

PHIL 667.5  
PHYSICS AND THE METAPHYSICS OF FUNDAMENTALITY

INTRODUCTION<sup>1</sup>

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**Seminars:** Monday and Wednesday 10–1, SS 1214

**Office Hours:** Thursday 10–12, SS 1208

## 1 Introduction.

Contemporary metaphysics is arguably transitioning to a paradigm in which *fundamentality* lies centre-stage. But it remains the case that contemporary metaphysics overwhelmingly subscribes to *physicalism* – the view that the actual world is fundamentally physical in nature. Such a view must entail naturalistic commitments of some sort, though what exactly these consist of is a matter of some dispute.

This course will investigate the stratified picture of reality emerging in contemporary metaphysics from a naturalistic perspective. We will study in some detail the concepts associated with this reorientation in metaphysics and thus develop a firm grounding in a key contemporary theme. But we will also critically evaluate the standing of the a priori assumptions contained within this work from a broadly scientific point of view. As such, we'll become proficient in a central topic in metaphysics whilst also acquainting ourselves with themes in contemporary philosophy of science, and in so doing be encouraged to reflect on the methodological demands implicit in 'naturalistic' metaphysics – a theme gaining increasing prominence in its own right.

### 1.1 Philosophy of science meets metaphysics.

Full disclosure: by its very nature some of the arguments we will encounter in the course will turn on some details of physics. But *don't worry*. Many of the major conceptual and metaphysical issues embedded in modern physics present themselves very quickly, and it will be my job to present them to you with the minimum of technicalities. Nor will your grades hang on any technical details. If you come away from this course aware of some of the questions which modern science poses to received fundamentality assumptions, and able to sketch some of their possible implications, you'll be doing fine.

## 2 Evaluation and Grading

You will be required to fulfill four tasks in order to pass the course.

**Presentation of Reading.** You will introduce the set reading for the class on two or perhaps three occasions. Your aim is to present material that will stimulate

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class discussion around a central issue; whether that will involve giving a synopsis of the reading will depend on the article, but do so where appropriate.

**Critical Summaries.** You will be required to produce a critical summary of some central issues in each of the following areas: (1) The definition of the levels hierarchy; (2) The existence of a fundamental level; (3) Structures vs Objects as the fundamental category; (4) The interplay between science and armchair metaphysics in the fundamentality debate. These should be between 1000 and 1500 words in length. Provide references where appropriate.

**Paper proposal.** The paper proposal will consist of two parts. The first part will explain and motivate the focus of your research by answering these questions. (1) What is the general topic area? (2) What are the main views on the topic? (3) What will your focus in that area be? The second part of your proposal will give a section-by-section outline of what you propose to write. This proposal will be discussed in detail with me and will serve as your research plan. The proposal should be no more than 1,250 words (approx. 5 pages double-space). I have some suggested titles for your essay, but you are welcome to write on a topic of your choice provided it is cleared with me in advance.

**Paper.** Your paper should be between 4,000 and 5,000 words. This includes footnotes but not bibliography.

#### Grading scale.

95 – 100 = A <sup>+</sup>	78-80=B <sup>+</sup>	68-70=C <sup>+</sup>	58-60=D <sup>+</sup>
85-94=A	75-77=B	65-67=C	50-57=D
81-84=A <sup>-</sup>	71-74=B <sup>-</sup>	61-64=C <sup>-</sup>	< 50=F

### 3 Structure of Course.

There are three broad topics we'll be focussing on in this course. (1) *The conceptual aspects of fundamentality.* What does it mean to call something fundamental? (2) *The locus of fundamentality.* What, if anything, is fundamental in this world? (3) *The methodology of fundamentality.* Questions about fundamentality seem to involve both traditional metaphysics and contemporary science, but what should the interplay between these two forms of enquiry be?

1. **Introduction.** We will discuss two pieces that will help get us in the right frame of mind. Readings: Jonathan Schaffer's 'On What Grounds What' and Ladyman and Ross, Chapter 1 of *Every Thing Must Go*, to end of Section 1.6.

#### TRANCHE 1: CONCEPTIONS OF FUNDAMENTALITY

2. **The Levels Hierarchy.** Our focus today is on 'levels of reality', and we'll look at excerpts of Oppenheim and Putnam's 'Unity of Science as a Working

Hypothesis', Schaffer's 'Is there a Fundamental Level?', and a pieced-together hybrid of Maudlin's 'Part and Whole in Quantum Physics' and 'Why be Humean?'. Ahead of time, please read the handout distributed in the previous class and the Maudlin hybrid.

3. **General Conceptions of Fundamentality 1.** In this and the next seminar we will discuss the concept of priority from a more general perspective than last time. This seminar will focus on two issues: (1) supervenience, and its usefulness in expressing ontological priority; (2) the differences between supervenience and ontological dependence. Readings: Leuenberger, 'Supervenience and Metaphysics'; Stanford entry 'Supervenience', to end of Sections 3; and Yoshimi, 'Supervenience, Determination and Dependence', Sections 1-5. (Be judicious in your reading, depending on how familiar you are with supervenience.)
4. **General Conceptions of Fundamentality 2.** We will consider ontological dependence in more detail, addressing in particular the issue of whether we can understand ontological dependence in purely modal terms. Readings: Kit Fine's 'Ontological Dependence', Secs 1-3 (esp. 1 and 2), and Nathan Wildman, 'Sparseness, Modality and Essence' (to be distributed).

#### TRANCHE 2: THE LOCUS OF FUNDAMENTALITY

5. **The Existence of a Fundamental Level 1.** In this and the next seminar we will consider some arguments for and against the existence of a fundamental *level*. The main reading for this seminar is Cameron's 'Turtles All the Way Down: Regress, Priority and Fundamentality'; read also the excerpts in the handout.
6. **The Existence of a Fundamental Level 2.** In this class we will consider whether and how we might positively deny the existence of a fundamental level. The main reading for this is Schaffer's 'Is There a Fundamental Level?'; read this plus excerpts in the handout.
7. **The Fundamental Category 1.** In this section we will consider some issues concerning what the fundamental category of the world is. We will introduce this topic by first acquainting ourselves with the topic of structural realism via two of the most important papers in contemporary philosophy of science: Larry Laudan's 'A Confutation of Convergent Realism' (slightly truncated version to be put on Blackboard), and John Worrall's 'Structural Realism: The Best of Both Worlds?'. These are classics that you should read regardless!
8. **The Fundamental Category 2.** We will continue our look at structuralism by thinking about 'ontic' structural realism in the context of quantum mechanics. In particular, we will think about how structuralists ask us to reconceive of quantum particles. We will consider their state-dependent (i.e. changeable) properties first, and here readings will include Saunders, 'Physics and Leibniz's Principles', Sections 1 and 2, plus handout.

9. **The Fundamental Category 3.** In this seminar we will think a bit about the understanding contemporary particle physicists have of the state-independent properties of quantum systems, an understanding which proceeds via the notion of *symmetries*. No reading this week – I will be leading this class.
10. **The Fundamental Category 4.** This class reserved for a review of the material presented in this tranche.

### TRANCHE 3: THE METHODOLOGY OF FUNDAMENTALITY

11. **Methodology 1.** Right at the beginning we looked at one extreme view on the usefulness of scientifically disinterested metaphysics. But now that we have completed the first two parts of the course we are in a position to develop a more nuanced picture of the physics–metaphysics relationship than we’ve encountered in the readings. Readings for this seminar are L.A. Paul, ‘Metaphysics as Modelling: The Handmaiden’s Tale’, and Callender’s ‘Philosophy of Science and Metaphysics’.
12. **Methodology 2.** In our final discussion, we will read and rip apart French and McKenzie’s ‘Thinking Outside the Toolbox’.

## 4 Possible Essay Questions

You are welcome to either select from this list or write on a topic of your own choice, **provided** it is cleared with me in advance.

### Tranche 1: conceptions of fundamentality

1. Describe one or some of the challenges relating to the definition of a levels hierarchy.
2. Can supervenience and / or ontological dependence act as a priority relation?
3. Can priority be defined modally?

### Tranche 2: the locus of fundamentality

5. Should we believe in the existence of a fundamental level to the actual world?
5. Is a fundamental level any more plausible than a ‘first cause’?
5. Should we believe the structuralist claim that even so-called ‘elementary particles’ such as electrons are not ontologically fundamental ?

### Tranche 3: the methodology of fundamentality

10. Discuss the ways in which the issue of fundamentality can illuminate the interdependence or otherwise of science and armchair metaphysics.
20. Do developments in 20th century physics suggest that analytic metaphysics should be ‘discontinued’?