General relativity: Preliminary courseplan, spring 2019

	Date	Subject	Reading (Hartle)
1	25 March (Monday) 13:15 – 15:00	**Introduction to curved surfaces.** **Special relativity: the Minkowski metric**	Chap 2 Chap 3.1, 3.2 Chap 4
		Problem 2: 3, 4, 5, 7 Problem 4: 9, 13, 15	
2	28 March (Thursday) 13:15 – 15:00	**Special relativity: 4-vectors, energy-momentum and acceleration.** **The equivalence principle (EP)**	Chap 5 Chap 6.1, 6.2
		Problem 5: 2, 7, 8, 11, 20	
3	1 April (Monday) 13:15 –15:00	**Newtonian gravity as spacetime geometry.** **Or: EP + SR = Curved spacetime!**	Chap 3.3 – 3.5 Chap 6.3 – 6.6
		Problem 6: 12, 13, 14	
	1 April, 15:15 – 17:00	**Problem solving session**	
4	4 April (Thursday) 13:15 –15:00	**The description of curved spacetimes:** **The metric**	Chap 7
		Problem 7: 2, 5, 9, 11, 12, 18, 20	
5	8 April (Monday) 13:15 –15:00	**Geodesics and symmetries.** **Local inertial frames.**	Chap 8
		Problem 8: 3, 5, 6, 8	
	8 April, 15:15 – 17:00	**Problem solving session**	
6	11 April (Thursday) 13:15 –15:00	**The Schwarzschild geometry.**	Chap 9.1 – 9.3
		Problem 9: 1, 5, 6, 7, 8, 10, 12	
7	15 April (Monday) 13:15 –15:00	**Bonustest I** **More on the Schwarzschild geometry.**	Chap 9.4 (Chap 10)
		Problem 9: 16	
	15 April, 15:15 – 17:00	**Problem solving session**	
8	25 April (Thursday) 13:15 –15:00	**Vectors, dual vectors and tensors.**	Chap 20.1 – 20.3
		Problem 20: 3, 4, 7	
9	29 April (Monday) 13:15 –15:00	**The covariant derivative.**	Chap 20.4 – 20.5
		Problem 20: 5, 10, 14, 15, 17, 18, 20	
	29 April, 15:15 – 17:00	**Problem solving session**	
10	2 May (Thursday) 13:15 –15:00	**The Riemann tensor:** **the result of parallel transport.**	See lecture notes!

11	6 May (Monday) 13:15 –15:00	**The Riemann tensor: geodetic deviation.** **The Einstein vacuum equation.**	Chap 21.1 – 21.4
		Problem 21: 4, 6, 7, 11, 12, 13, 14, 18	
	6 May, 15:15 – 17:00	**Problem solving session**	
12	9 May (Thursday) 13:15 –15:00	**The stress energy tensor.** **The Einstein equation.**	Chap 22
		Problem 22: 4, 8, 9, 10, 13, 15	
13	13 May (Monday) 13:15 –15:00	**Black holes.**	Chap 12 (Chap 15.1 – 15.3)
		Problem 12: 3, 5, 13, 14, 15, 17 Problem 20: 16	
	13 May, 15:15 – 17:00	**Problem solving session**	
14	16 May (Thursday) 13:15 –15:00	**Bonustest II** **More on black holes.**	
15	20 May (Monday) 13:15 –15:00	**Causal structure and Penrose diagrams.**	Page 137, 274 + Lecture notes
		Problem 7: 6 Problem 12: 8, 9, 25	
	20 May, 15:15 – 17:00	**Problem solving session**	
16	23 May (Thursday) 13:15 –15:00	**Gravitational waves.**	Chap 21.5 Chap 16.1 – 16.3 (Chap 16.4 – 16.5)
		Problem 21: 21, 22, 24 Problem 16: 1, 2, 5, 8	
17	27 May (Monday) 13:15 –15:00	**Cosmology.**	(Chap 17) Chap 18 (Chap 19)
		Problem 18: 5, 6, 7, 11, 23, 24	
	27 May, 15:15 – 17:00	**Problem solving session**	
18	29 May (Wednesday) 15:15 – 17:00 **(Note time!)**	**Special topic session:** **Black hole thermodynamics**	Extra material
	3 June (Monday) **?** 13:15 – 15:00	**Extra problem solving session ?**	
	5 June (Wednesday) 8:00 – 13:00	**Exam** (AlbaNova, rooms FR4, FA31, FA32)	