

## PHYS-E0414 – Advanced Quantum Mechanics, 08.09.2020-09.12.2020

Time & date	Lecture/exercises	Topics & home work	Material
08.09.2020, 10.15-12.00	Lecture, <b>Zoom</b>	History of quantum mechanics, overview of course	Zettili, p. 1-13, 22-30, 38-45 + hand-written notes
10.09.2020, 12.15-14.00	Exercises, <b>Zoom</b>	Home work: Exercise 3	Exercise sheet 1
15.09.2020, 10.15-12.00	Lecture, <b>Zoom</b>	Mathematics of quantum mechanics, two-level system (qubit/spin), time-evolution	Zettili, p. 79-107 + hand-written notes
17.09.2020, 12.15-14.00	Exercises, <b>Zoom</b>	Home work: Exercise 3	Exercise sheet 2
22.09.2020, 10.15-12.00	Lecture, <b>Zoom</b>	Two-level system (cont.), measurements, electron spin resonance	Zettili, p. 165-186 + hand-written notes
24.09.2020, 12.15-14.00	Exercises, <b>Zoom</b>	Home work: Exercise 4	Exercise sheet 3
29.09.2020, 10.15-12.00	Lecture, <b>Zoom</b>	Quantum harmonic oscillator, coherent states, displacement operator	Zettili, p. 239-249 + hand-written notes
01.10.2020, 12.15-14.00	Exercises, <b>Zoom</b>	Home work: Exercise 3	Exercise sheet 4
06.10.2020, 10.15-12.00	Lecture, <b>Zoom</b>	Orbital angular momentum, Stern-Gerlach experiment, spin	Zettili, p. 283-290, 295-301 + hand-written notes
08.10.2020, 12.15-14.00	Exercises, <b>Zoom</b>	Home work: Exercise 3	Exercise sheet 5
13.10.2020, 10.15-12.00	Lecture, <b>Zoom</b>	Perturbation theory, (WKB method), applications and examples	Zettili, p. 489-496, 515-518, 528-530 + hand-written notes
15.10.2020, 12.15-14.00	Exercises, <b>Zoom</b>	Home work: Exercise 3	Exercise sheet 6
<b>FALL BREAK</b>			
27.10.2020, 10.15-12.00	Lecture, <b>Zoom</b>	Composite systems, (addition of) two spins, Pauli principle, exchange coupling	Zettili, p. 455-469 + hand-written notes
29.10.2020, 12.15-14.00	Exercises, <b>Zoom</b>	Home work: Exercise 4	Exercise sheet 7
03.11.2020, 10.15-12.00	Lecture, <b>Zoom</b>	Entanglement, EPR paradox, Bell inequality, CHSH inequality	Supp. info on MyCourses + hand-written notes
05.11.2020, 12.15-14.00	Exercises, <b>Zoom</b>	Home work: Exercise 3	Exercise sheet 8
10.11.2020, 10.15-12.00	Lecture, <b>Zoom</b>	Qubits, quantum computing, Deutsch's algorithm, Grover's algorithm	Supp. info on MyCourses + hand-written notes
12.11.2020, 12.15-14.00	Exercises, <b>Zoom</b>	Home work: Exercise 3	Exercise sheet 9
17.11.2020, 10.15-12.00	Lecture, <b>Zoom</b>	No-cloning theorem, quantum communication and teleportation	Supp. info on MyCourses + hand-written notes
19.11.2020, 12.15-14.00	Exercises, <b>Zoom</b>	Home work: Exercise 3	Exercise sheet 10
24.11.2020, 10.15-12.00	Lecture, <b>Zoom</b>	Open quantum systems, density matrices, decoherence and dephasing	Supp. info on MyCourses + hand-written notes
26.11.2020, 12.15-14.00	Exercises, <b>Zoom</b>	Home work: Exercise 4	Exercise sheet 11
01.12.2020, 10.15-12.00	Lecture, <b>Zoom</b>	Summary of course	Summary of course
03.12.2020, 12.15-14.00	Exercises, <b>Zoom</b>	Exam from last year	Exercise sheet 12
09.12.2020, 13.00-16.00	Written exam		