Philosophy 593S: Space and Time Spring, 2021 M4:00-6:30 Fully Remote – Synchronous (by Zoom) Instructor: Phillip Bricker Office: E327 South College Office Hour (remote): Tuesday 2-3, and by appointment E-Mail: <u>bricker@philos.umass.edu</u> Course Website: https://blogs.umass.edu/bricker/teaching/space-and-time/

Course Prerequisites:

Two previous courses in philosophy, at least one at the 300-level or above. Also, some familiarity and comfort with high school math and physics. A more advanced background in physics or math would allow one to delve deeper into some issues, but it is not required.

Course Description:

The focus of this course will be the debate between substantivalism and relationalism with respect to space, time, and spacetime, both in a classical and relativistic setting. Substantivalism (with respect to space) is the view that space exists as a substance independently of the material objects that occupy it. Relationalism is the opposing view that only material objects exist, and that facts about space reduce to facts about spatial relations between those objects. The first half of the course will examine the debate with respect to classical physics by examining the arguments of Newton and Leibniz and contemporary perspectives on those arguments. We will also consider the issue of handedness: in virtue of what is a left-handed glove different from its mirror-image right-handed glove? The second half of the course will introduce the spacetime framework that is the foundation of the special and general theories of relativity. We will consider the debate between conventionalists and realists with respect to the geometry of spacetime. And we will examine the famous "hole argument" against spacetime substantivalism. Finally, we will ask how the geometry of spacetime in relativity theory has implications for the debate between the A-theory and the B-theory, for the objective passage of time.

Course Website:

Materials for the course, including readings, assignments, and updates of the schedule, will be posted on my website. (I am not using Moodle for the course.) Readings will be password protected. E-mail me if you forget the password.

Course Requirements:

(1) Six reading responses, one page or less, to be submitted by e-mail before the beginning of class. At least two must be done in the first five weeks and four in the first ten weeks.

These are graded satisfactory or unsatisfactory. They do not count towards the point total, but they are required for passing the course.

- (2) Either three four-to-eight-page papers or one four-to-eight-page paper and one ten-tofifteen-page paper. Suggested paper topics will be distributed well in advance of the paper's due date. The shorter papers each count 25% of the grade, and the longer paper (if done) counts 50% of the grade. (Typically, but not necessarily, undergrads will do the three-paper option and grad students will do the longer-paper option.)
- (3) A take-home final exam with five short essay questions, each requiring one-two pages. The exam counts 25% of the grade.
- (4) Attendance is mandatory. But the class sessions will be recorded and can be viewed if one cannot attend a class synchronously.

Grading Policy:

Papers and the exam are graded by points: 25 points max for the shorter papers and exam; 50 points max for the longer paper (if done). Those who participate either in lecture or the discussion section will receive up to 3 bonus points. Your letter grade for the course will then be assigned as follows (with any fractional points rounding up):

93-100: A 90-92: A-87-89: B+ 83-36: B 80-82: B-77-79: C+ 73-76: C 70-72 C-67-69: D+ 63-66: D 60-62: D-0-59: F

If you need an extension on an assignment, please e-mail me in advance of the due date. Unexcused late papers will be docked one point per day (two points per day for the long paper).

Discussion Section:

An optional one-hour discussion section will be held once a week. The day and time will be set the first day of classes.

Plagiarism:

The UMass Amherst Academic Regulations defines plagiarism as follows: "Knowingly representing the words or ideas of another as one's own work in any academic exercise. This

includes submitting without citation, in whole or in part, pre-written term papers of another or the research of another, including but not limited to commercial vendors who sell or distribute such materials." The penalty for plagiarism ranges from a zero on the assignment involved (in less severe cases) to an F for the course (in the most severe cases). You are expected to know and adhere to UMass's academic honesty policy and procedures, which is outlined <u>here</u>. All work submitted for the course should be entirely your own.

Accessibility:

Students with a disability on file at Disability Services are entitled to accommodations to ensure that they can participate equally in the course and have a fair opportunity to succeed. If you are in need of an accommodation for this course, please let me know as soon as possible. You can find information on disability services at UMass <u>here</u>

Readings:

There are three books that we will be reading in whole or in part:

Tim Maudlin, *Philosophy of Physics: Space and Time*. Robert Geroch, *General Relativity from A to B*. Lawrence Sklar, *Space, Time, and Spacetime*.

The Maudlin book is available on-line through the UMass library at

https://www-jstor-org.5colauthen.library.umass.edu/stable/j.ctvc77bdv

A complete pdf of the Geroch book and the required selections from the Sklar book will be made available on the website. For all other readings, they will either be made available on the website or a link to the paper will be provided. Note: the Readings are password protected. E-mail me if you forget the password.

Schedule: See separate document on website