

432018 PHILOSOPHY OF PHYSICS (Spring 2002)

Lecture and Seminar Programme for Weeks 7-10

Lectures and Seminars

A more detailed list of what we will be covering in the lectures and seminars (on a week by week basis) is given below. (Although, since it is quite hard to foresee how long we will need to spend on each topic, this list represents a 'best-case' scenario.) Preliminary reading from the set-text is also given, although other readings will be suggested as we go along.

Lecture programme

Week 7: An introduction to space and time

First lecture: An introduction to space and time.

Issues in the philosophy of space and time. Aristotle's 'container' theory of space. Reading: Sklar, pp. 11-18.

Second lecture: The 'absolutist' and 'relationist' views of space time.

Leibniz's 'relationist' and Newton's 'absolutist' view of space. The Leibniz-Clarke correspondence: Is space absolute? Is it a substance? Reading: Sklar, pp. 19-25.

Week 8: Clocks, rods and space-time: An introduction special relativity

First lecture: The rise of space-time and the Special Theory of Relativity.

Some different four-dimensional space-times. Maxwell's theory of electromagnetism and the luminiferous ether. The Michelson-Morley experiment. The Lorentz-Fitzgerald hypothesis: length contraction and time dilation. Einstein's postulates and the derivation of the Lorentz transformations. How Einstein's programme superseded Lorentz's and the *ad hoc* nature of the Lorentz-Fitzgerald hypothesis. Reading: Sklar, pp. 25-31.

Second lecture: Minkowski space-time and its consequences.

Minkowski space-time. How length contraction and time dilation arise in this space-time. The 'paradoxes' of time dilation and length contraction. Reading: Sklar, pp. 31-40.

Week 9: Gravity, the curvature of space-time and some consequences

First lecture: Gravity and the curvature of space-time.

Gravity and relativity. Non-Euclidean geometry. The General Theory of Relativity. Reading: Sklar, pp. 40-52.

Second lecture: Conventionalism about the geometry of space-time.

Poincaré's conventionalism. Responses to Poincaré. Reading: Sklar, pp. 53-69.

Week 10: The nature of space-time

First lecture: Substantivalism *vs.* relationism

Substantivalism and Relationism. Mach's proposal and the General Theory of Relativity. Reading: Sklar, pp. 69-82.

Second lecture: The relationship between space-time and causal structure.

Space-time structure and causal relations. The relationship between the topology of space-time and the causal structure. The possibility of reducing space-time features to causal features. Reading: Sklar, pp. 83-91.

Seminar programme

Instructions for the seminars will be distributed in the lectures in the week prior to the seminar. (This gives us the option of discussing material from the previous week's lecture in the seminar if people found it difficult.)