

### AYDIN ADNAN MENDERES UNIVERSITY COURSE INFORMATION FORM

Course Title		Nmr Applications								
Course Code		FİZ428		Couse Level		First Cycle (Bachelor's Degree)				
ECTS Credit	7	Workload	179 <i>(Hours)</i>	Theory	/	3	Practice	0	Laboratory	0
Objectives of the Course		To teach the principles of NMR spectroscopy, interpretations of spectral data and applications of NMR.								
Course Content		Spectroscopy, Nuclear Magnetic Resonance, Relaxation times and measurement techniques, NM imaging, application fields of NMR.					NMR			
Work Placement		N/A								
Planned Learning Activities		and Teaching	Methods	Explar	natio	n (Presentat	ion), Discu	ssion		
Name of Lecturer(s)										

#### **Assessment Methods and Criteria**

Method	Quantity	Percentage (%)	
Midterm Examination	1	30	
Final Examination	1	70	
Quiz	4	10	

## **Recommended or Required Reading**

1	Magnetic Rezonance (Fevzi Apaydın)
2	NMR Imaging in Biomedicine, P. Mansfield and P. G. Morris

Week	Weekly Detailed Cours	se Contents
1	Theoretical	Spectroscopy and magnetic resonance
2	Theoretical	Nuclear magnetic resonance
3	Theoretical	Dipol-dipol interaction, hyperfine splitting and Lande g-tensor
4	Theoretical	The chemical shift, spin-spin coupling
5	Theoretical	Spin-lattice and spin-spin relaxation mechanisms
6	Theoretical	T1 and T2 measurement technics
7	Theoretical	The analysis of NMR spectra
8	Intermediate Exam	Midterm Exam
9	Theoretical	NMR imaging
10	Theoretical	The methods of imaging
11	Theoretical	To compose imaging
12	Theoretical	Investigation time
13	Theoretical	Imaging quality
14	Theoretical	The reasons which effective NMR imaging
15	Theoretical	Clinical examples of NMR imaging

### **Workload Calculation**

Activity	Quantity	Preparation		Duration		Total Workload	
Lecture - Theory	14		8	3		154	
Midterm Examination	1		10	2		12	
Final Examination	1		10	3		13	
Total Workload (Hours)						179	
	7						
*25 hour workload is accepted as 1 ECTS							

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## Learning Outcomes

1	To learn spectroscopy
2	To learn Magnetic Resonance
3	To comment of NMR spectra



4	To learn NMR can use as imaging method
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5 To learn principles of NMR imaging

# Programme Outcomes (Physics)

1	To understand the importance of physics by understanding the general concepts of physics, matter and energy
2	To be able to define the movements of matter and to distinguish the characteristics of movements under different force (potential)
3	Be able to say the meaning of Lagrange and Hamiltonian formulations of the movement and apply them to simple problems,
4	To be able to express the fundamental concepts such as time, space, force, momentum and energy in the movements of matter close to the speed of light and be able to solve and interpret the simple problems related to
5	To be able to establish the relationship between electric and magnetic forces and to be able to illustrate their applications to technology and solve problems related to the movement of particles in electric and magnetic fields
6	Be able to say the basic laws of electromagnetics and apply them to problems, illustrate their applications to simple technology
7	To be able to tell the reasons of the differences between the classical cases and the quantum scale and explain the reasons
8	Explain the concepts of discontinuity, uncertainty, matter-antimatter, indecisiveness of quantum physics with examples and explain simple problems related to the subject.
9	To be able to solve the problems of micro-particles under different simple potentials and be able to say their meanings
10	To be able to establish the relationship between the movements and properties of multi-particle systems and the laws of probability and solve simple problems
11	To be able to illustrate the laws, meanings and applications of thermodynamics and use them
12	Be able to use their knowledge about quantum physics and mechanics in explaining some properties of atoms and nuclei
13	To be able to show the meanings of some theoretical concepts by experimenting, and develop a strong relationship between thought and the real world, develop analytical thinking
14	To be able to apply the meanings of the basic laws of physics, their comprehension of universality and the relations between them and the unity of the laws of nature.
15	Use computer to solve physics problems
16	To be able to understand the problems by using their analytical knowledge skills and to propose solutions by dealing with the laws of physics
17	Be able to use the knowledge of physics to understand new technologies
18	To be able to tell the relations between symmetry and conservation laws in laws of physics

## Contribution of Learning Outcomes to Programme Outcomes 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

	L1	L2	L3	L4	L5
P7	5	5	5	5	5
P8	4	4	4	4	4
P12	5	5	5	5	5
P17			4	4	4

