AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Advanced Atomic and Molecular Physics II								
Course Code	FZK526		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	6	Workload	150 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	To teach molecular structure, molecular spectroscopy and application fields of molecular spectroscopy								
Course Content	Diatomic and polyatomic molecules' structure, molecular spectra and their applications, atomic collisions.								
Work Placement									
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Individual Study, Problem Solving								
Name of Lecturer(s)									

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	15
Final Examination	1	60
Attending Lectures	14	10
Assignment	5	15

Recommended or Required Reading	
1	Atom ve molekül fiziği, B. H. Bransden and C. J. Joachain
2	Molecular Physics: theoretical principles and experimental methods, Wolfgang Demtroder
3	Molecular Physics and elements of quantum chemistry, Introduction to experiments and theory, Hermann Hakan, Willian D. Brewer
4	Advances in atomic, molecular and optical physics, Benjamin Bederson, Harbert Walther

Week	Weekly Detailed Course Contents	
1	Theoretical	Introduction of molecular physics and molecular structure
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 9 section 1
2	Theoretical	Diatomic molecules, Born Oppenheimer separation
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 9 section 2
3	Theoretical	The rotation and vibration of diatomic molecules
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 9 section 3
4	Theoretical	Electronic structure of diatomic molecules
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 9 section 4
5	Theoretical	The structure of polyatomic molecules
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 9 section 5
6	Theoretical	Molecular spectra
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 10 section 1
7	Theoretical	Vibrational-rotational spectra of diatomic molecules
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 10 section 2
8	Intermediate Exam	Midterm Exam
9	Theoretical	Electronic spectra of diatomic molecules
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 10 section 3
10	Theoretical	Electronic spin and Hund states
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 10 section 4
11	Theoretical	Atomic collisions
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 11
12	Theoretical	Electron-atom collisions
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 12
13	Theoretical	Atom-atom collisions
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 13

14	Theoretical	Applications of molecular spectroscopy
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 14
15	Theoretical	Relation of atomic and molecular physics to other sciences
	Preparation Work	Physics of Atoms and Molecules, B. H. Bransden and C. J. Joachain Chapter 14
16	Final Exam	Final Exam

Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	2	3	70
Assignment	6	5	1	36
Seminar	2	10	3	26
Midterm Examination	1	6	3	9
Final Examination	1	6	3	9
			Total Workload (Hours)	150
			[Total Workload (Hours) / 25*] = **ECTS**	6

**25 hour workload is accepted as 1 ECTS*

Learning Outcomes

1	To be able to learn the structure of the molecule
2	To be able to understand the interactions that occur within the molecule
3	To be able to understand the difference between classical mechanics and quantum mechanics.
4	To be able to understand molecular spectroscopy and its applications
5	To be able to understand the relation between the atomic and molecular physics and the other sciences.

Programme Outcomes *(Physics Master)*

1	The student should conceive the concepts in physics and may apply them on her/his own
2	The student should be able to conceive the relationship between the different physics laws and integrity of them and apply them in solving different physics problems
3	The student should know the basic principles of classical, quantum and relativistic physics and use them in the solutions of problems
4	The student should be able to do research in a specific area of physics
5	The student should be able to prepare reports on papers on the subject of her/his research and present her/his research subject in scientific conferences
6	The student should be able to explain the relationship between complicated problems and basic physics laws.
7	The student should be able to use computers for solving complicated physics problems
8	The student should be able to interrelate between the theory and the experiment. If she/he is experimentalist he/she has to explain the theory behind her/his work. If she /he is a theorist she/he should has to know the experiments in her/his subject.

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

	L1	L2	L3	L4	L5
P1	5	5	5	5	5
P2	4	4	5	5	4
P3	4	4	5	4	5
P4	3	3	3	4	3
P5	2	2	2	4	4
P6	4	4	4	4	4
P7	2	2	2	4	2
P8	3	3	3	5	4