"Physicists tend to express bafflement that philosophers care so much about the words. Philosophers, for their part, tend to express exasperation that physicists can use words all the time without knowing what they actually mean."

- Sean Carroll, *From Eternity to Here* (p. 396)

“It is utterly beyond our power to measure the changes of things by time. Quite the contrary, time is an abstraction, at which we arrive by means of the changes of things…. A motion may, with respect to another motion, be uniform. But the question whether a motion is *in itself* uniform, is senseless. With as little justice, also, may we speak of an “absolute time”—of a time independent of change. This absolute time can be measured by comparison with no motion; it has therefore neither a practical nor a scientific value; and no one is justified in saying that he knows aught about it. It is an idle metaphysical conception.”


"Anything you can do I can do better; I can do anything better than you."

- Irving Berlin (*Annie Get Your Gun*)

**Course Requirements:** This course will concentrate on one major issue in philosophy of space and time—the dispute between absolutism and relationism. The dispute began with Newton and Leibniz and (arguably) continues to this day, though in a more sophisticated form.

Classes will be conducted as a mixture of lecture, discussion, and student presentations. There will be periodic small specific written assignments (which count for 30% of the final mark). Class participation will count for 10%, and a final term paper or term project will count for the remaining 60%. (You can find a helpful document called “Guidelines on Writing a Philosophy Paper” at [http://www.jimpryor.net/teaching/guidelines/writing.html](http://www.jimpryor.net/teaching/guidelines/writing.html).) The class presentations may be used to try out material for your term paper. Class presentations can be done by teams, but of course your term paper must be your own work (along with the properly cited works or results of others).

We will use the following text, plus some extra readings that you will be able to find on the internet:

Aside from this text, there are other useful items available on the internet on the absolutism/relationism controversy that you may profit from consulting. One is a chapter on Philosophy of Space and Time by John Norton from a text consisting of chapters by members of the Pittsburgh HPS program and philosophy department called *Introduction to the Philosophy of Science*, edited by M. Salmon et al. The book is well worth owning, but Norton has provided a link to his chapter on his web site. There is much of interest on his site, by the way, including his introduction to special relativity, *Einstein for Everyone*.

The second item is the *Stanford Encyclopedia of Philosophy* article, “Absolute and Relational Theories of Space and Motion” by Nick Huggett and Carl Hoefer. Bits of this article will turn up as required reading from time to time. It is more than a neutral summary of the issues. Third is the standard historical and philosophical review of the absolutism/relationism controversy, John Earman's *World Enough and Spacetime*. This book is quite technical and by no means easy to read. You might find a link to it in a bibliography of Earman’s writings created by Bryan Roberts: [http://www.pitt.edu/~bwr6/johnearmanbibliography/](http://www.pitt.edu/~bwr6/johnearmanbibliography/).

There are two more books that you should know about. The first is Michael Friedman's *Foundations of Space-Time Theories*. This work sums up in an elegant way the modern realist or substantivalist arguments of Howard Stein and John Earman (and Michael Friedman too). The second is Julian Barbour's re-writing of the history of modern physics from a relationist perspective, *The Discovery of Dynamics*. Barbour has done more than anyone else to undermine the Stein-Earman-Friedman consensus that formed in the late 1960s/early 1970s.

In addition to the assignments listed in the following syllabus, there are a number of articles and books listed as “Further reading.” These are not assigned readings. They are pointers to further literature, should you find a topic particularly interesting, and they are usually good first sources to check for ideas for your term paper. I shall also add a short list of reference books and web sites that that may prove useful:

*The Encyclopedia of Philosophy*, ed. by Paul Edwards,
*One Hundred Years of Philosophy* by John Passmore,
*Recent Philosophers* by John Passmore
*The Cambridge Dictionary of Philosophy*, ed. by Robert Audi
*Dictionary.com*, *hyperdictionary.com* and *Wordnik* are good sites for general dictionaries.

Here are a few classic books or collections of articles on space and/or time:

*The Natural Philosophy of Time* (Second Edition) by G. J. Whitrow (Oxford University Press, 1980),
*Concepts of Space* by Max Jammer, 2nd edn. (Harvard University Press, 1969),
*Space, Time, and Spacetime* by Lawrence Sklar,
*Philosophical Problems of Space and Time* by Adolf Grünbaum, (Reidel: Second, enlarged edition 1973),
*Problems of Space and Time*, edited by J. J. C. Smart (Macmillan, 1964),
*The Concepts of Space and Time* edited by Milic Capek (Reidel Publishing Co., 1976,
ASSIGNMENTS (1.2)

5 January  Introductory Lecture

10 January  Newton: Matter and Motion

   **Required Reading:** “Descartes, Space, and Body” by Isaac Newton. This translation of a fragment of Newton’s *De Gravitatione et Aequipondio Fluidorum* (*De Grav.*) can be found at: http://www.earlymoderntexts.com/f_newton.html. Huggett and Hoefer, §§1-3

   **Further Reading:**

12 Jan.  Newton: Absolute and Relative Space and Time

   **Required Reading:** “Newton’s Views on Space, Time, and Motion” by Robert Rynasiewicz in *The Stanford Encyclopedia of Philosophy*. A supplement contains the text of Newton’s Scholium: http://plato.stanford.edu/entries/newton-stm/scholium.html. The two should be read together.

   **Further Reading:** The bibliography in Rynasiewicz’s Stanford Encyclopedia entry provides a good entry point to the enormous literature.

17 Jan.  Leibniz: What is Relationism?

   **Required Reading:** Class Notes, to be prepared. Huggett and Hoefer, §§4-7.


   **Required Reading:** Class Notes, to be prepared. Huggett and Hoefer, §§4-7.


   **Required Reading:** Chapter 1 in *General Relativity from A to B* (GRAB).


26 Jan.  The “Aristotelian” View: Absolute Space and Time
Required Reading: Chapter 2 in General Relativity from A to B (GRAB).

31 Jan.
The “Galilean” View: Geometry Meets Democracy

Required Reading: Chapters 3 and 4 in GRAB.

2 February  
Relativity: The Interval

Required Reading: Chapter 5 of GRAB, pp. 67-92

7 Feb. 

 Required Reading: Chapter 5 of GRAB, pp. 92-112.

9 Feb.
The Physics and Geometry of the Interval: Time Dilation

Required Reading: Chapter 6 of GRAB, pp. 113-140.


14 Feb.
The Physics and Geometry of the Interval: Length Contraction

Required Reading: Chapter 6 of GRAB, pp. 140-158.

16 Feb.
Einstein’s Theory of Gravitation

Required Reading: Chapter 7 of GRAB.


21 Feb.  
SPRING BREAK

23 Feb.  
SPRING BREAK

28 Feb.
Black Holes

Required Reading: Chapter 8 and Conclusion of GRAB.

1 March  
The Hole Argument


6 March  The Metaphysics of the Hole Argument


8 March  The Identity of Indiscernibles


13 March

**Primitive Thisness**


**Further Reading:** You might be able to find a transcript (not a very good one) on the internet of a series of lectures given by Saul Kripke called “Time and Identity”.

15 March

**Buckets of Water**

**Required Reading:** “Buckets of Water and Waves of Space: Why Spacetime is Probably a Substance” by Tim Maudlin in *Philosophy of Science* 60 (1993): 183-192.

20 March

**Waves of Space**

**Required Reading:** “Buckets of Water and Waves of Space: Why Spacetime is Probably a Substance” by Tim Maudlin in *Philosophy of Science* 60 (1993): 192-203.

**Further Reading:** "Can We Dispense with Space-Time?" by Hartry Field in P. D. Asquith and P. Kitcher (eds.), *PSA 1984*, vol. 2. East Lansing: Philosophy of Science Association (1985): 33-90.

22 March

**Conventionalism**


27 March

TBA

29 March

TBA

3 April

LAST CLASS