Week	Sec-tion	Dates	L#	Content	Thornton & Rex	IQT
1	A	F. 18.09	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 and the Galilean transformations. *Discussion of schedule issues and examination procedure.*	1-21	1-19; 26
2		T. 22.09	2	Relativity theory 1. Michelson-Morley experiment, Einstein's postulate of special relativity, Lorentz transformation, time dilation and length contraction. Relativistic velocity transformations.	21-47	
		F. 25.09	3	Relativity theory 2. Relativistic vs. classical Doppler effect. Relativity of simultaneity. Some famous relativistic paradoxes.	48-59	
3		T. 29.09	4	Relativity theory 3. Relativistic momentum, mass and energy. Conserved quantities vs. invariants. Energy-momentum relationship for light.	59-68	
		F. 02.10	*5*	*Lecture cancelled due to Unicareers*		
4		T. 06.10	6	Relativity theory 4. Spacetime diagrams and fourvectors. General relativity: the equivalence principle and its consequences.	544-553	
	B	F. 09.10	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
5		T.13.10	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
6		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
	C	F. 23.10	10	Black-bodies and their radiation spectra.	97-101	27-32
7		T. 27.10	11	Planck's suggestion to quantize energy in order to explain black-body radiation. The concept of a phenomenological theory.	101-103	33-43
		F 30.10	12	Wave and particle models for light. The photoelectric effect and the quantization of light into photons.	103-111	44-58
8		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
9		T. 10.11	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
		F. 13.11 8:00 - 11:15	15, 16	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
10		*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. 20.11	18	Wave-particle dualism and de Broglie's matter waves. The Davison-Germer experiment confirming electron diffraction.	167-190	105-131; 156-159
11		***M. 23.11 14:00 -15:30***	19	A primer on classical wave mechanics: phase and group velocity and wave packets. Heisenberg's matrix mechanics.	200-203; 205-207	132-140
		T. 24.11	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
		F. 27.11	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
12		T. 01.12	22	Dirac's unification of quantum mechanics, Bra-Ket notation (intro). Working with quantum probabilities, expectation values.		
	E	F. 04.12	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	
13		T. 08.12	24	Particle in a box (wrap-up). Applying the Schrödinger equation: finite square well potential, harmonic oscillator, wave reflection and transmission.	215-224	
		F. 11.12	25	Tunneling. Applying the Schrödinger equation to the hydrogen atom and the relevant variable separation (start)	225-231	
14		T. 15.12	26	Applying the Schrödinger equation to the hydrogen atom (finish), appearance of quantum numbers, back to line spectra.	240-250	
		F. 18.12	27	The orbital concept. Generating the periodic table, the Aufbau principle and Hund's rules. Decoherence.	261-265; 268-275	