13	9.Nuclear Reactions 1.Types of Reactions and Conservation Laws 2.Energetics of Nuclear Reactions 3.İsospin 4.Reaction Cross Sections 5.Experimental Techniques 6.Coulomb Scattering	
14	7.Nuclear Scattering 8.Scattering and Reaction Cross Sections 9.The Optical Model 10.Compound Nucleus Reaction 11.Direct Reaction 12.Resonance Reactions 13.Heavy Ion Reactions	

22	Textbooks, References and/or Other Materials:	1. K. S. Krane, Introductory Nuclear Physics, John Wiley & Sons, New York, 1987. 3. 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		

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	0	5	2	5	5	0	0	0	2	2	0	0	0	0	0	0
ÖK2	0	5	2	5	5	0	0	0	2	2	0	0	0	0	0	0
ÖK3	0	5	2	5	5	0	0	0	2	2	0	0	0	0	0	0
ÖK4	0	5	2	5	5	0	0	0	2	2	0	0	0	0	0	0
ÖK5	0	5	2	5	5	0	0	0	2	2	0	0	0	0	0	0
ÖK6	0	5	2	5	5	0	0	0	2	2	0	0	0	0	0	0

ÖK7	0	5	2	5	5	0	0	0	2	2	0	0	0	0	0	0
ÖK8	0	5	2	5	5	0	0	0	2	2	0	0	0	0	0	0
ÖK9	0	5	2	5	5	0	0	0	2	2	0	0	0	0	0	0
ÖK10	0	5	2	5	5	0	0	0	2	2	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**