Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Nuclear Physics II	FZ5034		3 + 0	3.0	7.5

Prerequisites	None

Language of Instruction	Turkish
Course Level	Second Cycle
Course Type	Elective
Mode of delivery	Face to face
Course Coordinator	Assist. Prof. Dr. Ayşe KÜÇÜKARSLAN
Instructors	Assist. Prof. Dr. Ayşe KÜÇÜKARSLAN
Assistants	
Course Objectives	The nature of nuclear force, as manifested by the two-nucleon potential, the properties of nucleer matter are summurized, independent-particle and independent-pair descriptions of nuclear matter developed, advenced nuclear shell model.
Course Content	Attractive, Short-range, Spin-dependent , Noncentral Nuclear Forces, Meson Theory of Nuclear Forces Nuclear Matter: Semiemprical Mass Formula, The Independent-Particle, Fermi-Gas Model, Second Quantization, Single Particle Potential, The Independent-Pair Approximation, Effective Mass Approximation, Nucleer Matter with a “Relativistic” Interaction, Nuclear Binding Energies, Attractive Well Contribution, Fermi Energy, The Shell Model, Solutionfor a pure Hard Core Potential, The single Particle Shell Model, The General Canonical Transformation to Particle and Holes.
Course Learning Outcomes	1) Explain the basic nuclear structure 2) Define the nature of the nuclear matter under extreme conditions 3) Solve the relativistic nuclear many-body problems 4) Apply strong coupling of Quantum Chromo Dynamics 5) Study electroweak interaction with nuclei

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Attractive, Short-range, Spin-dependent , Noncentral Nuclear Forces	Lecture, Problem solving, Homework	
2. Week	Meson Theory of Nuclear Forces	Lecture, Problem solving, Homework	
3. Week	Nuclear Matter: Semiemprical Mass Formula	Lecture, Problem solving, Homework	

4. Week	The Independent-Particle, Fermi-Gas Model	Lecture, Problem solving, Homework	
5. Week	Second Quantization, Single Particle Potential	Lecture, Problem solving, Homework	
6. Week	The Independent-Pair Approximation	Lecture, Problem solving, Homework	
7. Week	Effective Mass Approximation	Lecture, Problem solving, Homework	
8. Week	Midterm Exam	Exam	
9. Week	Nucleer Matter with a “Relativistic” Interaction	Lecture, Problem solving, Homework	
10. Week	Nuclear Binding Energies	Lecture, Problem solving, Homework	
11. Week	Attractive Well Contribution, Fermi Energy	Lecture, Problem solving, Homework	
12. Week	The Shell Model	Lecture, Problem solving, Homework	
13. Week	Solutionfor a pure Hard Core Potential	Lecture, Problem solving, Homework	
14. Week	The single Particle Shell Model	Lecture, Problem solving, Homework	
15. Week	The General Canonical Transformation to Particle and Holes	Lecture, Problem solving, Homework	
16. Week	Final Exam	Exam	

RESOURCES

Recommended Sources
“Theoretical Nuclear and Subnuclear Physics”, J.D.Walecka, 2004, Imperial College Press, London
“Modern Atomic and Nuclear Physics”, F.Yang and J.H.Hamilton, 2010, World Scientific Publishing Co. Pte. Lt., America
"Quantum Theory Many Particle System", A.L. Fetter and J.D.Walecka, 2003, McGraw Hill Book Company, New York

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

Area of pecialization Courses	% 50
Support Courses	% 50

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES

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

.

ECTS CREDITS AND COURSE WORKLOAD

Event	Quantity	Duration (Hour)	Total Workload (Hour)
Class Hours (14 weeks)	14	3	42
Final Exam Preparation	1	30	30
Mid Term Exam Preparation	1	25	25
Further Study	14	3	42
Assignment 1	3	15	45
Final Exam	1	4	4
Mid Term Exam 1	1	3	3
		Total Workload	191
		Total Workload / 25.5 (s)	7.49
		ECTS Credit of the Course	7