

## Syllabus - Philosophy of Science

### 1. Instructor

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### 2. Course Description

This is a course of philosophy of science, intended for those who studied philosophy before. In other words, you need to know what philosophy is, and you need to have basic skills of philosophical reasoning. Other than that, the only requirements are some interest in the topic and the knowledge of elementary arithmetic. The course will be divided into three parts: (i) introduction, (ii) scientific reasoning, and (iii) other issues in philosophy of science. In the first part, you will be introduced to a brief history of science as well as the basics of logic and probability. In the second part, you will study various problems about the nature of scientific reasoning. In the third part, you will study several important issues in this field, including but not limited to: what science is, explanation in science, realism and anti-realism, scientific change and scientific revolutions, and the values of science.

### 3. Readings

We will use two textbooks:

- Skyrms, B. (2000). *Choice and Chance: an Introduction to Inductive Logic*. Stamford, CT USA: Thomson Learning.
- Okasha, S. (2002). *Philosophy of Science: a Very Short Introduction*. New York, NY USA: Oxford University Press Inc.

For a long time, Skyrms's book has been the standard introduction to probabilistic inference. Okasha's is more recent, but it is a very clearly written introduction to the philosophy of probability.

### 4. Requirements

In the chronological order:

- The exercise problems (20 percents): During the first and second parts of the course, a set of very easy problems, typically of logic or probability, will be given each week. You are expected to submit your answers by the first day of the next week.
- The mid-term (30 percents): In this exam, you will be asked to define a few important concepts (e.g., what are rational degrees of belief) and to discuss some important problems in scientific inference (e.g., what is the correct criterion for a scientific theory's confirmation).
- A quiz (20 percents): In this quiz, your knowledge of some important concepts will be tested. Typically, you will be asked to fill the blanks, which will make correct definitions.
- The final (30 percents): In this exam, you will be asked to explain a few important debates in the philosophy of science, present each opposing view, and defend your own choice. For example, you might be asked to explain the realism vs. anti-realism debate, present realism

and anti-realism, and choose and defend one of them.

## 5. Schedule

### Part 1: Introduction

Wk1 - What is Science: Distinguishing Science from Non-Science and Pseudo-Science

Wk2 - Basics of Logic

Wk3 - Probability and Inductive Logic: Arguments, Logic, Probability

Wk4 - The Probability Calculus: Rules of Probabilistic Reasoning, Bayes' Theorem, etc.

Wk5 - Kinds of Probability: Rational Degrees of Belief, Relative Frequency, Chance.

### Part 2: Scientific Inference

Wk6 - Scientific Reasoning: Induction, Inference to the Best Explanation, Probability.

Wk7 - The Traditional Problem of Induction: Hume's Skepticism about Induction.

Wk8 - The Midterm Exam.

Wk9 - A New Paradox: Why Particular Emeralds fail to support the General Grueness of Emeralds.

Wk10 - Probability and Scientific Inductive Logic: Evidence, Convergence to Truth, etc.

### Part 3: Other Issues in Philosophy of Science

Wk11 - Explanation in Science: How do Explanations occur in Scientific Practice?

Wk12 - Realism versus Anti-Realism: Do Purely Theoretical Entities Exist?

Wk13 - Scientific Change and Scientific Revolutions: Thomas Kuhn.

Wk14 - Philosophical Problems in Special Sciences: Physics, Biology, and Psychology.

Wk15 - Science and its Critics

Wk16 - The Final Exam.