Fall 2024 edition of PHYS624
Advanced Quantum Mechanics (Quantum Field Theory)
Instructor: Zohreh Davoudi

Date	Topic	Event	Important dates
Week 1: 27,29 Aug	Introduction to QFT: Combining QM and relativity From classical to quantum scalar field theory	Lecture 1,2	Quiz 0 due on Aug 29
Week 2: 3,5 Sep	Introduction to QFT: Combining QM and relativity From classical to quantum scalar field theory	Lecture 3,4 PSS* 1	Quiz 1 due on Sep 3 HW 1 due on Sep 5
Week 3: 10,12 Sep	Continous symmetries and conserved charges Discrete and internal symmetries	Lecture 5,6 PSS 2	Quiz 2 due on Sep 10 HW 2 due on Sep 12
Week 4: 17,19 Sep	Interacting theories I: States and time evolution (LSZ formula, interaction picture, Dyson series)	Lecture 7,8 PSS 3	Quiz 3 due on Sep 17 HW 3 due on Sep 19
Week 5: 24,26 Sep	Interacting theories II: Scattering and perturbation theory (S-matrix, Wick's theorem, Feynman rules) Interacting theories III: Cross sections and decay rates	Lecture 9,10 PSS 4	Quiz 4 due on Sep 24 HW 4 due on Sep 26
Week 6: 1,3 Oct		Lecture 11,12 PSS 5	Quiz 5 due on Oct 1 HW 5 due on Oct 3
Week 7: 8,10 Oct		Lecture 13,14 PSS 6	Quiz 6 due on Oct 8 HW 6 due on Oct 10
Week 8: 15,17 Oct		Lecture 15,16 PSS 7	Quiz 7 due on Oct 15 HW 7 due on Oct 17
Week 9: 22,24 Oct		Lecture 17,18 PSS 8	Quiz 8 due on Oct 22 HW 8 due on Oct 24
Week 10: Oct 29, 31		Lecture 19,20 PSS 9	Quiz 9 due on Oct 29 HW 9 due on Oct 31
Week 11: 5,7 Nov		Lecture 21,22 PSS 10	Quiz 10 due on Nov 5 HW 10 due on Nov 7
Week 12: 12,14 Nov		Lecture 23,24 PSS 11	Quiz 11 due on Nov 12 HW 11 due on Nov 14
Week 13: 19,21 Nov		Lecture 25, 26 PSS 12	Quiz 12 due on Nov 19 HW 12 due on Nov 21
Week 14: 26 Nov		Lecture 27	Quiz 13 due on Nov 26
Week 15: 3,5 Dec		Lecture 28,29 PSS 13	HW 13 due on Dec 5
Week 16: 9-14 Dec	-	Final exam period	Exam to be posted on Dec 8 at 5 pm Exam due on Dec 11 at 5 pm

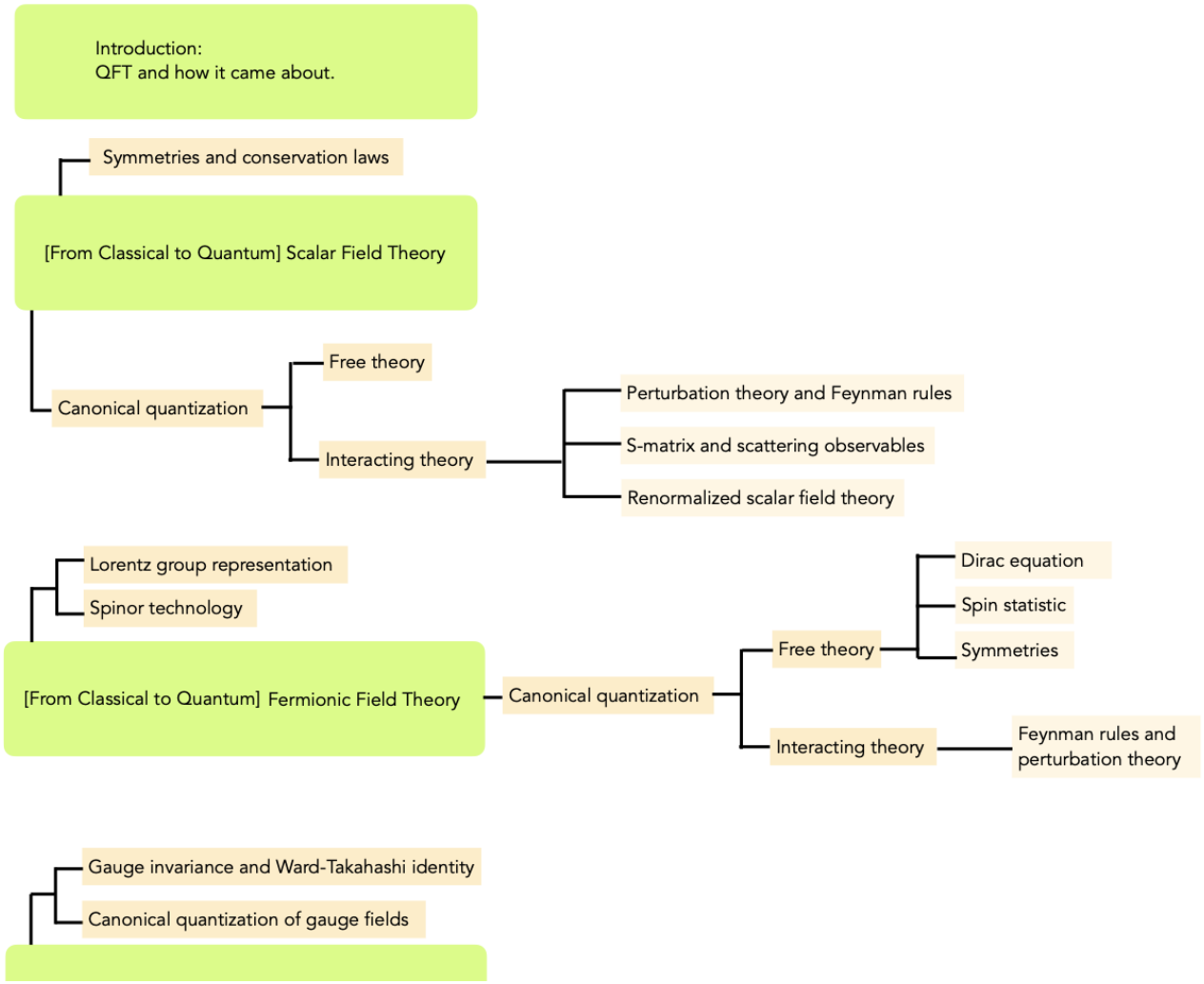
* PSS: Problem Solving Session

Quizzes are due at 9:30 AM of the dates noted (online submission through ELMS).

HW sets are due at 11:59 PM of the dates noted (online submission through ELMS).

For class and PSS time and location, see the course policy and info tab or the file posted on ELMS.

Textbooks and references (with descending priority)
1) Quantum Field Theory, Mark Srednicki
2) An Introduction to Quantum Field Theory, Peskin and Schroeder
3) Eduardo Fradkin's Lecture Notes in Quantum Field Theory
4) Quantum Field Theory Lectures of Sydney Coleman, Editted by Chen et al


Introduction:
QFT and how it came about.
Symmetries and conservation laws
[From Classical to Quantum] Scalar Field Theory
Canonical quantization
Free theory
Interacting theory
Perturbation theory and Feynman rules
S-matrix and scattering observables
Renormalized scalar field theory
Lorentz group representation
Spinor technology
[From Classical to Quantum] Fermionic Field Theory
Canonical quantization
Free theory
Dirac equation
Spin statistic
Symmetries
Interacting theory
Feynman rules and perturbation theory
Gauge invariance and Ward-Takahashi identity
Canonical quantization of gauge fields

Information/policy sheet for PHYS624
Advanced Quantum Mechanics (QFT)
Fall 2024

Class time and place	Tues-Thurs 11 AM to 12:15 PM (Likely to end right before 12:30 PM!)	3150 Physical Sciences Complex	
Instructor	Zohreh Davoudi	3162 Physical Sciences Complex Office: 301-405-4859 E-mail: davoudi@umd.edu Slack platform: Join here.	
Instructor's office hour (Problem Solving Session)	Thurs 3:30 PM to 5:00 PM	2136 Physical Sciences Complex	
TA	Chung-Chun Hsieh Vinay Vikramaditya	E-mail: cchsieh@umd.edu E-mail: vvinay@umd.edu	
TA's office hour	Tuesday 4:30 PM to 5:30 PM	3150 Physical Sciences Complex	
Grade breakdown	13 Quizzes each 1% of the total grade 13 HW assignments each 4% of total grade Final exam 35% of the total grade		
Grade policy	One lowest score among your 13 quizzes will be replaced by your highest score. One lowest score among your 13 HW assignments will be replaced by your highest score. Given this policy, no late quiz/HW is accepted under any circumstances. Final exam is mandatory and regardless of your accumulated grade, a no-show at the final exam will result in an F. The following conversion will be used to assign letter grades: [97.5%,\infty): A+, [90%,97.5%): A, [82.5%, 90%): A-, [75%,82.5%): B+, [67.5%,75%): B, [60%,67.5%): B-, [52.5%,60%): C+, [45%,52.5%): C, [40%,45%): C-, [35%-40%]: D+, [30%,35%]: D, [25%-30%]: D-, [0%-25%]: F.		
Homework policy	Quizzes will be due on 9:30 AM each Tues and are submitted via the corresponding ELMS links. HWs are due at 11:59 PM on Thurs. You will submit these electronically via ELMS. Researching and collaborating are acceptable but copying and plagiarism are not. Each student must present his/her solution and not solely present a collaborator's version. You are strongly encouraged to attend the Problem Solving Sessions and office hours to get hints and ideas.		
Final-exam policy (take-home)	No collaboration/consultation/group-work is allowed. No late submission is accepteded.		
Email/Slack policy	I will try to be as responsive as possible and I prefer Slack as the primary mode of communication. You should keep in mind though that I have abundant other commitments throughout the week and cannot be spontaneous with replying to inquires. Use Slack to your benefit. If you have a question and I am not available to help, the TA or your peers may be able to help, or that can generate a conversation that everyone can benefit from. Make sure to practice respect, patience, and tolerance in all communications.		
Other academic policies and resources	https://umdphysics.umd.edu/academics/graduate/graduate-resources.html		