# Introduction to Philosophy of Physics

Christian Wüthrich Spring 2026

---

Website: `http://wuthrich.net/teaching/_USI_PhilPhys_2026.html`
Contact: `christian.wuthrich@unige.ch`, office hours by appointment only

---

This course offers an introduction to the philosophy of physics, which deals with methodological, epistemological, and metaphysical issues in physics. It consists of seven modules offering a rich menu in philosophically deep questions arising in modern physics, concentrating on space and time in classical physics and in special and general relativity (and beyond), and quantum mechanics, the measurement problem and quantum non-locality.

The six modules are as follows:

1. Introduction: what is philosophy of physics, how did modern physics emerge, and what is determinism?
2. Substantivalism vs relationalism: Newton, Leibniz, and time in Newtonian physics in general
3. Time in special relativity: relativity of simultaneity, Minkowski spacetime, and implications for the metaphysics of time
4. Time in general relativity, cosmology, and beyond
5. Moving backward and forward in time: time travel in modern physics
6. Quantum mechanics: phenomena and theory
7. Quantum mechanics: the measurement problem and quantum non-locality

*Accessibility and Prerequisites.* This course will be self-contained and has no prerequisites. While some background in physics, mathematics, and philosophy will be helpful, I will not assume any specific knowledge beyond high school mathematics.

## Recommended texts

- Nick Huggett. *Everywhere and Everywhen: Adventures in Physics and Philosophy.* Oxford University Press (2010).
- Most readings are available at icorsi at `https://www.icorsi.ch/course/view.php?id=23026`.

## Course requirements and evaluation

The grade for this course is based on an essay of approximately 3,000 to 3,500 words to be submitted **by 30 April 2026** at the latest. I expect to receive essays which are well-structured, clearly argued, and show signs of independent thinking.

## Tentative schedule

**Readings**: for each session, the listed readings must be read in advance; the readings with an asterisk are background reading. Each of the modules will be covered in approximately 4 lessons.

### 1 Organization and introduction

- *Monday, 2 March 2026, 13:30-17:00*

Readings:

- Christian Wüthrich. *An Invitation to Philosophy of Physics*, chapters 1 and 2.
- *Huggett, chapter 1.

### 2 Substantivalism vs relationalism

- *Tuesday, 3 March 2026, 09:45-12:30, 13:45-14:30*

Readings:

- Huggett, chapter 9.
- *Nick Huggett, Carl Hoefer, and James Read. Absolute and relational theories of space and motion: classical theories. *Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.), `https://plato.stanford.edu/entries/spacetime-theories-classical/`, particularly §4, §6.5.

### 3 Time in special relativity

- *Tuesday, 3 March 2026, 14:30-16:30, and Monday, 9 March 2026, 13:30-15:00*

Readings:

- Huggett, chapters 14 and 15.
- *Michel Janssen. Appendix: special relativity. In Michel Janssen and Christoph Lehner (eds.), *The Cambridge Companion to Einstein*. Cambridge (2014), pp. 455-506 (excerpts).

### 4 Time in general relativity, cosmology, and beyond

- *Monday, 9 March 2026, 15:30-17:00, and Tuesday, 10 March 2026, 09:45-11:15*

Readings:

- Tim Maudlin. *Philosophy of Physics. Space and Time*. Princeton University Press (2012), chapter 6 (pp. 126-152).

## 5 Moving backward and forward in time

- *Tuesday, 10 March 2026, 11:45-12:30, 13:45-16:30*

Readings:

- Huggett, chapters 12 and 13.
- *David Lewis. The paradoxes of time travel. *American Philosophical Quarterly* **13** (1976): 145-152.
- *Frank Arntzenius and Tim Maudlin. Time travel and modern physics. *Royal Institute of Philosophy Supplement* **50** (2002): 169-200.

## 6 Quantum mechanics: phenomena and theory

- *Monday, 23 March 2026, 13:30-17:00*

Readings:

- Tim Maudlin. *Philosophy of Physics. Quantum Theory.* Princeton University Press (2019), chapter 1 (pp. 6-29).
- *Jenann Ismael. Quantum mechanics. *Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.), `https://plato.stanford.edu/entries/qm/`, particularly §3.
- *David Albert. *Quantum Mechanics and Experience.* Harvard University Press (1992), chapters 1 and 2.

## 7 Quantum mechanics: the measurement problem and quantum non-locality

- *Tuesday, 24 March 2026, 08:30-12:00*

Readings:

- N David Mermin. Is the moon there when nobody looks? Reality and the quantum theory. *Physics Today*, April 1985, pp. 38-47.
- *Tim Maudlin. Three measurement problems. *Topoi* **14** (1995): 7-15.