Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Atom and Molecular Physics	FZK447	7. Semester	2 + 2	3.0	8.0

Prerequisites	None
Language of Instruction	Turkish
Course Level	Bacheclor's Degree (First Cycle)
Course Type	Elective
Mode of delivery	Face to face
Course Coordinator	Assoc. Prof. Dr. Vildan BİLGİN
Instructors	Assoc. Prof. Dr. Vildan BİLGİN
Assistants	
Course Objectives	This course aims to investigate structure of atomic and to understand of formation mechanisms of structures, to argued to structure of molecules on systems with many atom.
Course Content	One electron atoms, energy states, probability dissociations of electron in atoms, fine structure, hyperfine structure, Zeeman effect Stark effect, two-electrons atoms, Pauli's exclusion principle, excited states of two electrons atoms, many electron atoms, LS- and JJ-couplings, Hund rules, Spectra of alkali atoms, selection rules Radiative transitions, molecular structure, Rotation and vibration motions of two atom molecules, electronic structure of two atom molecules, periodic table, Hartree-Fock method, Electronic, vibrational and rotational spectra of two electron molecules, Structure of many electron atoms, molecular spectra
Course Learning Outcomes	1) Describe the basic concepts and models used to account for atomic structure and spectra 2) Explain the fundamental importance of the landmark experiments in atomic physics 3) Appreciate how applications of atomic physics affect our daily life 4) Apply quantum mechanics to the analysis of atomic structure and spectra 5) Formulate the problems on the basis of acquired knowledge in this course

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	One electron atoms, energy states	Lecture, Problem solving	
2. Week	probability dissociations of electron in atoms	Lecture, Problem solving	

Quick Access

Physics
- Qualification Awarded
- Level of Qualification
- Qualification Requirements and Regulations
- Specific Admission Requirements
- Recognition of Prior Learning
- Profile of the Program
- Program Key Learning Outcomes
- Occupational Profile of Graduates
- Access to Further Studies
- Course Structure & Credits
- Exam Regulations & Assessment & Grading
- Graduation Requirements
- Mode of Study
- Programme Director(or Equivalent)
- Evaluation Questionnaire
- TYYÇ

Course Information
- Course Information
- Weekly Course Content
- Resources
- Assessment
- Course Category
- CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES
- ECTS credits and course workload

3. Week	fine structure, hyperfine structure	Lecture, Problem solving	
4. Week	Zeeman effect	Lecture, Problem solving	
5. Week	Stark effect	Lecture, Problem solving	
6. Week	two-electrons atoms, Pauli’s exclusion principle	Lecture, Problem solving	
7. Week	excited states of two electrons atoms, many electron atoms	Lecture, Problem solving	
8. Week	LS- and JJ-couplings, Hund rules	Lecture, Problem solving	
9. Week	Spectra of alkali atoms, selection rules	Lecture, Problem solving	
10. Week	Radiative transitions, molecular structure	Lecture, Problem solving	
11. Week	Rotation and vibration motions of two atom molecules, electronic structure of two atom molecules	Lecture, Problem solving	
12. Week	periodic table, Hartree-Fock method	Lecture, Problem solving	
13. Week	Electronic, vibrational and rotational spectra of two electron molecules	Lecture, Problem solving	
14. Week	Structure of many electron atoms, molecular spectra	Lecture, Problem solving	
15. Week	molecular spectra	Lecture, Problem solving	
16. Week	Final Exam	Exam	

RESOURCES

Recommended Sources
Bransden, B.H., Joachain, C.J. (1983). Physics of Atoms and Molecules. London: Langman Grp.Lmt.
Aygün, E., Zengin, D. M. (1992). Atom ve Molekül Fiziği. Ankara: Bilim yayınevi.
Eisberg, R., Resnick, R. (1974). Quantum physics of atoms, molecules, solids, nuclei and particles. New York: John Wiley & Sons.

ASSESSMENT

Measurement and Evaluation Methods and Techniques		
Midterm exam, Homework, Final exam		
In-Term Studies	**Quantity**	**Percentage**
Mid Term Exam 1	1	30
Assignment 1	1	20
Total	2	50
End-Term Studies	**Quantity**	**Percentage**
Final Exam	1	50
Total	1	50
Contribution Of In-Term Studies To Overall Grade		50
End-Term Studies		50
Total		100

COURSE CATEGORY

Course Category	Percentage
Core Courses	% 100

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES

Programme Outcomes	Contribution Level	DK1	DK2	DK3	DK4	DK5
PY1	4	5	3	3	4	5
PY2	4	4	4	4	4	4
PY3	0	0	0	0	0	0
PY4	3	2	4	3	2	4
PY5	4	3	5	4	4	4
PY6	0	0	0	0	0	0
PY7	2	2	3	2	2	1
PY8	0	0	0	0	0	0
PY9	0	0	0	0	0	0
PY10	0	0	0	0	0	0
PY11	0	0	0	0	0	0
PY12	0	0	0	0	0	0
PY13	2	2	2	2	2	2
PY14	0	0	0	0	0	0
PY15	0	0	0	0	0	0

*DK = Course's Contrubution.

	0	1	2	3	4	5
Level of contribution	None	Very Low	Low	Fair	High	Very High

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ECTS CREDITS AND COURSE WORKLOAD

Event	Quantity	Duration (Hour)	Total Workload (Hour)
Final Exam	1	3	3
Assignment 1	1	20	20
Class Hours (14 weeks)	14	4	56
Final Exam Preparation	1	25	25
Mid Term Exam Preparation	1	13	13
Mid Term Exam 1	1	3	3
Further Study	14	6	84
		Total Workload	204
		Total Workload / 25.5 (s)	8.00
		ECTS Credit of the Course	8