Philosophy 165/265: Philosophy of Physics:
  Space, Time and Motion

Stanford University, Winter Quarter 2015
Mon & Weds 3:15-4:30

Professor Thomas Ryckman
Office: Bldg. 100, Room 101A
Office Phone: (650)-725-9665
Office Hours: Weds. 1:30 – 2:30 and by appointment:
tryckman@stanford.edu

I. TOPICS: Absolute and relational theories of space, time, and motion: the problem of motion from Descartes, Newton and Leibniz to Einstein and beyond. The principle of relativity leads from space and time to space-time. Mach’s attempt to ‘relativize’ inertia and its influence on Einstein in formulating the general theory of relativity. Space-time substantivalism and relationism. The problem of determinism in Einstein’s “Hole Argument”, and the meaning of general covariance. Background independence as a requirement for fundamental physical theory, including quantum gravity.

II. PREREQUISITES: Some background in philosophy, physics or mathematics will be helpful. While no detailed knowledge of relativity physics or higher mathematics is presumed, discussions of the philosophical issues will occasionally necessitate introducing small doses of reasonably advanced mathematics (the mathematics of the general theory of relativity). Most of the central concepts can be explained in pictures (as mappings) with a bit of set theory. Leave math anxiety at the door.

III. REQUIRED READINGS.

-- Books: first three in paper editions; all available at the Stanford Bookstore


-- Other Readings, available as pdf files on the CourseWork website:


IV. EVALUATION.

Undergraduates (Phil 165): two written papers (ca. 1500 words) and final exam. Each paper counts 30% of the course grade and also the final counts 30%. The remaining 10% is based upon class participation.

Graduates (Phil 265): a term paper and the final exam. The term paper counts 60% of the course grade, the final 30%. The remaining 10% based upon class participation.

V. SCHEDULE OF LECTURES/DISCUSSIONS.

Jan 5th: Introduction & Galileo reading.

Jan 7th: Descartes. Excerpts from Principles of Philosophy.


Jan 14th: Newton, Selections from the Principia, pp. 40-93 in Janiak (ed).

Jan 19th: no class (Martin Luther King Jr. Day)

Jan 21st: Leibniz-Clarke Correspondence, 36-87.

Jan 26th: Berkeley, Mach and Popper readings.

Jan 28th: Euler readings (first undergraduate paper due at beginning of class)

Feb 2nd: Maxwell & Poincaré readings.

Feb 4th: Geroch, chs. 1-4. Maudlin, ch.3

Feb 9th: Einstein (1911).

Feb 11th: Maudlin, ch. 4.

Feb 16th: no class (Presidents’ Day)

Feb 18th: Einstein (1916) and (1918).

Feb 23rd: Geroch, chs 5-7. (second undergraduate paper due at the beginning of class)

Feb 25th: Maudlin, ch. 6

March 2nd: Maudlin, ch. 7, Geroch ch. 8.

March 4th: Witten readings.

March 9th: Summary and review I.

March 11th: Summary and review II.

March 16th: Graduate student term papers – hard copy only! -- due by 5pm in my mailbox at the Philosophy Department.

March 19th: 12:15 – 3:15 pm. The scheduled final exam slot for this course.