Ankara Üniversitesi
Kütüphane ve Dokümantasyon Daire Başkanlığı
Açık Ders Malzemeleri

Ders izlence Formu / Syllabus

Dersin Kodu ve İsmi *Course Title and Code*	**PEN425 Advanced Quantum Mechanics II**
Dersin Sorumlusu *Course Coordinator*	Dr. Hasan Özgür Çıldıroğlu
Dersin Düzeyi *Course Level*	Bachelor's Degree
Dersin Kredisi *Course Credits*	3
Dersin Türü *Course Type*	Theoric
Dersin İçeriği *Course Content*	**1) Introduction to Quantum Mechanics** • State • Stern – Gerlach Experiment • Dirac Notation • Ket and Bra Spaces **2) Operators** • Inner Product • Normalization • Linear Operators • Outer Product • Matrix Representations of Operators **3) Definitions in Dirac Reps** • Completeness of Eigenvectors • Matrix Representations • Spectral Decomposition • Measurement • Probability and Expectation Value **4) Compatible Operators** • Measurement of Compatible Operators • Incompatible Observables • Heisenberg Uncertainty Relations • Schwarz Inequality • Heisenberg Uncertainty Principle **5) Change of Basis** • Matrix Representations of Transformation Operators • Transformation of Coordinates • Transformation of Operators • Trace of an Operator **6) Unitary Equivalence** • Continious Spectra • Position Operator • Momentum Operator

	7) Commutation Relations • Wave Functions in Position and Momentum Space • Recitation for MT 8) **Wave Mechanics** • Quantum Dynamics • Time Evolution of Quantum Mechanical System • Dynamical Phases **9) Adiabatic Theorem** • Quantum Mechanical Phases • Geometric Berry Phase **10) Gauge Transformations** • In Classical Mechanics • In EMT • In Quantum Mechanics **11) Topological Phases** • Aharonov-Bohm Phase • Aharonov-Casher Phase • He-Mc-Kellar-Wilkens Phase **12) Pictures of Quantum Mechanics** • Schrödinger Picture • Heisenberg Picture • Dirac Picture **13) Perturbation Theories** • Time-Independent • Time-Dependent **14) A Brief Introduction to Relativistic Quantum Mechanics** • Recitation for Final
Dersin Amacı *Course Goals*	To give the applications of advanced quantum mechanics by using Dirac representation and some approximation methods.
Dersin Süresi *Office Day-Hours*	14 Weeks / 3 Hours of each
Eğitim Dili *Language of Instruction*	English
Ön Koşul *Prerequisites*	-
Önerilen Kaynaklar *Recommended Sources*	• J.J. Sakurai, Modern Quantum Mechanics (2nd Ed.) • E. Merzbacher, QM (3rd Ed.) • J. Bjorken, S. Drell, RQM (v.1) • J.J. Sakurai, Advanced QM • W. Greiner, D.A. Bromley, RQM
Dersin Kredisi (AKTS) *ECTS*	4
Laboratuvar *Laboratory*	-
Diğer-1 *Others*	-