

PHILXXX – Metaphysics of Science

Day(s), Time, Place

Instructor: Xavi Lanao

Email: jlanaoca@nd.edu

Office Hours: TBD; 118 Malloy Hall

Concepts that have proven useful in ordering things easily achieve such authority over us that we forget their earthly origins and accept them as unalterable givens. Thus they come to be stamped as “necessities of thought,” “a priori givens,” etc. The path of scientific progress is often made impassable for a long time by such errors. – A. Einstein, Phys. Zeitschr., 17, 101 (1916)

Course Description: Metaphysics is a branch of philosophy concerned with questions of existence. What things exist? What categories of things are there? What are the natures of these things and categories? Although to many these question will sound like paradigmatically philosophical questions, it seems clear that fields other than philosophy, such as the sciences, are also concerned with questions of existence. After all, it is through science that we learn what entities populate our universe, which properties those entities have, how to classify them, and what laws they follow. But, if that is so, is there a job left for the metaphysician? In this course we will explore this question both by reflecting on the relationship between science and metaphysics in general and by looking at particular examples where metaphysicians have applied their expertise. In particular, we will explore questions such as: What is the nature of properties? Are there natural kinds? What is a law of nature? And, can we hope for a unified science? The course is organized as a discussion seminar requiring constant and active participation by the students. Most of the class time will be devoted to discussing the readings, and students will be asked to prepare short presentations and lead discussions.

Pre-requisites: This course is targeted towards advanced philosophy majors and graduate students. A good background in philosophy is required. Ask the instructor in case of doubt.

Text(s): all the required readings will be made available online.

Learning Goals:

- Be familiar with some of the main debates in the metaphysics of science.
- Understand the relevance that (some) traditional metaphysical concepts have for the articulation and production of scientific knowledge.
- Have a critical perspective on the relationship between science and metaphysics as knowledge producing activities.
- Understand the prospects and challenges of metaphysics as an enquiry into the nature of reality.
- Be able to critically assess the relevance that particular scientific theories may have for ontological questions.

Requirements:

- Participation and Attendance (15%)

This course is discussion based. Everyone is expected to carefully do the assigned readings for the day and come prepared to discuss them and raise questions.

- Presentation (15%)

Every student will choose a day to prepare a presentation on the readings and lead the class discussion. Presentation should be roughly 20 minutes and not merely summarize the paper but critically assess it and present questions and topics to spark discussion.

- Midterm Paper (30%)

A short paper (3000 words) on a topic related to the course material to be chosen by the student in consultation with the instructor.

- Final Paper (40%)

A longer paper (5000 words) on a topic related to the course material to be chosen by the student in consultation with the instructor. It is possible to write an extensive revision and expansion of the midterm paper with permission from the instructor.

Course Policies:

- **General**

- You are expected to behave ethically. You are encouraged to ask questions, respond to other students points, and raise issues for discussion. Everyone is expected to treat their fellow students and professor critically but respectfully.
- You are expected to attend class on a regular basis. Every unexcused absence after the first one will be penalized with half a letter grade of your final grade.
- You are to have done the assigned readings prior to each class meeting (see below for the list of readings). I also expect each of you to make frequent, quality contributions to class discussion.

- **Assignments**

- You are expected to work independently on the assignments. Discussion amongst students is encouraged, but when in doubt, direct your questions to me.
- Late assignments will be penalized with half a letter grade per day. In case there are special circumstances, please come talk to me preferably before the deadline.

- **Academic Integrity**

- As a member of the Notre Dame community, I will not participate in or tolerate academic dishonesty. Please take advantage of the aid I can give you rather than resorting to academic dishonesty.
- It is your responsibility to familiarize yourself with the Academic Honor Code (<http://fys.nd.edu/current-students/honor-code/>).

Tentative Course Outline:

The weekly coverage might change as it depends on the progress of the class. However, you must keep up with the reading assignments.

Unit 0: Metaphysics and Science
Why do metaphysics? <i>mm DD</i> Ladyman, Ross and Kincaid, <i>Everything Must Go</i> , ch. 1 <i>mm DD</i> Chakravartty, “On the Prospects of Naturalized Metaphysics”
Unit 1: Properties
The Nature of Properties <i>mm DD</i> Oliver, “The Metaphysics of Properties” <i>mm DD</i> Lewis, “New Work for a Theory of Universals”
Categorical and Dispositional Properties <i>mm DD</i> Armstrong “Defending Categoricalism” & Bird “Monistic Dispositional Essentialism” <i>mm DD</i> Hawthorne, “Causal Structuralism” & Black, “Against Quidditism”
The Metaphysics of Quantities <i>mm DD</i> Dasgupta, “Absolutism vs. Comparativism about Quantity”
Unit 2: Laws of Nature
What is a Law of Nature? <i>mm DD</i> Dretske, “Laws of Nature” <i>mm DD</i> Cohen and Callender, “A Better Best System Account of Laws” <i>mm DD</i> Bird, “The Dispositionalist Conception of Laws” & Mumford, <i>Laws in Nature</i> , ch. 9, “The Central Dilemma”
Do Laws of Nature Govern? <i>mm DD</i> Beebe, “The Non-governing Conception of Laws of Nature” & Carrol, <i>Laws of Nature</i> , sec. 3.1, “The mirror argument”
Unit 3: Natural Kinds
Natural Kinds and Essentialism <i>mm DD</i> Kripke, <i>Naming and Necessity</i> , Lecture I (excerpts) & Putnam, “The Meaning of ‘Meaning’” <i>mm DD</i> Sidelle, “On the Metaphysical Contingency of Laws of Nature”
⇒ mm DD MIDTERM PAPER DUE ←

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Natural Kinds in the Special Sciences

mm DD Boyd, "Homeostasis, Species, and Higher Taxa"

mm DD Thomasson, "Realism and Human Kinds"

Unit 4: Causation**Causal Skepticism and Humean Theories of Causation**

mm DD Mackie, *The Cement of the Universe*, Ch. 1, "Hume's Account of Causation"

mm DD Lewis, "Causation" (including postscripts)

Realist Theories of Causation

mm DD Armstrong, "Going through the Open Door Again: Counterfactual versus Singularist Theories of Causation"

mm DD Salmon, *Causality and Explanation*, Ch. 1, "A New Look at Causality" & excerpts of Part III

Unit 5: Unity of Science**Vertical Reductionism**

mm DD Oppenheim and Putnam, "The Unity of Science as a Working Hypothesis"

mm DD Fodor, "Special sciences, or the Disunity of Science as a Working Hypothesis"

Horizontal Reductionism

mm DD Cartwright, *The Dappled World*, Ch. 1, "Fundamentalism vs. the Patchwork of Laws" & brief excerpts from other chapters.

mm DD Hofer, "For Fundamentalism"

Unit 6: Scientific Ontology**Are Science and Metaphysics Opposed?**

mm DD Thomasson, *Ordinary Objects*, Ch. 8, "Problems of Rivalry With Science"

mm DD Paul, "Metaphysics as Modeling: the Handmaiden's Tale"

Can Science Guide Metaphysics?

mm DD Chakravartty, *Scientific Ontology*, Ch. 1, "Ontology: Scientific and Meta-scientific"

mm DD Hawley, "Science as a Guide to Metaphysics?"

⇒ **mm DD FINAL PAPER DUE** ⇐