Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Theory Of Many-Particle Systems II	FZ5022		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	Prof. Dr. İsmail TARHAN
Instructors	Prof. Dr. Serhat ÖZDER
Assistants	
Course Objectives	The main objective of this course is to provide informations on classical and quantum relativistic formalism of many-particle systems, Green functions in the classical relativistic theory, many-particle Fermi systems, many-particle bose systems.
Course Content	Topics to be covered in this course content are classical relativistic theory of one-particle systems, quantum relativistic theory of one-particle systems, classical relativistic theory of many-particle systems, quantum relativistic theory of many-particle systems, use of Green functions in classical relativistic theory, use of Green functions in quantum relativistic theory, the properties of Fermi systems, Dirac's relativistic quantum mechanics, Dirac equations in electromagnetic field, application of Dirac method to atoms, application of Dirac method to molecules, the properties of Bose systems, Bose theory and their applications.
Course Learning Outcomes	1) Interpret the properties of many-particles Fermi and Bose systems 2) Apply Green's functions 3) Explain properties of Fermi systems 4) Write Dirac equations 5) Explain properties of Bose systems

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Introduction	Oral and written expression	
2. Week	Classical relativistic theory of one-particle systems	Oral and written expression	
3. Week	Quantum relativistic theory of one-particle systems	Oral and written	

Quick Access

Physics (Master)
- 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
- Course Category
- CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES
- ECTS credits and course workload

		expression	
4. Week	Classical relativistic theory of many-particle systems	Oral and written expression	
5. Week	Quantum relativistic theory of many-particle systems	Oral and written expression	
6. Week	Use of Green functions in classical relativistic theory	Oral and written expression	
7. Week	Use of Green functions in quantum relativistic theory	Oral and written expression	
8. Week	Mid-term Exam	Written Exam	
9. Week	The properties of Fermi systems	Oral and written expression	
10. Week	Dirac's relativistic quantum mechanics	Oral and written expression	
11. Week	Dirac equations in electromagnetic field	Oral and written expression	
12. Week	Application of Dirac method to Atoms	Oral and written expression	
13. Week	Application of Dirac method to molecules	Oral and written expression	
14. Week	The properties of Bose systems	Oral and written expression	
15. Week	Bose theory and their applications	Oral and written expression	
16. Week	Final Exam	Written Exam	

RESOURCES

Recommended Sources
Classical Relativistic Many-Body Dynamics, M. A. Trump, W. C. Schieve, Springer; 1 edition
Quantum electrodynamics, V. B. Berestetskii, E. M. Lifshitz and Pitaevski, 2nd ed. Pergamon Press, Oxford, 1989.
Quantum theory of many-particle systems, A.L. Fetter & W.D. Walecka
Greiner, Walter; Bromley, D.A.,Müller, Berndt. (2000). Gauge Theory of Weak Interactions. Springer.

ASSESSMENT

Measurement and Evaluation Methods and Techniques
Mid-term exam + Assignment + Research & Project and Presentation 40%, Final Exam 60%

COURSE CATEGORY

Course Category	Percentage
Support Courses	% 100

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES

Programme Outcomes	Contribution Level	DK1	DK2	DK3	DK4	DK5
PY1	5	5	4	4	4	4
PY2	4	4	4	3	3	4
PY3	4	4	3	4	4	5
PY4	4	5	4	4	5	4

PY5	4	3	4	4	4	5
PY6	5	5	3	3	4	4
PY7	5	4	3	3	5	5
PY8	4	4	5	5	4	4
PY9	5	5	5	4	4	4
PY10	4	4	4	3	3	4
PY11	5	4	4	3	4	4
PY12	4	4	4	3	4	4
PY13	4	4	3	4	5	5
PY14	4	4	3	3	4	4
PY15	4	4	4	4	4	4

*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)
Class Hours (14 weeks)	14	3	42
Final Exam Preparation	1	12	12
Mid Term Exam Preparation	1	8	8
Preliminary Study	14	5	70
Assignment 1	1	10	10
Final Exam	1	3	3
Presentation/Seminar	1	2	2
Mid Term Exam 1	1	3	3
Further Study	14	3	42
		Total Workload	192
		Total Workload / 25.5 (s)	7.53
		ECTS Credit of the Course	8