Week	Sec-tion	Dates	L#	Content	Thornton & Rex	IQT
1	A	T. 22.09	1	Introduction to the course, the concept Modern Physics, the historical context in which it developed, and its role in physics of the 21st century. The principle of relativity. *Discussion of schedule issues and examination procedure.*	1-21	1-19; 26
		F.23.09	*2*	*Lecture cancelled due to Unicareers*		
2		T. 29.09	3	The Galilean transformations. Relativity theory 1. Michelson-Morley experiment, Einstein's postulate of special relativity, Lorentz transformation, time dilation and length contraction.	21-47	
		F. 30.09	4	Relativity theory 2. Deriving time dilation. Relativistic velocity transformations. Relativistic vs. classical Doppler effect. Relativity of simultaneity. Some famous relativistic paradoxes.	48-59	
3		T. 06.10	5	Relativity theory 3. Relativistic momentum, mass and energy. Conserved quantities vs. invariants. Energy-momentum relationship for light.	59-68	
		F 07.10	6	Relativity theory 4. Spacetime diagrams and fourvectors. General relativity: the equivalence principle and its consequences.	544-553	
4	B	*M.10.10?*	7	Statistical physics & thermodynamics 1: Basic concepts: energy, heat, work and the first law. Definition and meaning of entropy, the second law (thermodynamic formulation).	294-297;	16-18
		F.14.10	8	Statistical physics & thermodynamics 2: Statistical formulation of the second law. The energy equipartition theorem (in exercise class), thermal energy and Brownian motion. Avogadro's number and proof of the atomistic model.	298-303	19; 24-25
5		T. 20.10	9	Statistical physics & thermodynamics 3: Definition of temperature. The Boltzmann distribution and the concept statistical weight/degeneracy. Maxwell speed distributions.	297-299; 303-311	20-23
		F. 21.10	10	Black-bodies and their radiation spectra.	97-101	27-32
6	*Tu. 25.10?*		11	Planck's suggestion to quantize energy in order to explain black-body radiation. The concept of a phenomenological theory.	101-103	33-43
	C	??	12	Wave and particle models for light. The photoelectric effect and the quantization of light into photons.	103-111	44-58
7		T 03.11	13	Discovery of the electron. The electromagnetic spectrum. X-ray radiation and its generation. The Compton effect	85-92; 111-118	59, 70
		F. 04.11	14	Basics of particle/wave scattering experiments and their use to probe the structure of matter. Picking apart the atom, and the discovery of radioactivity.	127-139; 161-167	71-74
8		T 10.11	15	Line spectra, the Balmer series and the Rutherford-Bohr atomic model. The Franck-Hertz experiment and characteristic x-ray spectra. Bohr's correspondence principle.	92-96; 139-157	60-69; 75-89
		F. 11.11	16			
9		T. 17.11	*17*	The Zeeman effect. Sommerfeld's attempts to extend Bohr's model with more quantum numbers and different orbit shapes. The Stern-Gerlach experiment. The magnetic moment of the atom, the intrinsic spin, and the Pauli exclusion principle.	251-257	90-104
	D	F. 18.11	18	Wave-particle dualism and de Broglie's matter waves. The Davison-Germer experiment confirming electron diffraction.	167-190	105-131; 156-159
10		T.24.11	19	A primer on classical wave mechanics: phase and group velocity and wave packets. Heisenberg's matrix mechanics.	200-203; 205-207	132-140
		F 25.11	20	The uncertainty principle. Schrödinger's wave mechanics, as it was originally introduced. The Schrödinger equation. Separation of time and space dependencies.	184-185; 239-240	141-147; 160-165
11		T. 01.12	21	Schrödinger's own hopes about his equation, and Borns's probability interpretation of the wave function. Schrödinger's cat. The Copenhagen interpretation of particle-wave duality: Bohr's complementarity concept. ***Visit of ESMP lab.***	208-210	149-152
		F 02.12	22	Dirac's unification of quantum mechanics, Bra-Ket notation (intro). Working with quantum probabilities, expectation values.		
12	E	T. 08.12	23	The operator concept. Momentum and energy operators. Applying the Schrödinger equation: Requirements on the wave function. Infinite square well potential (particle in a box).	203-205; 211-215	
		F. 09.12	24	Particle in a box (wrap-up). Applying the Schrödinger equation: finite square well potential, harmonic oscillator, wave reflection and transmission.	215-224	
13		T. 15.12	25	Tunneling. Applying the Schrödinger equation to the hydrogen atom and the relevant variable separation (start)	225-231	
		F. 16.12	26	Applying the Schrödinger equation to the hydrogen atom (finish), appearance of quantum numbers, back to line spectra.	240-250	
14		T. 22.12	27	The orbital concept. Generating the periodic table, the Aufbau principle and Hund's rules. Decoherence.	261-265; 268-275	