

PHYS-E0414 – Advanced Quantum Mechanics, 06.09.2022-08.12.2022

Time & date	Lecture/exercises	Topics & home work	Material
06.09.2022, 10.15-12.00	Lecture, N228	History of quantum mechanics, overview of the course	Zettili, p. 1-13, 22-30, 38-45 + hand-written notes
08.09.2022, 12.15-14.00	Exercises, N228	Homework: Exercise 3	Exercise sheet 1
13.09.2022, 10.15-12.00	Lecture, N228	Mathematics of quantum mechanics, two-level system (qubit/spin), time-evolution	Zettili, p. 79-107 + hand-written notes
15.09.2022, 12.15-14.00	Exercises, N228	Homework: Exercise 3	Exercise sheet 2
20.09.2022, 10.15-12.00	Lecture, N228	Two-level system (cont.), measurements, electron spin resonance	Zettili, p. 165-186 + hand-written notes
22.09.2022, 12.15-14.00	Exercises, N228	Homework: Exercise 3	Exercise sheet 3
27.09.2022, 10.15-12.00	Lecture, N228	Quantum harmonic oscillator, coherent states, displacement operator	Zettili, p. 239-249 + hand-written notes
29.10.2022, 12.15-14.00	Exercises, N228	Homework: Exercise 3	Exercise sheet 4
04.10.2022, 10.15-12.00	Lecture, N228	Orbital angular momentum, Stern-Gerlach experiment, spin	Zettili, p. 283-290, 295-301 + hand-written notes
06.10.2022, 12.15-14.00	Exercises, N228	Homework: Exercise 3	Exercise sheet 5
11.10.2022, 10.15-12.00	Lecture, N228	Perturbation theory, (WKB method), applications and examples	Zettili, p. 489-496, 515-518, 528-530 + hand-written notes
13.10.2022, 12.15-14.00	Exercises, N228	Homework: Exercise 3	Exercise sheet 6
FALL BREAK			
25.10.2022, 10.15-12.00	Lecture, N228	Composite systems, (addition of) two spins, Pauli principle, exchange coupling	Zettili, p. 455-469 + hand-written notes
27.10.2022, 12.15-14.00	Exercises, N228	Homework: Exercise 4	Exercise sheet 7
01.11.2022, 10.15-12.00	Lecture, N228	Entanglement, EPR paradox, Bell inequality, CHSH inequality	Supp. info on MyCourses + hand-written notes
03.11.2022, 12.15-14.00	Exercises, N228	Homework: Exercise 3	Exercise sheet 8
08.11.2022, 10.15-12.00	Lecture, N228	Qubits, quantum computing, Deutsch's algorithm, Grover's algorithm	Supp. info on MyCourses + hand-written notes
10.11.2022, 12.15-14.00	Exercises, N228	Homework: Exercise 3	Exercise sheet 9
15.11.2022, 10.15-12.00	Lecture, N228	No-cloning theorem, quantum communication and teleportation	Supp. info on MyCourses + hand-written notes
17.11.2022, 12.15-14.00	Exercises, N228	Homework: Exercise 3	Exercise sheet 10
22.11.2022, 10.15-12.00	Lecture, N228	Open quantum systems, density matrices, decoherence and dephasing	Supp. info on MyCourses + hand-written notes
24.12.2022, 12.15-14.00	Exercises, N228	Homework: Exercise 4	Exercise sheet 11
29.11.2022, 10.15-12.00	Lecture, N228	Summary of course	Summary of course
01.12.2022, 12.15-14.00	Exercises, N228	Exam from last year	Exercise sheet 12
08.12.2022, 13.00-16.00	Written exam		